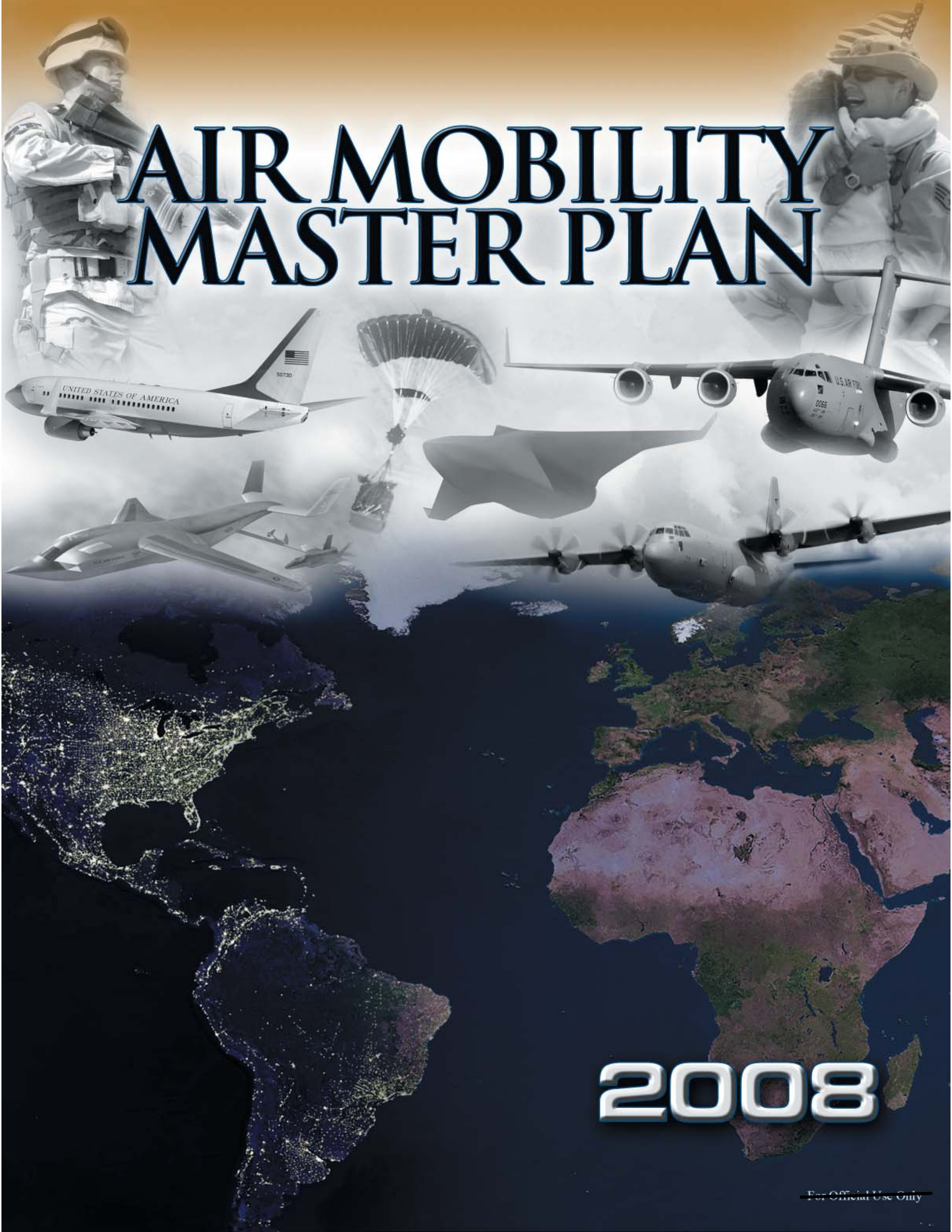
AIR MOBILITY MASTER PLAN



2008

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Preface

The Air Mobility Master Plan 2008 is an 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 future air mobility needs. It serves as the Command's long-range planning document, given a fiscally unconstrained environment and anticipated operational requirements. This Master Plan is not to be viewed as "carved in stone" but rather as the ***planned*** direction for the future of Air Mobility.

This document is intended as a reference for planners, operators, and leaders within the military and industry. Specialists in specific mission areas may only choose to read portions dealing in their areas of expertise while those in top leadership positions will likely choose to read the entire document. That said, all are encouraged to read the entire document for the purpose of gaining a better understanding of the future of the MAF as a whole.

The world in which we operate 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 asymmetrical weapons against us. Weapons of mass destruction will be more widespread and man-portable, surface-to-air missiles, the greatest threat to our aircraft today, will become more common. Mobility operations are dependent upon communications and information systems which are vulnerable to attack. As US forces become more expeditionary, lighter and more lethal…they become more dependent on air mobility.

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 2008 lays out our course to meet the air mobility needs of the warfighters.

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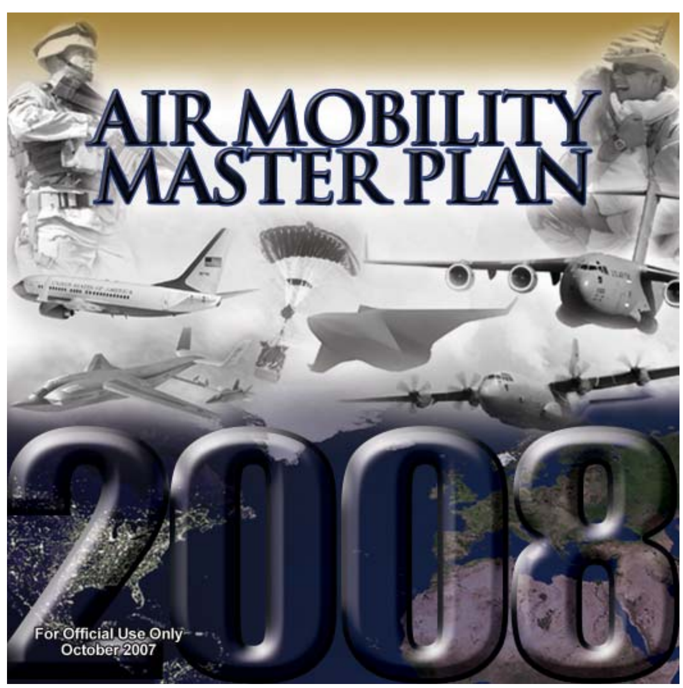

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Commander's Intent

As we enter the seventh year of the long war on terrorism, the men and women of the Mobility Air Forces continue to perform absolutely magnificently…you should be proud of your many outstanding accomplishments. You have been in a constant surge since the very beginning of this conflict yet also understand that the war will not end soon and we must continue this high level of effort. During this time of war, you have built the best air mobility capability that the world has ever seen—and are working hard every day to make it even better. You have transformed air mobility operations to meet the needs of the warfighters and maintain our advantage over our adversaries.

The road ahead will certainly be filled with unforeseen and significant challenges. The future security environment will continue to evolve; our armed forces must be prepared to prevail against irregular forces, terrorists, or insurgents as well as defeat technologically advanced conventional forces. Along with the unknowns, we can also expect certain trends to continue; our adversaries will continue to employ asymmetrical methods to counter our seemingly overwhelming military capabilities, increasingly lethal and effective weapons will continue to proliferate around the globe, weapons of mass destruction will become more widespread, and we will have decreased access to overseas bases. Just as modern warfare is changing, the Air Force, along with the other services, continues its evolution to become leaner, more lethal, and increasingly agile. Our armed forces will become increasingly mobile, yet dependent upon air mobility forces for rapid deployment and responsive battlefield sustainment. We can be certain air mobility will be absolutely critical to projecting US power around the globe in pursuit of our national interests.

My intent for the future is straightforward and clear—fight and win the war on terrorism while we prepare the Mobility Air Forces for the next conflict. To do that, we must take care of our Airmen and their families, and recapitalize and modernize our equipment.

The Air Mobility Warrior

The real strength behind our readiness and our combat capability is our exceptional men and women—Air Mobility Warriors who have met the Nation's call. Winning this war, and those that may likely follow, requires us to develop our Airmen; whether active duty, Guard, Reserve, or civilian. We must recruit and retain the very best; instill the warrior ethos in their fiber; give them the best possible training and equipment; and take care of them and their families. In these days of continued high operations tempo, we must remain sensitive to quality of life concerns. The stress on our people is high, and it plays a significant role in retention and reenlistment rates. The high operations tempo is not limited to active duty as the workload on the Air Reserve Component is high even when not mobilized or deployed.

The MAF leads the Air Force in developing the Total Force—we have learned valuable lessons during over 30 years of experience in sharing the mobility mission. We are just beginning to see the effects of new relationships between active and reserve component units; the personnel and divestiture savings derived from these efforts will aid our recapitalization and modernization programs. We commonly think of associate units with a flying mission—associations are taking place across a wide range of mission areas from intelligence squadrons, logistics support centers and contingency response groups. We must continue to further explore new and innovative ways to improve Total Force operations.

Recapitalization and Modernization

I am committed to providing our people the very best equipment possible as they go into harm's way. Our mobility fleets are aging and we must continue recapitalization efforts of the entire air mobility enterprise to provide the increased air mobility capabilities that the warfighters require to be effective on the battlefield. We also need to continue to modernize our legacy fleets to ensure they meet the evolving demands of the operating environment. Recapitalization and modernization efforts must be carefully integrated to maximize our capabilities in a fiscally constrained environment. Process improvements, streamlined operations, and elimination of excess or unnecessary capabilities can help fund, or enhance the effectiveness derived from recapitalization or modernization programs.

The KC-X, a commercial derivative KC-135 replacement aircraft, is our number one acquisition priority and will enable the United States to project combat capability anywhere on the globe. It will fill shortcomings in the current air refueling capability and will be equipped with defensive systems, be receiver capable, allow for multi-point refueling, have up-to-date navigation, communication, and surveillance equipment plus be capable of boom and drogue refueling operations on the same mission. Built with cargo floors and oversized doors, the new aircraft could assist in the airlift of personnel, patients, and cargo. As this aircraft is being procured, we need to continue other modernization programs to keep the current air refueling fleet viable. The aging KC-135 has been stressed from continuous-engagement combat operations reaching back to 1990 and it is becoming increasingly expensive to keep in the air. We plan to retire the KC-135Es and execute the KC-135R Global Air Traffic Management program that improves the aircraft's operational readiness and gives it the communications, navigation, and surveillance upgrades necessary to operate in worldwide airspace. We expect to have continued access to global airspace by completing similar modifications to the KC-10. Air refueling missions are flown worldwide and must be capable of operating in a threat environment. Defensive systems and chemical, biological, radiological, and nuclear (CBRN) counter measures are essential for the air refueling fleet.

The war has also placed a heavy toll on our airlift fleet and is driving the recapitalization and modernization of our intratheater airlift capability. Operations in Afghanistan and Iraq highlighted a capability gap in moving small amounts of priority cargo or passengers into unimproved, austere areas or very short runways.

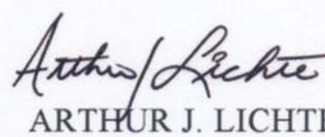
The C-130E has reached the end of its useful life and will be retired. We need to complete the Center Wing Box Replacement Program to extend the operational lifetime of the various C-130Hs plus modernize these aircraft with the Avionics Modernization Program modifications. This will allow the C-130H to operate in tomorrow's airspace, increase the overall combat capabilities, and reduce the operations and sustainment costs of this venerable theater airlifter. The recapitalization of the intratheater airlift capability will be completed, over the mid-term, with the acquisition of additional C-130Js. The C-27J, when used in concert with C-130s and C-17s, will increase the effectiveness of our support of the intratheater distribution process. The long-term solution is to develop a more capable tactical aircraft, like the Advanced Joint Air Combat System, or AJACS, that can support the Army's concept of mounted vertical maneuver and carry large cargo loads onto unprepared surfaces in forward areas. Fielding capabilities, like those provided by the Joint Precision Airdrop System, will complement our airland resupply operations in geographical areas without even short runways or where increased enemy threats or adverse weather preclude landings.

The C-17 has proven to be a remarkable, flexible aircraft. It has an impressive long-range airlift capability, can operate very well on short, semi-prepared runways, and will be the mainstay of our long-range airdrop capability for the foreseeable future. The C-17 has provided outstanding support for combat operations and, in addition flew numerous humanitarian and disaster relief missions following hurricanes in the United States, the Southeast Asian tsunami, the Pakistani earthquake and the Lebanon noncombatant evacuation operation. Heavy use of the aircraft during the war has decreased its planned life time and recent congressional action to procure additional C-17s to maintain a fleet size of 190 is helpful. We need to continue to modernize the C-17 with extended range fuel tanks, defensive systems, and an improved situational awareness capability. The C-5 continues to make very significant contributions in the movement of outsized and oversized cargo. The C-5 avionics modernization program is required to fly the aircraft in tomorrow's airspace. Given the results of recent mobility capability studies, the numbers of C-5s modified under the Reliability Enhancement and Re-engining Program is proportional to the numbers of C-17s needed for war time use. All airlift aircraft will require modern defensive systems and CBRN protection to be survivable on tomorrow's battlefield. Now is the time to begin planning for the follow-on global airlift aircraft, the C-X.

Support processes, and their modifications, are vital to the success of the air mobility system. The MAF will remain fully engaged in Air Force Smart Operations for the 21st Century; while we are modernizing our air mobility fleet, we are increasing velocity and precision of mobility operations through process improvements and enhancing our training systems through transformation initiatives such as the Distributed Mission Operations capabilities. We are looking at a number of process improvements and understand the effectiveness and efficiency of air mobility operations is contingent upon an effective, global command and control system. Therefore, we must continue to modernize our C2 systems and infrastructure, leverage the most current information technologies available, and revise our processes to increase mobility asset visibility and availability to meet the warfighters' needs.

Some Final Thoughts

The future of air mobility is very bright and gives us the opportunity to build upon the capabilities we provide to today's warfighters. We will remain on course—win the war on terrorism while we recapitalize and modernize our air mobility fleet, improve our capability to operate in threat areas, and streamline our air mobility processes. Most importantly, there should be no doubt that our greatest strength is our people…Air Mobility Warriors. We must continue our focus on taking care of them; ensure they have the best training and the proper equipment to meet our nation's air mobility needs.



ARTHUR J. LICHTE
General, USAF
Commander

Executive Summary

Task

For over 10 years, Air Mobility Command (AMC) has developed and published an Air Mobility Master Plan (AMMP) every 2 years. The document, and the biennial planning process necessary to create it, have guided the command's modernization and recapitalization efforts, keeping AMC as the world's premiere provider of Rapid Global Mobility. The 2008 AMMP continues that process and incorporates new roadmaps in response to the challenges presented in our changing operating environment. As the lead command for air mobility, AMC charts the direction for our MAF partners in developing and maintaining concepts, processes, and force structure. As such, our MAF partners provide input to the AMMP as AMC provides advocacy on their behalf.

Capabilities-Based Planning (CBP) Process

Following DOD and Air Force guidance, HQ AMC has developed a CBP process that ensures the MAF provides the airlift, air refueling, and air mobility support capabilities required by combatant commanders, today and into the future. This capabilities-based planning process supports the National, Joint, and Air Force visions. CBP provides consistent direction for MAF planning activities and supports Joint and Service level capabilities-based planning processes. Key to the CBP process are the command's several Functional Capability Teams (FCT). These teams, composed of subject matter experts from within the MAF, perform CBP-related activities to ensure the identification, prioritization, and analysis of MAF capabilities needed to support current, and future, Joint and AF military effects for each respective capability area. They also support generation of the Air Mobility Master Plan, the development of the Air Mobility Roadmap, the Capabilities Review and Risk Assessment (CRRA) process, and the AMC POM and supporting documents. CBP is based upon a three-phased planning process conducted by FCTs. The three phases of the capability analysis process are Functional Area Analysis (FAA), Functional Needs Analysis (FNA), and Functional Solutions Analysis (FSA).

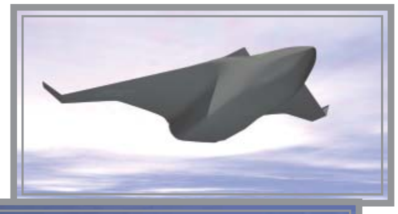
FAA is the first phase in a strategy-to-capability-to-task process where the FCTs identify the functional capabilities that air mobility forces must perform today and 25 years into the future. During this phase, air mobility capabilities are identified and mapped to the air mobility mission areas, mission categories, and support processes published in the Global Mobility CONOPS, Air Mobility Master Plan and in enabling and functional concepts. The results of FAA serve as the starting point for the FNA. The FNA is a task-to-need, or gap analysis process, that identifies deficiencies in the MAF's ability to provide required capabilities today and projected capabilities in the future. During this phase, the FCTs compare actual capabilities with required capabilities, identifying and quantifying deficiencies in the process. These deficiencies are documented in the AMMP, which is used by other organizations external to the FCTs to focus their research and development efforts on critical capability gaps to the 25 year planning horizon. FSA is an FCT-led operational assessment of potential doctrine, organization, training, material, leadership and education, personnel, and facilities (DOTMLPF) approaches, or solution sets, intended to solve the capability deficiencies identified during the FNA. Selected solutions and approaches, both material and nonmaterial, establish the roadmap for the functional area and serve as the analytical foundation for programs in the Joint Capabilities Integration Development System (JCIDS) process. FSA solutions are published in the Air Mobility Master Plan and the Air Mobility Roadmap.

Air Mobility Operating Environment

Predicting air mobility capability needs for the future is dependant upon the environment we will be forced to operate within. The guidance provided in our National Security Strategy, National Defense Strategy, Quadrennial Defense Review, National Military Strategy, USTRANSCOM Strategic Plan, Air Force Strategic Plan, and Air Force CONOPS provides us a glimpse of that future environment and guides us in our planning efforts. The challenges of the future environment will increase in variety and scale requiring the MAF to support major force operations and humanitarian missions while countering unconventional threats. Our operations will need to leverage our global alliances in an increasingly complex international environment where international partnerships will be key to success. Cyberspace will become a major battleground as we seek to protect our important information, communications, and data systems from increasing threats. Threats against civilian targets, designed to inflict high casualties, and weapons of mass destruction are just some of the dangers we face today and in the future. Today's high operations tempo creates increased demand on our Air Reserve Component forces, places stress on our people and equipment, and affects retention of personnel and aircraft mission capable rates.

Future Air Mobility Concepts

Meeting the challenges of the future environment will require new technologies and concepts. To successfully achieve the MAF vision, AMC must leverage the talents and capabilities of the Science and Technology (S&T) community. To that end, AMC over the past 2 years has expanded the Future Concepts Branch to partner with industry, the scientific community, and the Air Force Research Laboratory (AFRL) to find solutions to the future capability needs of the MAF. As we plan for the future, four major themes emerge that guide our vision for the MAF. First, we will look at "airlift" from a new perspective, as an overall capability where intertheater and intratheater missions merge into a single mission. The Advanced Joint Air Combat System (AJACS) and the Global Airlift Aircraft will be the workhorses in defining this capability. Secondly, we need to increase efficiency through the use of common systems wherever possible as we modernize our current fleet of aircraft, select replacement aircraft, or design the next-generation aircraft. Interoperability and compatibility among our future systems will reduce engineering costs, lower operator and maintainer training costs, and increase effectiveness through improved velocity in operations. Third, we must reduce our dependency upon the fixed mobility infrastructure used to deploy and sustain US forces around the globe. Aircraft with



increased range and fuel efficiency will reduce our dependency on forward operating bases while minimizing our footprint and reducing transit time. Fourth, the MAF will continue to open bases in forward areas. Our contingency response wings will need new tools and gear that is ultra light, reliable, easy to maintain, and fuel efficient. Power generation systems must be self sustaining, taking advantage of solar, chemical or wind driven systems. The integration of Agile Combat Support (ACS) capabilities will be integral to providing persistent and effective support for application of global air and space operations.

AMC's Science and Technology Working Group, led by AMC's Chief Scientist, will lead the way in leveraging the S&T efforts of both its government and industry partners. AMC has identified research, development, test and evaluation (RDT&E) areas critical to its future success. Some of these areas include autonomous operations, defensive systems, energy conservation and efficiencies, human factors, austere area operations, all weather capability, and vertical delivery. AMC is exploring solutions to these areas via advanced/joint concept technology demonstrations, advanced technology demonstrations, and critical experiments. Whatever solutions will be needed to make the MAF vision a reality, the AMC Future Concepts Branch will be fundamental to our success.

Roadmaps

The 2008 AMMP contains mission area, mission category, weapon system, and support process roadmaps. Each roadmap is based upon an approved mission capability statement and contains an assessment of our ability to accomplish the mission today and in 2032. Milestones, organized into short-, mid-, and long-term time intervals, needed to obtain the required mission capabilities are also included. Roadmaps are written for use by strategic planners, industry partners, and senior leadership.

Air Mobility Mission Area Roadmaps

The Mobility Air Forces are responsible for three mission areas that support national security needs: Airlift, Air Refueling, and Air Mobility Support. Chapter 3 contains roadmaps providing a strategic view of those areas. The deficiencies and solution sets for each mission area roadmap (included on the CD-ROM that accompanies this volume) are broad in nature. The following are a few of the highlights. Our analysis suggests that while the MAF has fielded the finest airlift capability in military history, improvements are required to continue to support the warfighter in the future. The C-130 fleet continues to age and, without modernization, some of our older C-130s will no longer be able to meet the needs of the warfighter. Additionally, the C-130J cargo compartment size is not large enough to carry the US Army's larger vehicles of the future combat system now under development. Although improved aircraft defensive systems are planned, the increased range and lethality of future systems may restrict C-130s from all but low threat environments. AMC will proceed with additional C-130J procurement and C-130H modernization as we replace restricted or grounded C-130E aircraft. Over the long term, AMC intends to field the Advanced Joint Air Combat System (AJACS) as the eventual replacement for the C-130H. Additionally, as AMC looks to the long-term and the replacement of the C-5s and C-17s, AMC will initiate procurement actions for the next generation Global Airlifter, the C-X.

Our air refueling fleet is old, with our KC-135s averaging 48 years of age in 2008, and in need of recapitalization. The Tanker Requirements Study-2005 (TRS-05) highlighted a shortfall in both tanker aircraft and aircrews. This shortfall does not include the additional requirements to support the Global War on Terrorism and homeland defense, not yet envisioned when TRS-05 was accomplished. To keep our tanker fleets viable for the short term, the KC-135 Global Air Traffic Management program is providing improved communication, navigation, and surveillance upgrades necessary to maintain access to worldwide airspace. Similarly, the KC-10 Aircraft Extension Program will provide modifications with deliveries scheduled from FY10 to FY22. Due to its age and increasing maintenance costs AMC plans to retire all KC-135Es by FY08. Meanwhile, AMC is continuing the process to procure a KC-135 replacement aircraft, the KC-X, with source selection ongoing at this time. The KC-X will augment the MAF's airlift needs now provided by the C-130, C-5, and C-17. An automated air refueling capability is in development that will permit refueling of tomorrow's unmanned aircraft. Envisioned for both airlift and tanker aircraft is an autonomous approach and landing system that will permit approaches and landings to operating bases during low-weather conditions, independent of ground based navigation aids. As infrared (IR), radio frequency (RF), and directed energy weapons develop, mobility aircraft will be put at increased risk. Improved aircraft designs or more effective countermeasures will be necessary to operate under these threat conditions in the future.

Air Mobility Support provides the people and processes to support airlift and air refueling at home station or deployed locations across the range of military operations and in all operating environments. Our people who perform the mission are our most important asset and bring all actions together to create battlefield effects. To meet the expeditionary nature of our operations, the Air Force is employing Agile Combat Support capabilities to shape the personnel career field to leverage technology to provide self-service actions anytime and anywhere, improving the availability of service to our total force. We're also working to improve working, living, and social environments where respect for all Airmen and their families is a routine part of the MAF culture. The air mobility support processes cut across every mission category and provide the foundation for the successful accomplishment of all our missions.

Mission Category Roadmaps

Chapter 4 of the AMMP contains the mission category roadmaps of Aeromedical Evacuation, Special Operations, and Open the Air Base. Our Aeromedical Evacuation System is the world's best and has been critical in supporting the War on Terror. The MAF uses universally qualified medical air crews to provide intratheater and intertheater patient movements on designated organic aircraft. Commercial B-767 aircraft of the Civil Reserve Air Fleet also provide patient movement on certified aircraft when activated. While the current system is robust, a replacement for the B-767 will be needed in the future as that aircraft ages and is phased out of commercial service. An aeromedical evacuation formal training unit is needed, improvements are needed to allow transportation of contaminated patients, and advanced medical care and equipment initiatives are needed.

AMC operational support to the Special Operations mission principally involves the C-17 and KC-135 aircraft. The C-17 was built with night vision goggle-compatible cockpit lighting systems and modifications are now ongoing to retrofit the C-17 fleet with a night vision-compatible cargo compartment and exterior lighting. The KC-135 Block 45 modification program will provide the entire fleet, including special operations air refueling aircraft, with a night vision goggle (NVG)-compatible cockpit, boom station, and external lighting. The addition of improved defensive systems, real-time information in the cockpit, and autonomous approach and landing capability will significantly enhance special operations support in the future.

Projecting and employing US forces involves the establishment of airbases within the area of operations. The securing, opening, and providing initial airfield and airbase operations is critical to follow-on forces. This fundamental task falls to the Air Force Contingency Response Groups (CRGs). CRGs provide a wide range of ACS functional capabilities to include aerial port operations, fuels support, medical support, mobile C2, air traffic control, ground transportation, intelligence, and explosive ordnance disposal among others. The Open the Airbase Roadmap indicates future challenges will lie in identifying manpower and equipment resources necessary to align this capability in newly established units and codifying "Open the Airbase" concepts into Air Force and Joint Tactics.

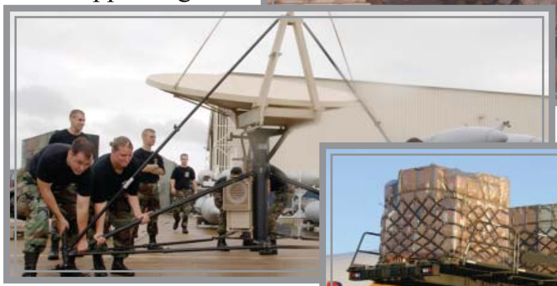
Weapon System Roadmaps

Detailed guidance on each specific airframe type can be found in the weapon system roadmaps in Chapter 5. These roadmaps provide more detailed guidance for the specific airframe type than is contained in the mission category roadmaps and support the generalized guidance contained in the various mission category roadmaps. 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 a program/modification funding chart.

Several modernization programs are currently being worked on mobility airframes and are discussed in these roadmaps. Significant ongoing programs include the C-5 Avionics Modernization Program (AMP) to provide data link capability, Traffic Alert and Collision Avoidance System II, Terrain Awareness and Warning System, and UHF satellite communications and the C-5 Reliability Enhancement and Re-engining Program to improve aircraft reliability, maintainability, and availability. C-17 programs include Block 17, consisting of NVG-friendly lighting, airdrop improvements, aerial delivery system improvements, navigation performance improvements, and the Formation Flight System. The C-130 fleet is being modernized with enhancements to include features to improve maintainability, reliability, protection, and performance. Additionally, numerous C-130E/H models have been grounded or placed under significant flight restrictions due to cracking in the center wings necessitating replacement of center wing boxes. Tanker aircraft upgrades include avionics modernization on the KC-10 to ensure worldwide airspace access and KC-135 Aircraft Extension Program consisting of avionics upgrades, night vision imaging system lighting, aeromedical evacuation upgrades, and real time information in the cockpit upgrades.

Support Roadmaps

Air mobility has thirteen support processes and associated roadmaps that provide a foundation for the successful accomplishment of all mobility missions. These support process roadmaps range from Information Operations to Logistics to Force Protection. All support process roadmaps address key issues—three stand out as absolutely essential to increase air mobility capability for the MAF. First, Global En Route Support (GERS) is a critical enabling element of rapid global mobility. While GERS sustains thirteen established, robust, strategically located en route bases, our future vision is to incorporate newly identified Cooperative Security Locations (CSLs) to support global deployment and sustainment of forces. CSLs are locations to be used "as-is" through the use of political agreements with host nations. Future construction will be limited to low-cost/maximum-impact infrastructure to enhance existing capabilities at CSLs. Secondly, the AMMP recognizes that tomorrow's decision makers will need greater access to fused information and greater situational understanding to enable leaders to make decisions faster and more accurately. The Command and Control (C2) Integrated Roadmap seeks to synchronize and coordinate operations, processes, and supporting disciplines in the face of technical challenges. With significant C2 systems integration challenges in the future, systems security, interoperability, and information assurance will be crucial issues. Third, Air mobility must be prepared for operations following the use of chemical, biological, radiological, and nuclear (CBRN) weapons. The proliferation of CBRN weapons and the means to deliver them presents a significant threat to US forces. The Counter-CBRN Roadmap focuses on mitigation of the threat through contamination avoidance, protection, and contamination control with a long-term goal of unrestricted operations in a CBRN environment.



Next Steps

The capabilities, deficiencies, and solutions identified in the Air Mobility Master Plan feed the MAF's investment strategy modeling resulting in the AMC input to the Air Force POM. Deficiencies and needs for capability improvements, particularly in the weapon system roadmaps also feed into the Joint Capabilities Integration Development System (JCIDS). The JCIDS process guides the development of requirements for future acquisition systems to reflect the needs of all four services. In this way it reduces redundancies in capabilities that fail to meet the combined needs of all US military services. The end product is an investment strategy that is linked, integrated, and provides unity of effort in one integrated process across the Mobility Air Forces, the Air Force, and the Department of Defense.

Chapter 1—Air Mobility Operating Environment

"America is at war. This is a wartime national security strategy required by the grave challenges we face—the rise of terrorism fueled by an aggressive ideology of hatred and murder, fully revealed to the American people on September 11, 2001. The strategy reflects our most solemn obligation: to protect the security of the American people.

The challenges America faces are great, yet we have enormous power and influence to address those challenges. The times require an ambitious national security strategy, yet one recognizing the limits to what even a nation as powerful as the United States can achieve by itself. Our national security strategy is idealistic about goals, and realistic about means.

There was a time when two oceans seemed to provide protection from problems in other lands, leaving America to lead by example alone. That time has long since passed. America cannot know peace, security, and prosperity by retreating from the world. America must lead by deed as well as by example."

President Bush, National Security Strategy, March 2006

Air mobility operations have been significantly improved over time in order to meet the changing needs of the warfighters. We have witnessed the fielding of aircraft with increased range and the ability to carry outsized cargo over strategic distances…or conduct airdrop operations in adverse weather…or conduct long-range strike missions against targets anywhere on the globe through the use of air refueling.

These capability improvements were not random, or even transformational, events. In fact, these improvements were rather evolutionary and directly driven by the environment in which the Mobility Air Forces (MAF) operate. Predicting the future is a complex and difficult task, but strategic planning requires an objective look at the characteristics or attributes that we can expect the future operating environment to possess. This chapter looks at those characteristics; it first reviews the National, Joint, and Service guidance we must follow; next, it explores the challenges we can expect to face over the near and far terms; lastly, it reviews the planning process used to field tomorrow's air mobility forces.

The Guidance

National Security Strategy

The terrorist attacks against America and around the globe, during the early years of this century, had a profound effect on the international security environment and forever changed our world. For decades to come, this Nation will confront an environment characterized by an array of adversaries who will employ any means of attack to exploit our weaknesses. We can expect that failed states, terrorist organizations, and coalitions hostile to the United States (US) will exploit widely available technologies to develop dangerous capabilities to use against us. The March 2006 National Security Strategy (NSS) is clear: "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 happened; and we know these successes have not come without sacrifice. US service men and women, our allies, contractor personnel, innocent civilians, and foreign nationals have given their lives to permit others to enjoy the opportunities that democracy offers.

Recent events have had important implications for the employment of air mobility forces; unforeseen trends will undoubtedly emerge in the coming years and will require our plans for the future 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.

National Defense Strategy

The National Defense Strategy (NDS) builds upon the NSS and recognizes that "uncertainty is the defining characteristic of today's strategic environment. We can identify trends but cannot predict specific events with precision." It places future challenges into four categories: traditional, irregular, catastrophic, and disruptive.

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.

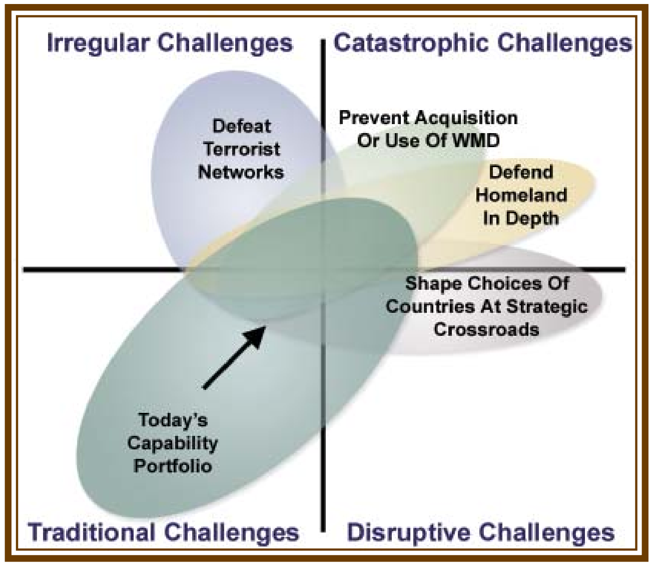
The third is **Catastrophic**: the ability of adversaries to have easy access to information-related technologies and the ability to possess or seek weapons of mass destruction (WMD). This challenge is very problematic because neither the US nor our allies can afford to allow this to happen even once. Every measure must be taken to dissuade any adversary that may pose this challenge.

The last challenge 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.

Quadrennial Defense Review

The NDS also provides the strategic foundation for Quadrennial Defense Review (QDR) 2006 and reinforces the reality that because the US military maintains considerable advantages in traditional forms of warfare, it is unlikely adversaries will challenge the United States in this manner. The Global War on Terrorism, fought against enemies using asymmetrical warfare strategies and tactics to counter our strengths, is typical of the kinds of warfare that our Nation must be prepared to fight and win. QDR 2006 identifies 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 nonstate 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 better address the irregular, catastrophic, and disruptive challenges while sustaining capabilities to address traditional forces. 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.

National Military Strategy

The National Military Strategy provides strategic direction to the Armed Forces of the United States for supporting the National Security and Defense Strategies in this time of war. It describes the ways and means to protect the United States. Success rests on three priorities:

1. Winning the War on Terrorism while protecting the United States.
2. Enhancing our ability to fight as a Joint force.
3. Transforming the Armed Forces.

The NMS derives objectives, missions, and capability requirements from an analysis of the NSS, the NDS, and the security environment. The NSS establishes homeland security as the Nation's first priority; the NMS recognizes that to achieve this priority our first line of defense is abroad. Air mobility will continue to play a large role in taking the fight to the enemy. Force application in multiple overlapping operations will challenge our deployment and sustainment capabilities. Sustaining such operations requires the ability to support forces operating in and from austere or unimproved forward locations. This increasing importance of mobility will necessitate more expeditionary logistics capabilities.

United States Transportation Command Strategic Plan

Air Mobility Command (AMC) is the air component of United States Transportation Command (USTRANSCOM) and supports the combatant commander and his strategic vision. USTRANSCOM has a vision that reflects the change from a command that provides only transportation solutions to a command that enables the full spectrum of global logistics solutions. USTRANSCOM is the DOD distribution process owner (DPO) responsible for ensuring delivery of supplies from factory to foxhole. As USTRANSCOM's air component, AMC's role under Title X US Code is to train, organize, and equip the MAF. However, AMC forces are assigned to USTRANSCOM under SECDEF's orders; and under SECDEF guidance in the Global Force Management Plan, AMC forces are apportioned to USTRANSCOM for planning purposes. When required, SECDEF apportions forces to USTRANSCOM and/or other combatant commands (COCOMS) for execution of plans.

The USTRANSCOM Strategic Plan establishes four long-range goals that directly impact the MAF's planning process:

1. Mature the Joint deployment and distribution enterprise.
2. Leverage collaboration and partnerships.
3. Develop expeditionary approaches.
4. Enable Joint distribution concepts developing expeditionary approaches.

Air Force Strategic Plan

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. We execute our mission in a challenging environment. The 2006 Quadrennial Defense Review Report describes this environment and provides the strategic context and overarching guidance that direct our planning efforts.

As the foundation of our planning, we use three specific Air Force priorities, from the AF Strategic Plan, as the criteria for judging the choices we make:

1. Winning the war on terror while preparing for the next war.
2. Developing and caring for Airmen and their families…to maintain the competitive edge.
3. Recapitalizing and modernizing our aging aircraft, satellites, and equipment…to optimize the military utility of our systems and to better meet 21st century challenges.

The AMMP supports the overall Air Force vision put forth in the AF Strategic Plan, "…where every Airman fights alongside and above our fellow Soldiers, Sailors, and Marines, and puts air, space, and cyberspace power on target as part of a dominant Joint warfighting team. It is a vision of an Air Force that leverages asymmetric advantages across the "commons" to provide desired effects—an Air Force that develops, sustains, and is always sharpening its warfighting edge—an Air Force that provides the most highly motivated, trained, and respected Airmen in the world to accomplish its missions with integrity and leadership as an integrated Total Force team."

Air Force Concept of Operations (CONOPS)

The purpose of the AF CONOPS is to express a vision for how the Air Force intends to plan, prepare, employ, deploy, sustain and/or recover a Joint force within a specified set of conditions. The CONOPS lays the foundation for our transformation to a capabilities-based Air and Space Expeditionary Force (AEF) through 2025. The CONOPS transforms 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 is 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 air mobility planning process examines the impact that "external" threats could have on mobility operations between now and 2032. 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. Following is a brief description of the Global Mobility CONOPS with a chart defining each AF CONOPS. Given the fact that AMC is lead command for the air mobility mission area, the Global Mobility CONOPS is explained in more detail than the others.

Global Mobility CONOPS

The Global Mobility CONOPS capabilities of airlift, air refueling, expeditionary air mobility operations, spacelift, and SOF mobility create the effect of rapid projection and application of Joint US military power. As we develop these capabilities and further describe them in supporting functional and enabling concepts, it is critical that the capabilities incorporate, to the maximum extent possible, the required Joint characteristics of being knowledge empowered, networked, interoperable, expeditionary, adaptable/tailorable, enduring/persistent, precise, rapid (fast), resilient, agile, and lethal. These characteristics are important because they serve as a guide to how the future Joint force is to be developed, organized, trained, and equipped. The MAF is focused on increasing the precision and velocity of air mobility operations.

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 and Command, Control, Comm, Computers, Intel, Surveillance, and 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	ACS is the ability to create, protect, and sustain air and space forces across the full range of military operations. It is the foundational and crosscutting system of support enabling AF operational concepts and the capabilities that distinguish air, space cyberspace power—speed, flexibility, and global perspective.

Air Force Smart Operations for the Twenty-First Century (AFSO 21)

More efficient processes result in the deliberate and systematic elimination of surplus or waste—the objective of AFSO 21 is to better utilize resources, increase speed, and create flexibility to increase combat capability. It provides an AF approach to continuously improve all processes, develops a culture which promotes elimination of waste, and ensures that all Airmen understand their role. The MAF is fully engaged in AFSO 21; while it is modernizing the force to improve effectiveness and efficiency, it is also increasing the velocity and precision of mobility operations through process improvements, slashing waste throughout the Air Mobility Enterprise, and creating a lasting culture of continuous process improvement.

Guidance Summary

Speed, agility, and tailored forces characterize the Joint Force capabilities required to achieve the goals outlined in the NSS, NDS, QDR, NMS, USTRANSCOM Strategic Plan, Air Force Strategic Plan, the Air Force CONOPS, and AFSO 21. 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 Challenges

Operations Increase in Variety and Scale

> ***"…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***

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 war on terrorism 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 US military be able to deploy a greater percentage of our forces where and when 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]

Sourcing, from a global perspective, and operating from global commons (space, international waters and airspace, and cyberspace), enable 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 MAF, along with the rest of the Air Force, will be called upon to support major force operations across the globe with speed and agility, plus accomplish the air mobility mission in permissive and nonpermissive environments. As in the past, the MAF may act alone in supporting humanitarian efforts following natural disasters at home and abroad or following strife that displaces large numbers of people in the most remote regions of the world. The latter operations will be accomplished with the same velocity and precision required for combat operations and, as witnessed in Somalia, the most benign humanitarian operation overseas can rapidly deteriorate into armed conflict.

Whether the MAF is supporting a small contingency or a large-scale humanitarian mission, it will be faced with the challenges of having access to the area and in operating from 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 2032 warfighting environment, we must ensure our aircraft, personnel, and information systems are protected. The NMS recognizes this concern.

> The "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 nonstate 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

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

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 that 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.

Global airspace is highly fractionalized, creating a complicated environment. Support from international communities across the globe for airspace access is necessary to achieve national defense security and other interests of the US. Collaborating with the nation states with sovereignty over the airspace enables the application of air power to achieve the mission.

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 to 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.

Cyberspace Will Become A Major Battlefield

On 2 November 2006, the Secretary of the Air Force, Michael Wynne, announced that Eighth Air Force would become the Air Force's lead command for cyberspace. "The aim is to develop a major command that stands alongside Air Force Space Command and Air Combat Command as the provider of forces that the President, combatant commanders and American people can rely on for preserving the freedom of access and commerce in air, space, and now cyberspace."

This is a new direction for the Air Force. Historically, war meant using expensive kinetic weaponry to destroy the adversary's ability to fight and change his behavior. Today, adversaries are exploring relatively low-cost technologies to fight in the cyberspace domain. The AF reigns supreme in the atmospheric domain and is seeking to reign supreme in the cyberspace domain. Cyberspace is the domain for information operations (IO). IO is based on three pillars: network warfare operations (NWO) and electronic warfare operations (EWO), together with influence operations (IFO), which takes place in the cognitive realm.

> ***"In the past few years, threats in cyberspace have risen dramatically. The policy of the United States is to protect against the debilitating disruption of the operation of information systems for critical infrastructures and, thereby, help to protect the people, economy, and national security of the United States. We must act to reduce our vulnerabilities to these threats before they can be exploited to damage the cyber systems supporting our Nation's critical infrastructures and ensure that such disruptions of cyberspace are infrequent, of minimal duration, manageable, and cause the least damage possible."***
>
> ***President George Bush,***
> ***"The National Strategy To Secure Cyberspace" Feb 2003***

While the offensive role of EWO and NWO is left to the Combat Air Forces (CAF), the Mobility Air Forces have a definite role in defensive EWO and NWO. Protecting our platforms and systems from an adversary's EWO capabilities is essential to complete the flying mission. Protecting MAF networks is essential because the networks enable decision makers to conduct command and control functions to execute a strategy. The MAF must be able to react to EWO and NWO threats. Additionally, the adversary will use cyberspace to conduct offensive IFO. However, the MAF can affect the adversary's cognitive realm through proactive IFO. For example, the presence of an American flag, on the tail of a MAF aircraft, can have a psychological effect upon an adversary.

The AF will conduct IO in the cyberspace domain, either solely or in conjunction with kinetic weaponry in the atmospheric domain, to affect the adversary's behavior. Collaboration between the MAF and the CAF for atmospheric operations has become routine. In the cyberspace domain, MAF-CAF collaboration will be just as important to ensure a strategy complementary to atmospheric operations.

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. Attacks will be intended to cause high casualties, in an effort to sway public opinion against an operation, and to force a withdrawal of military forces. We should expect our enemies to attack undefended civilian or soft military targets in nontraditional ways to avoid the direct confrontation with superior US military forces and allies on the conventional battlefield. Weapons may range from improvised explosive devices and conventional weapons to weapons of mass destruction. The growing international economy, global interdependencies, interconnected systems, and rapid technological advances increase vulnerability to asymmetric attack; and the proliferation of weapons of mass destruction will increase their lethality.

Chemical attacks on aerial ports of debarkation could temporarily stall the deployment of our forces. Biological agents may be spread in a manner similar to chemical agents, but it is more likely that they will be deployed in more covert or subtle ways that are very difficult to recognize. Most likely, a biological incident will probably emerge as an isolated illness until it spreads and gains the attention of medical facilities such as the Centers for Disease Control and Prevention (one of the major operating components of the Department of Health and Human Services). Regardless of the delivery mechanism, we must be able to transit contaminated areas, pick up contaminated patients, and then be able to sanitize aircraft, equipment, and living areas. The MAF must also be capable of continued operations, following the spread of radioactive material through the use of conventional explosives, referred to as radiation dispersal devices or radiological weapons. Information warfare attacks can be expected to sow confusion and leave our forces vulnerable to further attack.

Adversaries will increasingly attempt to deny MAF access to certain regions of the world. Their anti-access strategies may include threatening MAF aircraft operations with advanced man-portable air defense systems at forward airfields, major CONUS bases, or 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. While improved aircraft defensive systems are planned, the increased range and lethality of future systems will deny all mobility aircraft from operating in/from all but low-threat environments. It is imperative that the MAF continues to field defensive systems, become less dependent upon en route bases, and work for a smaller, more-agile footprint to support operations 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 active duty forces, the volunteerism of the Air Reserve Component (ARC), and commercial carriers that are under contract to move personnel during SSC operations. For larger operations, the ARC forces become fully available when units are activated; the Civil Reserve Air Fleet may be activated in three stages depending on the airlift requirement. Absent activation, the demands on the active duty for contingency operations have been considerable and have begun to affect personnel retention and aircraft mission capable (MC) rates. ARC forces are also strained during long periods of activation or extended deployments. The MAF has led the Air Force in the employment of the Total Force; aircrews are standardized, and Associate units have been used for decades. More work is needed; however, to develop alternative solutions to the OPTEMPO challenges that the MAF will face. The stress on our people and equipment must be balanced with maintaining a high degree of combat readiness and improved mission capabilities.

Enhanced Force Protection and Defensive Systems

It is not possible to predict every facet of the future operating environment for the MAF; however, one thing is certain: the importance of force protection for our aircrews, aircraft, support personnel, and installations. 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 in various stages of 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 threats—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 a major 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 using aircraft with greater unrefueled range, decreased reliance on en route infrastructure support, decreased mobility footprint at forward locations, and standardized intermodal containers and mission equipment across the range of strategic, theater, and tactical air mobility assets. These improved capabilities will increase the velocity of air mobility operations; plus, they will help overcome anti-access strategies often used as defensive measures by the enemy. Recognizing the dynamics of the global threat and the evolving challenges for the warfighter, we will continue our CBP efforts to analyze existing aircraft availability and supporting programs to ensure that the command has the right assets and capabilities to support the warfighters' ability to plan and execute at an acceptable level of operational risk. The NDS called the capability to rapidly surge military forces from strategic distances to deny adversaries sanctuary a key goal. In some cases, this may involve discrete SOF precision attacks on targets deep inside enemy territory. In others, sustained Joint or combined combat operations may be necessary, requiring the comprehensive defeat of significant state and nonstate opponents operating in and from enemy territory or an ungoverned area.

Regardless, whether hunting down terrorists overseas or defending US interests at home and abroad, mobility responsiveness will be required in order to meet the challenges of the future environment. SOF and strike 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.

We have learned that limited numbers of forces have the potential to be employed more efficiently and effectively when operating in a network-centric environment. The NDS recognized the benefits that network-centric operations bring: "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." It also recognizes the challenge: "Transforming to a network-centric force requires fundamental changes in processes, policy, and culture." 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 and will provide commanders and warfighters with decision-quality information. Joint network-centric operations promise improved C2 processes that will increase the velocity and precision of MAF support to the warfighters.

The MAF Effects-Driven, Capabilities-Based Planning Process

Warfighting commanders put effects-based operations into practice. First, they determine campaign objectives at the strategic, operational, and tactical levels. 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 desired effects.

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 in the early phases of the Iraqi war. Strategically, it hastened the fall of the Hussein regime and allowed for the conditions to be set in place to encourage 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 current and future commanders to employ in order to attain their campaign objectives.

The purpose of the MAF's capabilities-based planning (CBP) process is to provide a framework that enables the systematic development and fielding of air mobility capabilities for use by the combatant commanders as they create the effects necessary for the successful prosecution of their mission. The results of the CBP process are reflected in the AMMP and drive programming and budget actions.

During the first phase of the CBP process, the Functional Area Analysis, the functional capability teams (FCTs)—airlift, air refueling, agile combat support, net-centric, command and control, battlespace awareness, and information operations—thoroughly reviewed and validated air mobility capabilities in their respective functional areas.

The FCTs based their analysis on higher-level guidance that includes the National Security Strategy, the National Defense Strategy, the National Military Strategy, and the Quadrennial Defense Review. They also reviewed Joint-level documents, to include the Joint Operating Concepts, Joint Functional Concepts, Joint Integrating Concepts, and the United States Transportation Command Strategic Plan.

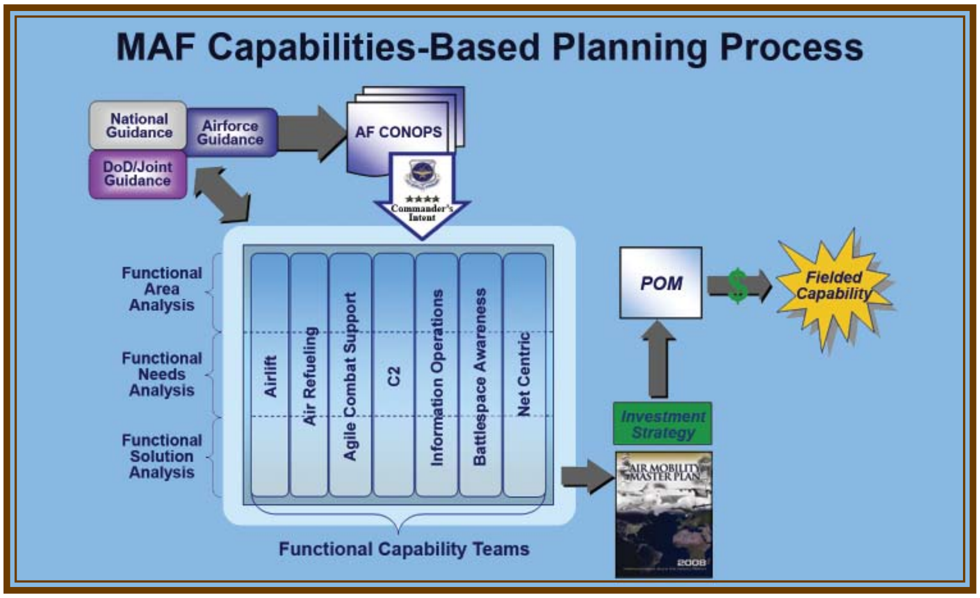
Additionally, they incorporated guidance from the Air Force Strategic Plan, the Air Force Roadmap, and the Air Force CONOPS, with specific direction from the Global Mobility CONOPS.

The teams then viewed air mobility capabilities through the prism of the future operating environment discussed earlier in this chapter. Making predictions about the future undoubtedly imparts uncertainty into the equation and must be undertaken very carefully. The MAF does not create its own future operating environment; it relies heavily on the National Intelligence Estimate, Defense Planning Scenarios, and Steady State Security Posture documents to formulate reasonable assumptions about the future.

The product of this analysis phase was the identification of capabilities that the MAF will need to provide to the warfighters in order for them to create the effects necessary to meet present and future national security needs. As the FCTs developed the capabilities, they defined the capabilities' attributes and established performance standards that were appropriate for the near-, mid-, and long-term time frames.

Next, in the Functional Needs Analysis phase, the FCTs compared the MAF's actual or predicted performance of air mobility capabilities against the levels required to meet future warfighter air mobility needs. Performance shortfalls, commonly referred to as capability deficiencies or gaps, were identified, validated, and quantified.

Lastly, during the Functional Solutions Analysis phase, the FCTs carefully evaluated the alternative solutions that were developed by Headquarters AMC, the AF Research Laboratory, other Services, and industry.

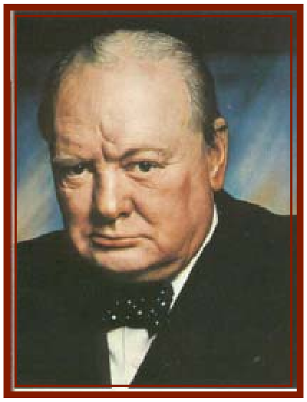


Throughout the planning process, the FCTs used a value-focused thinking analytical model to ensure that the MAF fields the capabilities needed by the warfighters. The model allowed the FCTs to evaluate required capabilities, compare MAF performance against the required standards, identify areas of risk and shortfalls, and evaluate the capability contributions of alternative solution sets.

MAF Deficiencies/Solutions

Reference Documents

Chapter 2—Future Air Mobility Concepts



"A hiatus exists between inventors who know what they could invent, if only they knew what was wanted, and the soldiers who know what they want, and would ask for it if they only knew how much science could do for them. You have never really bridged that gap yet…"

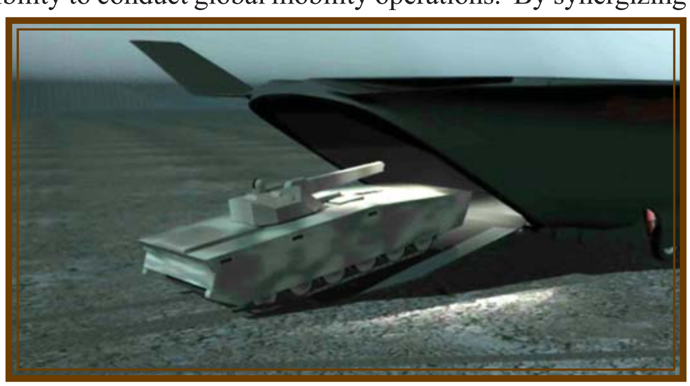
Winston Churchill
The Great War

Chapter 1 explored the formidable challenges facing the Mobility Air Forces today and over the next quarter century. While the future operating environment will undoubtedly remain demanding, we will meet the challenges head on, leveraging industry-leading research and development activities to support the warfighter. The Commander, Air Mobility Command (AMC), has set the course: "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." AMC's Future Concept Branch is partnering with industry, the scientific community, and the Air Force Research Laboratory (AFRL), to find alternative solutions to the capability needs defined during the MAF's capabilities-based planning process. This chapter highlights ongoing efforts to harness technology and develop future mobility concepts.

Future Concepts for Air Mobility

First, we view "airlift" from a new perspective…as a capability where inter- and intratheater missions merge into one mission…one that offers improved airlift effectiveness to the warfighter while preserving and enhancing efficiencies for an airlift system in very high demand. This approach is the "glide path" to our future planning.

The "course centerline" for this future planning is a common, multi-role aircraft with support systems that give commanders wide-ranging flexibility to conduct global mobility operations. By synergizing this capability with the Army's Future Combat System, the air mobility team will help lead a revolution in battlefield employment. The workhorses for these defining capabilities are the Advanced Joint Air Combat System (AJACS) and the global airlift aircraft, the C-5 replacement capable of delivering large cargo payloads anywhere on the globe without refueling. Teaming with our commercial aircraft industry partners on this future-generation capability, we will use a holistic approach to pursue an aircraft design that incorporates ultra-light, super-durable materials and propulsion systems that dramatically raise fuel efficiency with simultaneous gains in



thrust output. We will seriously explore blended-wing bodies, morphing wings and surface areas; integral and adaptable antennas; and automated offload systems. With independent, non-Global Positioning System (GPS) dependent navigation systems, "on-demand" airdrop systems functioning like a flying warehouse, and guided by an autonomous approach, landing and taxi system, the velocity, precision and reliability of air mobility systems will exponentially increase.

Today's air refueling capability, originally fielded to support the Strategic Air Command in the 1950s, served us heroically through the Cold War to today. The air refueling aircraft for tomorrow's tanker fleet will provide the DOD a force multiplier aircraft with unmatched capability. We clearly recognize the current air refueling fleet is aging and must be modernized to push the next generation of strike aircraft deep in denied territory. Whether this mission is fulfilled by the AJACS-Tanker (AJACS-T), a penetrating tanker with a common mobility platform, or another tanker variant, this aircraft will need the capability to operate in contested airspace to guarantee strike aircraft success. Similarly, future tanker aircraft will continue to support US Strategic Command (USSTRATCOM) requirements that dictate specific range/fuel offloads for this unique mission. Likewise, this future tanker will support an entire family of unmanned air vehicles (UAV) engaged in strike, suppression of enemy air defenses (SEAD), and intelligence, surveillance and reconnaissance (ISR) operations. Future tankers must be self-deployable, capable of performing the secondary missions of airlift and aeromedical evacuation, and function as a node in the net-centric operations and the global information grid (GIG). With the ability to both use and transfer alternative fuels, future tanker aircraft will include reinforced cargo floors, oversized cargo doors, and defensive systems enabling employment flexibility. We also envision a future tanker capability providing unmanned, autonomous air refueling for both manned and unmanned receiver systems.

Secondly, interoperability and compatibility must be inherent in our future systems as we modernize our current fleet of aircraft and design the next-generation mobility aircraft. The benefits of this approach are obvious—common systems reduce supply requirements and will reduce overall engineering development costs, while simultaneously minimizing the sustainment costs over the weapon system life cycle. These efficiencies translate to lower operator and maintenance training costs for initial, qualification, and recurring courses. Maintenance technicians will be qualified across a wide spectrum of systems and airframes. Ultimately, crewmembers will perform a variety of missions while flying essentially common airframes, increasing the effectiveness and efficiency through improved velocity in operations.

Third, we continue to explore innovative ways to reduce our dependency upon the vast mobility infrastructure required to deploy and globally sustain US forces. The anti-access and area-denial strategies of our adversaries will likely escalate, significantly limiting the availability of today's en route bases. Well-established overseas bases, used for refueling and aircrew stage operations, have long been necessary because of limited aircraft range. Over the next 25 years, we must dramatically reduce our dependence on these forward operating bases. We have validated the concept of direct delivery and confirmed the advantages gained by air refueling C-17s and flying nonstop to deliver cargo and passengers to forward area landing zones. While minimizing our threat footprint with en route stops, flight time is saved by overflying en route locations to the objective areas. Consequently, cargo handling times are reduced, en route delays are avoided, and diplomatic clearance challenges and base landing right permissions are minimized. And at the extreme edge of the "direct delivery envelope" is our goal of transatmospheric transport, a capability to enable the MAF to conventionally launch an aircraft that subsequently assumes a space trajectory, reenters the atmosphere, and delivers a payload with microscopic precision to any location on the globe. This capability to move both passengers and cargo over thousands of miles in minutes provides the combatant commander with the ultimate in mission flexibility.

Fourth, recent operations demonstrated the value of having the MAF open airbases in forward areas—this trend will continue, but we must ensure our personnel are well trained and equipped to support US expeditionary operations. Our contingency response wings (CRWs) need tools and gear that are ultra lightweight, highly reliable, easy to maintain, and fuel efficient. Specifically, power generation systems must have a minimal footprint while being self-sustaining, using solar, chemical, or wind-driven systems. This professionally trained and experienced airbase opening force, focused on rapidly introducing air mobility operations, must have combat support equipment that rivals the simplicity and sophistication of the aircraft systems that deploy it. The CRWs are critical organizations to guarantee that the critical "first step" in opening the airbase is made aggressively in the right direction.

The Way Ahead for AMC Science and Technology (S&T)

The AMC S&T charter within the Future Concepts and Transformation Branch is to link all aspects of the S&T enterprise to the AMC Commander's vision. Despite the high OPTEMPO of daily mobility, the Future Concepts and Transformation Branch remains focused in leading a wide array of S&T participants on a course direction that extends 25 years into the future. To unite this broad S&T enterprise, the command created the Science and Technology Working Group (STWG) to combine the efforts of AMC, Air Force Research Laboratory (AFRL) and the Air Mobility Battlelab (AMB) into one consolidated S&T team. Led by AMC's Chief Scientist, the STWG directly interfaces with the Capabilities-Based Planning Process, ensuring that S&T is integral to the strategic planning process supporting the warfighter.

With the strong leadership of the STWG and the guidance codified in the newly published AMC Instruction (AMCI) 61-101, ***Management of AMC Science and Technology***, AMC is positioned to better leverage the S&T efforts of both its government and industry partners.

As the air component of United States Transportation Command (USTRANSCOM), AMC supports USTRANSCOM's research, development, test, and evaluation (RDT&E) efforts to explore innovative joint technologies addressing the Distribution Process Owner (DPO) and Defense Transportation System (DTS) capability gaps. The AMC Commander has identified the following four RDT&E focus areas as critical to AMC's future success:

Defensive Systems: Continuous improving area for missile warning, advanced flares, and cost/reliability actions. Longer term efforts address radar, advanced infrared guided missiles, and enhanced directed energy warning systems.

Command, Control, Communications, Intelligence and Information Operations. Aggressively pursuing critical technologies in dynamically retasking and replanning, in-transit visibility (ITV) and total asset visibility (TAV), visualization of fused information, and collaboration/shared awareness and understanding. Work has begun on leading-edge efforts in server virtualization and more capable senior leader airborne communication systems.

Vertical Delivery: Exploring the concept of the aerial delivery of a broad range of assets with superb accuracy from extended airdrop offset distance and higher altitudes. The Joint Precision Airdrop System (JPADS) delivers precise payloads while meeting survivability requirements and minimizing exposure of AMC aircraft and personnel to ground threats.

MAF Adverse-Weather Capability: Developing precision wind-sensing tools supporting pinpoint airdrop solutions; investigating reduced visibility air refueling and identification/detection of flight path turbulence.

The following additional RDT&E areas have been identified by AMC as critical for future success:

Autonomous Operations. Exploiting advances in machine-to-machine and man-machine interfaces to improve aerial port operations, supply chain management processes, and air refueling of unmanned air vehicles (UAV) and future joint unmanned combat air systems (J-UCAS).

Counter Chemical, Biological, Radiological, Nuclear (C-CBRN): Participating in Joint duration studies evaluating aircrew capabilities and equipment requirements for longer term, sustained operations. This entails examining sequencing of decontamination technologies and material coatings to repel chemicals.

Energy Conservation and Efficiencies: Leading efforts to dramatically affect both supply and demand sides of energy (USAF and AMC are DOD's largest energy consumer). AMC S&T efforts are exploring alternative fuels, next generation aircraft materials, and advanced conservation technology.

Human Factors: Investigating pharmacological and nonpharmacological strategies to combat the effects of fatigue and the safety implications of continued high OPTEMPO operations for both ground and aircrew personnel.

Improved Austere Area Operations: Pursuing revolutionary advances in expeditionary combat service support resources and equipment, with particular emphasis on acquiring already developed/mature, commercial-off-the-shelf (COTS) components with a focus on compatibility and interchangeability.

With support from USTRANSCOM, AFRL, and industry, AMC is actively exploring solutions for many of these gaps identified in the capabilities-based planning process through advanced/joint concept technology demonstrations, advanced technology demonstrations, and critical experiments. Recent activities include the advanced tactical directed energy system, integrated flight management, automated air refueling, and the autonomous approach and landing capability.

The AMC S&T road ahead has one dominant theme: unwavering support to the global mobility warfighter, today and in the future. Please review the roadmaps, contained in subsequent chapters, for our plan to deliver the results of our S&T efforts.

Chapter 3—Air Mobility Mission Area Roadmaps

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 become more widespread and increasingly lethal 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 peacetime humanitarian missions to participating in major combat operations. The synergy of airlift, air refueling, and support processes provides the velocity and precision necessary in deploying, employing, protecting, and sustaining our combat forces.

This chapter contains the roadmaps for three mission areas—airlift, air refueling, and air mobility support. These roadmaps are designed to serve as approved flight plans that provide the overarching guidance to field the required mobility capabilities necessary to meet our Nation's needs from now through the year 2032.

Air Mobility Mission

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 anywhere in the world 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.

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 Global Mobility CONOPS "operationalizes," or puts into context, many air mobility capabilities delivered by the MAF. It ties them together to suggest that air mobility is a system dependent upon a wide range of supporting sub-capabilities. The essence of global mobility is rapid global projection of US warfighting capability. This may equate to supporting strike operations with air refueling, or quickly moving personnel and equipment 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 warfighters a "single face" for their air mobility requirements.

Airlift

Airlift is key to force projection, the dynamic battlespace maneuver to position forces when and where required. It 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; 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 effect, delivering personnel and assets to any location on the globe including prepared, unprepared, and austere airfields without the use of ground-based navigation aids and regardless of weather conditions.

Air Refueling

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.

Mission Support

Support is the backbone of global mobility. Large-scale mobility operations require an integrated system of agile combat support forces and capabilities 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.

Airlift Roadmap

OPR: Airlift Functional Capabilities Team

MAF Capability Statement

Provide the capability to effectively move personnel and materiel from onload to final offload through established airfields or deliver combat forces, with their supplies and equipment, in direct support of combat operations by airdrop or airland operations at austere landing zones. Airdrop a brigade-size force over strategic distances and sustain combat forces across the range of military operations in all operating environments.

Assessment

The Mobility Air Forces (MAF) have fielded the finest airlift capability in military history, yet we also recognize that improvements are necessary to provide the required support to the warfighters. We once had two airlift systems—intertheater, flown by long-range transports dedicated to this mission, and intratheater, flown by shorter-range, tactical airlift aircraft normally assigned to a theater of operation. Today, we have one…MAF aircraft are quite versatile and should be used where they can best meet mission requirements.

Combat delivery was 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. The deployment of expeditionary C-17 squadrons, as long done with C-130s, has significantly increased our airlift capability in Southwest Asia. With more cargo going by air, this increased capability has directly contributed to saving lives by reducing the need for ground convoys to travel through hostile areas. The C-17 has excelled at operating on assault landing zones in a combat environment and is the backbone of our long-range brigade airdrop capability.

C-5s were designed for the long-range airlift of outsized and oversized cargo, yet we have used them effectively to move very large amounts of cargo within a theater of operations. C-17s can deliver equipment directly to forward airfields more quickly than transferring the cargo from a strategic airlift aircraft to C-130s at a theater hub for flight to the final destination.

We understand that the distribution of cargo or the movement of passengers from origin to point of need is expedited by using the aircraft with the capabilities best suited for the specific mission segment. This process improvement, when enabled by an improved command and control capability, will allow USTRANSCOM to "schedule the movement of passengers and cargo from origin to destination and use a range of short- and long-range organic and commercial aircraft." This blending of intratheater and intertheater airlift operations has improved support to the warfighter.

MAF airlift aircraft are optimized for cargo movement and airdrop operations; we rely upon commercial carriers to move the majority of military personnel between theaters in peace and war. We recognize that the airlines cannot fly in an environment contaminated with chemical, biological, or radiological agents, nor can they survive against enemy threat systems. Consequently, we use C-130s and C-17s, equipped with defensive systems, to move passengers within the theater.

Combatant commanders rely on the MAF's combat delivery capability to insert forces directly into battle and sustain those forces engaged in combat operations. While the number of combat delivery missions flown, or the tonnage of cargo delivered, may be small when compared to major 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 a unique military force projection capability—forcible entry into denied areas—that other nations cannot match. This mission may involve the airdrop of airborne forces or Ranger units, but also may be accomplished by carefully planned airland assaults on airfields and other landing areas.

High-altitude, precision-airdrop operations are used to deliver cargo to forces in remote areas or where threats preclude conventional low-altitude airdrops.

The older C-130s, without modernization, will be unable to provide the cargo/passenger airlift and special mission capabilities needed by warfighters. The C-130J's cargo compartment size is not large enough to carry the larger vehicles of the future combat system now under development by the US Army. Additionally, the aircraft performance at high gross weights will not permit operations from runways less than 2,000 feet in length, nor will its ground flotation characteristics allow operations on rough or soft (unprepared) surfaces.

The C-17 can carry all future combat system vehicles now planned; however, future threat systems will also preclude it from operating in many forward areas, and its ground flotation performance will not allow it to operate on unprepared surfaces. While improved aircraft defensive systems are planned, the increased range and lethality of future systems will deny airlift operations in all but low-threat environments.

Our operations in Afghanistan and Iraq have indicated the need for an aircraft, smaller than a C-130, to provide a responsive, light airlift capability to better support the combatant commander. We need to fill the 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 the larger C-130 or C-17 aircraft or permit their employment due to short- or low-strength runways. These operations also highlighted the importance of precision airdrops for combat operations and humanitarian relief.

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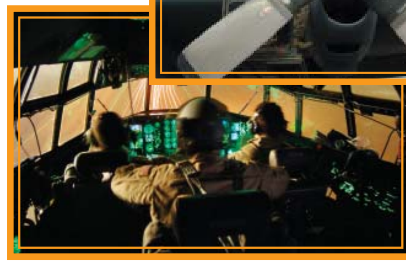
The Road Ahead



The C-130 fleet is aging, and recapitalization efforts are essential to maintain mission capabilities. During the near- and mid- terms, AMC plans to procure the C-130J to replace the restricted or grounded C-130E aircraft and in sufficient numbers (consistent with MCS) to maintain a minimum number of aircraft. AMC also intends to complete the C-130 Avionics Modernization Program (AMP) to bring our aircraft up to date, and ensure compliance with Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM) requirements. 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.

We plan to overcome the impact of high-tempo operations on the C-17 fleet with the procurement of additional aircraft. We will also increase the mission capability rates of our C-5 fleet with the Avionics Modernization Program and the C-5 Reliability Enhancement and Re-engining Program modifications.

AMC sees the Joint Cargo Aircraft (JCA) as a good addition to the theater airlift fleet and believes it will be an integral part of the supply and distribution system. This short takeoff and landing (STOL) aircraft will 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, compatible with night vision goggles, and have aircraft defensive systems to enable operations in a threat environment. The JCA is ideally suited for the Homeland Defense mission. It will also complement the C-130 and C-17 fleets and will fill the low-end niche of our combat delivery capability following its projected IOC in 2013.

KC-X units will be self-deployable, and the aircraft, with its inherent airlift capability and equipped with defensive systems, will augment the MAF airlift capability. The KC-X will be a good hedge against airlift shortfalls and will improve the velocity of the airlift fleet.

Over the long term, AMC intends to field the Advanced Joint Air Combat System (AJACS) as the replacement for the C-130H. When fielded, this 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 of the US Army or Marine Corps. It will be a very flexible aircraft that will be capable of carrying the Army's largest Future Combat System vehicle or up to 80,000 pounds of outsized cargo into unimproved areas in zero-zero weather conditions, conduct airdrops, and survive in the 2020+ threat environment. While the Mobility Capability Study suggested some future combat delivery requirements, we need a more thorough look that the ongoing Joint Future Theater Airlift Capability Assessment will provide. This study will deliver qualitative and quantitative assessments for the need for rapid theater delivery and resupply by air in the 2020+ time frame. This study will also contrast and compare future technologies that could meet our future combat delivery needs.

Lastly, we will initiate procurement actions for the next Global Airlifter, the C-X, to replace C-5s and eventually C-17s. This aircraft will be optimized for the long-range airlift of large amounts of bulk cargo, vehicles, and passengers.

Aside from aircraft acquisition programs, several key supporting capabilities will be extremely important in making our airlift fleet more effective.

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. The Large Aircraft Infrared Countermeasures (LAIRCM) program has proven itself, and we will continue the planned modifications to improve the survivability of mobility aircraft.

The effectiveness of the C-17 will increase with the full implementation of the dual-row airdrop system, and an improved instrument meteorology conditions (IMC) formation capability will improve strategic brigade airdrop operations.

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. Unit deployment times could drop rapidly with the increase in the number of usable airfields in the objective area, and the combat resupply of units will become much more responsive than today.

We need to aggressively develop and field the equipment and procedures to permit the airlift system to operate following the employment of chemical, biological, radiological, or nuclear (CBRN) weapons (see 2008 C-CBRN Roadmap).

Recapitalizing our legacy materials 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. Automated cargo loading/unloading will reduce our need to move MHE into forward fields for cargo handling and produce an overall increase in system velocity. Lastly, the MAF lacks the capability to efficiently move cargo within the Defense Transportation System without rehandling cargo when it moves from one mode of transportation to another. The use of standardized shipping containers will decrease the need for reconfiguring bulk cargo loads to fit the cargo compartments of individual aircraft types and produce an increase in cargo movement velocity.

Improved command, control, communications, computers, and intelligence (C4I) systems, to include data link integration, true secure global communications, and a responsive intransit visibility capability, are necessary for the cargo mobility system to be truly effective. As the concept of net-centricity matures, system interoperability will become the standard.

The phased solutions to our airlift capability needs are planned to the next 25 years and are reflected in the milestones below. The short-term milestones reflect the presence of funded, mature programs that are ready for fielding. 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

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Air Refueling Roadmap

OPR: Air Refueling Functional Capabilities 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 an important 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. 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 require air refueling to extend the persistence and endurance as well as range of all aircraft. The USMC (KC-130), AFSOC (MC-130E/P/H/W), and ACC (Rescue C-130P) have C-130 tanker aircraft that conduct refueling operations for 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, and the airborne relay for command and control (C2) information. AMC is working with Air Combat Command to develop the capability to refuel future unmanned aircraft.

The MAF operates the world's best air refueling fleet, but continuous combat 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 the 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 under way to improve refueling capabilities. The 827 Aircraft Sustainment Group (ACSG) 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 (GATM) program improves the aircraft's operational readiness and gives it communication, navigation, and surveillance upgrades necessary to fly in worldwide airspace. Similar benefits will be realized from the KC-10 Aircraft Extension Program (AEP).

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The Road Ahead

This roadmap illustrates the plan to improve our air refueling fleet over the next 25 years. AMC has retired several KC-135E models and plans to retire the remainder by FY08. Meanwhile, AMC is continuing the process to acquire the replacement tanker, or KC-X, and as of this writing, proposals from industry are being evaluated.

A KC-10 Aircraft Modernization Program (AMP) capability development document (CDD) was approved by the Joint Requirements Oversight Council (JROC) and addressed global airspace access (Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM)); lack of real-time situation awareness; night vision imaging system; provisions to support defensive systems; reliability, maintainability, and supportability; and downward-directed programs (i.e., Aircraft Information Program, Joint Tactical Radio System, and Network-Centric Operations). KC-10 AMP is being descoped due to affordability reasons and will primarily focus on CNS/ATM requirements. This descoped effort, referred to as KC-10 AEP, will require further Joint Capability Integration and Development System (JCIDS) activity.

Automated air refueling capability is in development and, when fielded, will permit refueling of unmanned aircraft. These same technologies could be adapted to manned aircraft and improve air refueling mission effectiveness during low-visibility flight conditions.

Air refueling is a worldwide mission and must be capable of operating amidst a wide range of threat systems. With the proliferation of threat systems, air refueling aircraft are no longer able to simply avoid hostile environments. Air refueling aircraft must be able to counter radar and infrared guided systems, light anti-aircraft artillery (AAA), and small arms fire. Directed energy weapons, including lasers and radio frequency weapons, represent an emerging threat to the air refueling fleet, especially during ground operations as well as takeoff and landings. The air refueling fleet of the future must be equipped to survive in these environments.

Additional fleetwide improvements are planned to provide the capability of automatic identification of all aircraft. Modification of cockpit, boom operator station, and aircraft external lighting with night vision imaging system (NVIS) compatible lighting will improve crew situational awareness and enhance operations in tactical environments. Over the long term, we should look at the capabilities that a more survivable tanker aircraft, like the Advanced Joint Air Combat System-Tanker (AJACS-T), would have on our strike operations.

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. Electromagnetic pulse (EMP) hardening and the ability to rapidly start engines, take off, and navigate in a GPS-denied environment will improve aircraft and mission survivability.

Improved connectivity will provide the capability to seamlessly and automatically transmit and receive secure, nonsecure line-of-sight (LOS), and beyond-line-of-sight (BLOS) 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.

The phased solutions to our air refueling capability needs are planned for the next 25 years and are shown as the milestones that follow. 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 which require additional research or study before final adaptation by the MAF.

Milestones

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Air Mobility Support Roadmap

OPR: ACS and C4I & IO Functional Capabilities Teams

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 (AF) 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 Mobility Air Forces (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 forces employ Agile Combat Support (ACS) processes that provide the foundation for successful mission accomplishment. 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.

Communications and Computers, Command and Control, Intelligence, and Information Operations. 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 and 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. Plans, organizes, trains, and equips forces, and provides medical counsel to maximize operational effects in support of rapid precise global air mobility. Primary capabilities include medical care and support for AMC operations and beneficiary population; care-in-the-air (aeromedical evacuation) system; force wellness and health protection; human performance enhancement; and the medical aspects of AMC operations in a chemical, biological, radiological, or nuclear (CBRN) environment, homeland security, and global stability operations.

Modeling, Simulation, and Analysis (MS&A). Provide capability for modeling, simulation, and analysis 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.

All support processes address key issues and are absolutely essential to increase air mobility capability for the MAF. In chapter six, the Mission Support Roadmaps identify courses of actions the MAF can pursue to ensure critical support capabilities provide our MAF customers the right thing, to the right place, at the right time beyond the first quarter of the twenty-first century!

MAF Deficiencies/Solutions

Reference Documents

Chapter 4—Mission Category Roadmaps

The Mobility Air Forces provide three unique capabilities to the combatant commanders: Aeromedical Evacuation, Special Operations Mobility, and Air Base Opening. The first two employ mobility aircraft, equipped with specialized equipment and flown by aircrews uniquely trained for the mission. 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's Contingency Response Units are trained and equipped to open air bases around the world. This chapter contains the roadmaps that chart our course for the future of these mission categories.

Aeromedical Evacuation Roadmap

OPR: AMC/A3O

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

AE has proven to be a critical capability supporting the War on Terrorism, enabling the mobility airlift system to move casualties with improved effectiveness and efficiency; rapidly delivering access to higher-level medical care. In addition, this capability is now being fully integrated into plans supporting homeland defense requirements, to provide a robust evacuation support within CONUS. Prepositioned medical aircrews, universally qualified to operate on practically any organic mobility aircraft configurable for the AE mission, continue to optimize this system. Aircraft support equipment innovations, such as the C-17 Litter Support Augmentation System, will continue to be key in ensuring AE capability in the current MAF fleet, while forecasting organic AE capability to future aircraft.

AE system performance, globally, provides state-of-the-art, in-flight medical care during transport of US and coalition forces, as well as eligible beneficiaries, as required. Today, contingency-related intratheater patient movements are conducted primarily by C-130s; intertheater patient movements are accomplished with C-17s and KC-135s. 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. In addition, future solutions to support the transfer of patients from staging facilities to high-deck aircraft will be required in concert with changes to the MAF fleet mix, to ensure the safe, efficient, and effective movement of patients from the aircraft following flight.

The Road Ahead

Our aeromedical airlift capability is the world's best; however, several efforts are needed to ensure we can continue to meet the requirements and expected standards of care in 2032. 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, while aircraft are important, universally qualified medical aircrews are absolutely critical to the success of the AE system; world-class patient care is the hallmark of the AE mission. To enable this, establishment of an aeromedical evacuation formal training unit to ensure standardized training, plus reduce the overall mission qualification time will provide a Total Force solution, meeting crewmember upgrade requirements and reducing the need for training aircraft to support AE. 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. Finally, the clinical-operational synergy of the AE mission must continue to be enhanced through advanced medical care and equipment initiatives and persistent efforts to ensure AE capability on future mobility aircraft.

Milestones

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Special Operations Roadmap

OPR: AMC/A3D

MAF Capability Statement

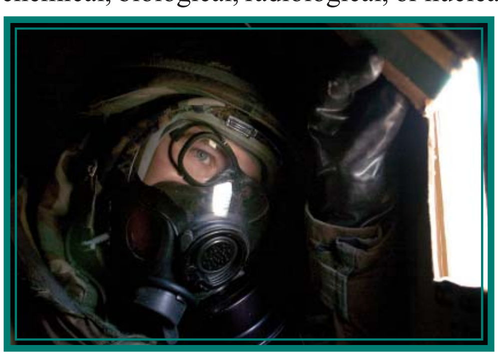
Provide airlift capability to execute clandestine special operations missions while extending the range of special operations with air refueling. Conduct worldwide operations in adverse weather and hostile threat conditions with special operations aircraft.

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, EC-130J, and MC-130E/H/P/W aircraft. AFSOC also provides short-range MH-53s and CV-22s. Fully fielding the CV-22 will significantly improve AFSOC's mobility capability. 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-135 special operations air refueling aircraft. Refueling support of rotary-winged aircraft is accomplished by MC-130E/H/P/W aircraft. Given that C-17 aircraft have the inherent capability to transport outsized/oversized cargo over strategic distances, we have equipped them specifically for the special operations mission. Both the C-17 and KC-135 have proven their ability to perform the special operations mission. Both aircraft have been equipped with beyond-line-of-sight (BLOS) voice/data capability. The C-17 was 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 and the KC-135 community is in the initial stages of modifying its special operations air refueling aircraft with an NVG-compatible boom station and external lighting. Aircrew members must receive intensive, highly specialized, and frequent training to be a part of the special operations team.

The Road Ahead

Enabling capabilities that will significantly assist us in performing the special operations mission include improved aircraft defensive systems, adaptable electronic warfare jamming systems, detection awareness, detection avoidance systems, threat avoidance, aircrew situational awareness, and an autonomous approach and landing capability. We recognize the challenges of operating in a chemical, biological, radiological, or nuclear (CBRN) 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. The capabilities listed above are not just SOF-unique, and are addressed as deficiencies for all combat delivery MAF forces in the Airlift 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

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Open the Airbase Roadmap

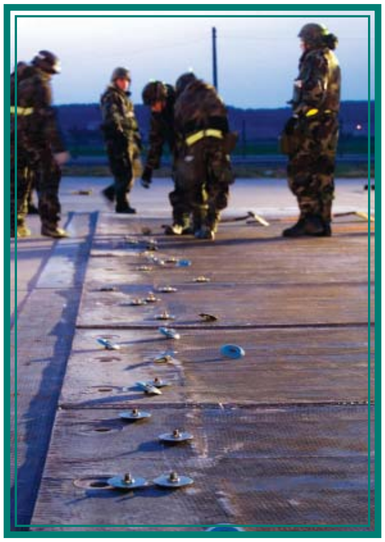
OPR: AMC/A3M

MAF Capability Statement

Provide the rapid response capability to initiate airbase opening globally across the full range of military operations and in all operating environments, regardless of follow-on mission or aircraft type. This capability seamlessly bridges 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. 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 have 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 six modules are outlined in the AETF Force Module Construct. The Open the Airbase Force Module initiates the Airbase Opening AETF as the first of the six force modules.

Air Force Contingency Response Groups (CRGs) are the embodiment of the Open the Airbase Force Module capability and can be augmented by regular Air and Space Expeditionary Force (AEF) specialties, as required. CRGs rapidly deploy to seamlessly bridge the gap between seizure forces and follow-on Air Expeditionary Group/Air Expeditionary Wing (AEG)/(AEW) forces (or Service equivalents) that will establish and operate the airbase. 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. Initial mobility, force protection, intelligence, threat assessment, civil engineering, command and control, reachback, medical support, and airfield terminal control operations form the CRG's core capability set. In addition, each CRG may maintain skill sets/UTCs that augment initial 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 groups will be composed of multi-skilled personnel who are both warfighters and functional experts. CRGs will be equipped with state-of-the-art equipment to facilitate airfield assessment and interim command and control, force protection, reach-back communications, timely intelligence, initial airfield operations, and limited mobility operations until the AEG/AEW leadership and replicative capabilities arrive. The CRG Assessment Team must include a senior field grade officer (O-6) to assume the critical role of 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 airbase assessment consists of thorough predeployment planning (both deliberate and crisis-action), 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 to Navy AEG/AEW equivalent). 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 a total of eight CRGs—one under US Air Forces, Europe, at Ramstein AB; one under Pacific Air Forces at Andersen AFB; and six under AMC (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, and codifying "Open the Airbase" concepts and best practices into Air Force and Joint doctrine. Efforts are currently under way between AMC, Air Staff, Air Force Doctrine Center, and Joint Forces Command to insert these concepts into existing doctrine publications.

Milestones

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Chapter 5—Weapon System Roadmaps

C-5 Roadmap

OPR: AMC/A5Q

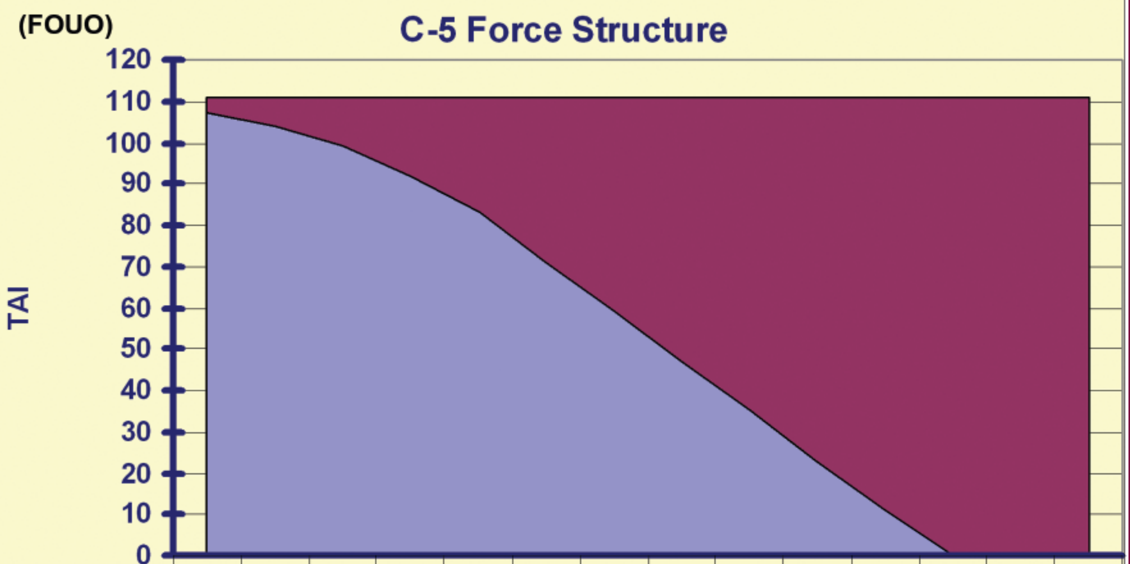
Weapon System Assessment

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, and nuclear (CBRN) environment (see 2008 C-CBRN 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 and provide field support required to help sustain the fighting force. Many members of the MAF, including AMC, 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 has C-5s at 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 111 C-5 aircraft within the MAF.

- First Flights: C-5A, 30 June 1968; C-5M, 19 June 2006
- First Operational Aircraft Delivered: C-5A, 1969; C-5B, 1986
- Average Age of Fleet: C-5A, 32 years; C-5B, 20 years
- Payload/Range: 291,000 pounds (max) at 1,530 nautical miles (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 (FY06: C-5A 49% and C-5B 66%—AMC standard 75%) and logistics reliability rates (~61%—AMC standard 85%). Two modernization programs address these C-5 problems: the Avionics Modernization Program (AMP) and the 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 85% and a wartime MC rate of 75% or greater. 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.



	08	09	10	11	12	13	14	15	16	17	18	19	20	21
C-5M	4	7	12	19	28	40	52	64	76	88	100	111	111	111
C-5A/B/C	107	104	99	92	83	71	59	47	35	23	11	0	0	0

Fiscal Year

Fleet Sustainment Strategy

Total dependence on the "fly-to-fail" sustainment strategy has contributed to high en route system component failures and has driven unscheduled maintenance rates to unacceptable levels. To complement the AMP and RERP and improve aircraft availability and flight safety, the 730th 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 missions and decrease costs to deploy maintenance recovery teams, support equipment, and readiness spares packages (RSP).

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

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 establishes the command's priority of projects within the C-5 program, including the introduction of new blocks. AMC has numerous ongoing capability improvement programs planned for the C-5 fleet with the most critical programs shown on the Program/Modification chart. Use the chart, in concert with the modification explanations shown immediately following.

C-5 Program/Modifications

[redacted]

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Modification Explanations

[redacted]

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Horizontal Tie Box Replacement

Because of the problems with the C-5A tie box, programmed depot maintenance (PDM) inspections track cracks in the C-5B horizontal stabilizer aft tie box fitting. The number and significance of the cracks has reached a point where the Tie Box program must transition from "inspect and repair" to "replace." The A- and B-model tie boxes were both manufactured from 7075-T6 aluminum forgings. The 7075-T6 is known as a Stress Corrosion Crack (SCC) susceptible alloy. The tie box is not fail-safe for limit load for a crack beyond the critical crack length. Limit load is the maximum load that any aircraft in the fleet would see during the service life of the fleet. Plans are to implement replacement of all C-5B tie box fittings as soon as possible through PDM. To mitigate the risk during the replacement program, AMC has implemented a tie box inspection during isochronal (ISO) inspection. The same procedures that were used for A-model replacement are applicable for B-model replacement. The new tie boxes are made of 7049-T73, a material more resistant to SCC.

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 40 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 and a battery charging system, and modifies the flight engineer's direct current control panel.

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Enhanced Surveillance/IFF Mode 5

Enhanced Surveillance (EHS) expands the capability of elementary surveillance by requiring the following additional information: selected vertical intention, track and turn report, and heading and speed report. Selected vertical intention includes barometric pressure setting and the altitude to which the aircraft has been cleared. The track and turn report includes roll angle, true track angle, ground speed, track angle rate, and true airspeed. The heading and speed report contains magnetic heading, indicated airspeed, Mach number, barometric altitude rate, and inertial vertical rate. The Flight Management System (FMS) software in the VIA/AIU requires updating. EHS is designed to improve airspace safety by reducing ground controller workload, which continues to increase exponential as airspace utilization increases. The international civil aviation organization (ICAO) mandate for these functions is March 2009.

IFF Mode 5 is a new military identification program that is being implemented DOD-wide. The AF plans to begin the C-5 implementation in FY10 with the entire fleet completed by FY15. Mode 5 provides longer range, improves range accuracy, increases security against exploitation and spoofing, improves identification of friend and foe, reduces garbling and mutual interference, and reduces IFF interference with civil air traffic control systems. The current Mode IV IFF is not Airborne Information Management System (AIMS)-certified which also poses future certification issues.

Selective Availability Anti-Spoofing Module

SAASM is an anti-tampering capability that significantly enhances the GPS precise positioning service (PPS) signal security. It consists of an architecture change to the GPS navigation receiver that essentially eliminates the probability that the GPS navigation signal can be compromised with current spoofing equipment. SAASM allows for unclassified black key encryption security systems as opposed to the classified red key encryption security system used today. SAASM uses crypto-nets which allow mission planners to tailor sets of receivers that could receive PPS signals. SAASM allows for automatic over-the-air re-keying of black key encryption which significantly reduces security requirements.

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 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. Thirteen C-5A aircraft kits have been installed. PDM currently has kits ready for installation. AMC programmed kit installation through the R&PC process. The requirement is approximately $2.3 million.

TF39 Thrust Reverser End Shoe/Slider Support Beam

Program is applicable to C-5 aircraft that will be flying TF-39 engines. It eliminates the track jumping failure mode of the thrust reverser. Track jumping is caused by the translating cowl end shoe pulling away from the pylon beam wear surface under load and engaging the side of the beam when the reverser is stowed. The engagement can result in an asymmetrical stow and damage to the unit. The slider support beam modification will extend the overlap engagement point of the translating cowl (the "end shoe") from approximately a .5 inch to a 1.5 inch wear surface by affixing a slider beam to the pylon beam assembly.

Aircraft Armor

Presently C-5s fly into hostile areas with little or no protection for the aircraft and crew. Mission reports show the C-5 aircraft receiving increased small arms fire. To provide protection for the C-5 aircraft and aircrew from small arms fire, the platform should be outfitted for armor protection. Addition of armor protection to the aircraft will increase the survivability of the crew and aircraft from hostile enemy small arms fire. The armor needs to be capable of stopping a 12.7 mm round. Vital aircraft systems (liquid oxygen) and junctions where multiple aircraft systems could be lost need to be protected. The requirement was defined by AMC/CV previously.

Advanced Situational Awareness and Countermeasures

ASACM addresses the AMC radio frequency countermeasures mission need statement dated November 2000. The system will initially provide advanced situational awareness 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.

Airborne Network Integration

ANI integrates hardware (antennas, power supplies, radios, processors, etc.) and software IT infrastructure within the platform so the network-enabled capabilities outlined in the MAF Airborne Networking Enabling Concept can be realized. ANI is a critical enabler for the success for multiple capabilities including, but not limited to, JPADS, ASACM, tactical data link (TDL), and intransit visibility (ITV). ANI allocation is necessary to enable AMC weapons systems to meet the net-ready key performance parameter (KPP) for the platform as well as individual systems employed on the platform.

Mobility Air Forces Data Link Integration

AMC requires global secure communications to ensure mission accomplishment in support of USAF CONOPS. Currently, AMC is pursuing secure line-of-sight (LOS) (i.e., Link 16), beyond line-of-sight (BLOS), and intelligence-broadcast-receive capabilities, as well as connectivity to the global information grid (GIG), via airborne networking architecture under the MAF DLI effort. MAF DLI provides infrastructure critical to airborne networking (AN) and network-centric operations (NCO) and enables operational advancements via secure intransit visibility, reachback/forward command and control, and situational awareness, enhancing MAF visibility to the common operating picture and MAF-CAF interoperability. The MAF DLI effort delivers cross-platform development, Group A/B kits, and integration and installation in concert with acquisition guidelines; fully supports the Air Force Tactical Data Link Capabilities Development Document; aligns with Joint Tactical Radio System program mandates; and postures AMC to begin realizing the vision described in the Mobility Air Forces Airborne Networking Enabling Concept and the Tactical Data Link—Transformation CDD.

Joint Tactical Radio Systems

JTRS is a DOD-mandated Joint program that is using spiral development to produce a family of interoperable software-compliant-architecture radios supporting multiple waveforms and providing secure, wireless networking communications capabilities for Joint forces. JTRS is critical to serving as the last tactical mile connecting the warfighter on the ground into the networking capabilities that are delivered through the GIG. Under the newly revised requirements, budget, and schedule established for the program, JTRS will provide the mobile, ad hoc networking capability that is essential to realizing DOD's transformational goals for the warfighter. The AMC plan is to migrate to JTRS technologies as JTRS radio solution suites become available and can be incorporated into future and existing AMC programs (i.e., MAF DLI, CNS/ATM, AMP, and block upgrades) as solution sets.

C-17 Roadmap

OPR: AMC/A5Q

Weapon System Assessment

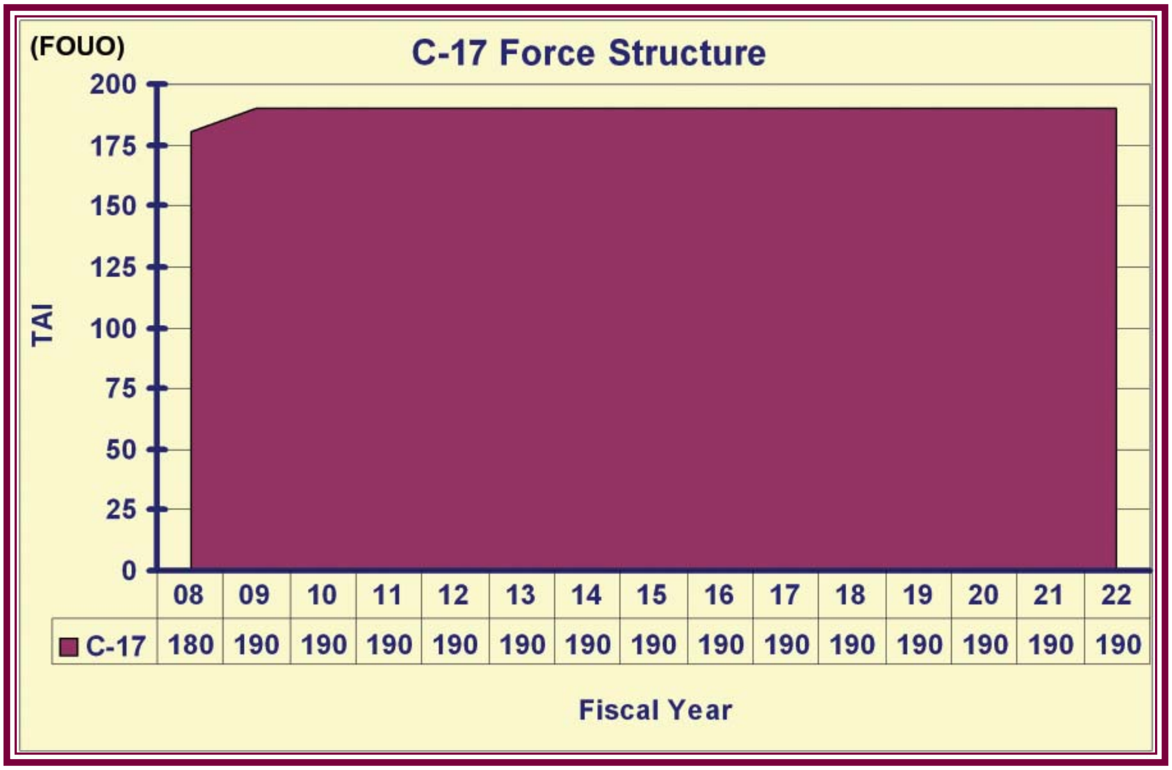
The C-17 is the Nation's core military airlifter, and it continues to excel in a wide range of operational mission scenarios. Initial squadron operations began in June 1993 with the first aircraft delivery to Charleston AFB SC and AMC/CC declared initial operational capability on 17 January 1995. The 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 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, and nuclear (CBRN) environment must be addressed (see 2008 C-CBRN 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: 3200 NM range (threshold) with payload of 110,000 pounds (Non-ER) and 127,000 (ER). The max unrefueled range with max payload (164,900 pounds ER / 170,900 pounds non-ER) is 2,372 NM
- Max Ferry Range: 4,600 NM
- Crew Ratio: 5.0

Production aircraft under the current program of record are scheduled for delivery through FY09. Current 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 (Air Force Reserve Command [AFRC] unit), Hickam AFB HI, Travis AFB CA, Elmendorf AFB AK, and Dover AFB DE.



Numerous aircraft improvements have been made since the first delivery. 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 (GRIP) or field retrofits. Both methodologies are used to maintain a single-model aircraft fleet. The first 70 aircraft produced (P-1 through P-70) are scheduled to be modified with extended-range (ER) fuel tanks concurrent with their upgrade with a Second-Generation On-Board Inert Gas Generating System (OBIGGS II). In addition, P-71 through P-137 require OBIGGS II retrofit.

The forum for addressing capability improvements is AMC's Requirements and Planning Council (R&PC) meetings between AMC and the 516th Aeronautical Systems Group (516 AESG). Reflecting the MAF and AMC/A5/8-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 production line is currently delivering Block 17 aircraft. The first Block 17 aircraft (P-153) was delivered to Hickam AFB HI in July 2006. Block 17 improvements include NVG-friendly combat lighting; on-board loose equipment storage; liquid oxygen bottle protection;

electronic flight control system changes to reduce lateral PIO susceptibility; required navigation performance (RNP) improvements; and Formation Flight System (FFS). The FFS is an alternative-technology (MIL-ACAS) solution intended to replace the legacy station keeping equipment (SKE) system and provide the capability to meet the US Army's requirement for the Strategic Brigade Airdrop (SBA). FFS will replace SKE traffic collision avoidance system (TCAS) overlay system that was introduced on P-125. It is designed to provide significantly higher reliability and availability, compared to the C-17's current system. Operational frequency approval submission for the FFS is under way.

Current 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 infrared countermeasures (LAIRCM). Future nonblock improvements include demand-assigned multiple access satellite communication; identification friend or foe (IFF) Mode 5; and communications, navigation, surveillance/air traffic management (CNS/ATM) IFF Mode S enhanced surveillance.

Key Capability Improvements

The forum for addressing capability improvements is AMC's R&PC process. Numerous ongoing capability improvement programs are planned for the C-17 fleet with the most critical programs shown in the following chart below. Use the chart, in concert with the modification explanations shown immediately following.

C-17 Program/Modifications

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Modification Explanations

Airdrop Improvements

Airdrop Improvements is a two-phased project to add GPS retransmission capability in the cargo compartment, increase airdrop operations altitude to above FL 250, improve C-17 airdrop system operations, eliminate safety deficiencies, and improve reliability. JPADS-MP will use the GPS retransmission capability in the cargo compartment.

Advanced Situational Awareness and Countermeasures (ASACM)

ASACM provides an integrated framework of protection from radar guided weapons (surface-to-air missiles [SAMs], anti-aircraft artillery [AAA], and airborne interceptors [AIs]) through threat avoidance and radio frequency countermeasures (RFCM) when threat avoidance isn't possible. C-17 ASACM capability is provided in two increments. The first increment (FY08 Program Objective Memorandum (POM), FY10 notional installs) provides situational awareness for threat avoidance. The second increment adds RFCM and maneuver cueing data on select aircraft.

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. OBIGGS creates nitrogen-enriched air (NEA) and introduces it into the fuel tanks to keep fuel tank ullage below flammability limit per operations requirement document (ORD). OBIGGS enhances system aircraft survivability by preventing small arms fire, electrical strike, etc. from igniting fuel tank vapors. The redesign of OBIGGS using a new constant flow technology, vice high-pressure storage bottles, will significantly increase system effectiveness, utility, and 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 was awarded on 31 March 2003 for production beginning with P-138 and subsequent aircraft. OBIGGS II will also be retrofitted on all aircraft prior to P-138.

ER/OBIGGS II Retrofit

This program combines two retrofits into one combined synergistic effort 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 was accomplished in FY05. Multiple-kit proofing was needed to address multiple fuel tank configurations due to differences in secondary structure, bracket, fixture, 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.

RNPI/HFDL

RNPI and HFDL are follow-ons 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 five 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. An additional set of landing and taxi lights will be installed to permit the pilots to switch from overt to covert mode. This capability was included with P-153 and subsequent aircraft, with a planned retrofit for the rest of the fleet.

Formation Flight Systems (FFS)

The FFS is an alternate-technology (MIL-aircraft collision avoidance system [ACAS]) solution intended to meet the US Army's requirement for an SBA pass time across the drop zone of 30 minutes. The FFS will replace the current TCAS overlay system introduced on P-125. 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 provide TCAS functionality currently fielded on C-17 aircraft, and thus eliminate the current TCAS line replaceable unit (LRU) from the aircraft.

Core Integrated Processor (CIP) Replacement

The current C-17 mission computer/core integrated processor has been identified as an obsolescent item 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 production and retrofit starting in March 2009.

Joint Precision Airdrop System - Mission Planning

JPADS-MP is a combat-delivery-enabling system designed to increase aircrew survivability while significantly improving airdrop reliability and accuracy when airdropping payloads from high altitudes and stand-off distances. The system will provide the means to meet the combatant commander's requirement of projecting and sustaining combat power using high-altitude, precision airdrop, as a direct delivery method, into a dynamic, dispersed battlespace. Precision airdrop supports the full spectrum of military operations from humanitarian relief/low-intensity conflict to major theater war. Forcible entry operations, immediate emergency resupply, delivery of resupply and forward caches to maneuvering ground forces, sustainment of small units operating in remote locations, resupply of surrounded forces, and delivery of supplies and equipment near or within urban areas are a few examples of supportable military operations. Accurate aerial delivery minimizes both the on-ground logistic footprint and vehicle convoy vulnerability to enemy attack. The capability to conduct unilateral, Joint, and other DOD combat, resupply, and humanitarian high-altitude airdrop operations —with accuracy standards that meet Army requirements (150 meter accuracy)—will eliminate lost or damaged resupply material and enhance survivability of AMC assets via high-altitude, standoff distances from ground threats.

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

Refer to C-5 Roadmap for ANI description.

Mobility Air Forces Data Link Integration

Refer to C-5 Roadmap for MAF DLI description.

Joint Tactical Radio Systems

Refer to C-5 Roadmap for JTRS description.

C-130 Roadmap

OPR: AMC/A5Q

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 (AETC). Special mission variants are operated by Air Force Special Operations Command (AFSOC) and Air Combat Command (ACC) 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, these aircraft operate in a Joint environment throughout the world and across the range of military operations. Employed primarily in a theater role, the venerable "Herk" provides rapid transport of personnel and cargo by 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, and fight forest fires, as well as provide for clandestine penetration and close air support/battlefield interdiction. 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 and 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/passenger airlift and special mission capabilities needed by warfighters. While the C-130J permits the transport of 8 pallets versus the standard 6 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- to 2,000-

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 and future missions, operations following the employment of chemical, biological, radiological, and nuclear (CBRN) weapons must be addressed (see 2008 C-CBRN Roadmap).

For the near- and mid-term, the Air Force plans to retire its C-130E variants and acquire combat-delivery C-130Js. Special Operations Command (SOCOM) plans to recapitalize its older MC-130E/P aircraft, while ACC is taking steps to increase the size of its HC-130 tanker fleet. AMC, through the C-130 Avionics Modernization Program (AMP), will upgrade 222 combat-delivery aircraft. The AMP modification addresses avionics-related reliability, maintainability & supportability (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 Joint Air Combat System (AJACS) 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

The forum for addressing capability improvements is AMC's Requirements and Planning Council (R&PC) process. Numerous capability improvement programs are ongoing or planned for the C-130 fleet with the most critical programs addressed below. Use the chart in concert with the modification explanations shown immediately following.

C-130 Program/Modifications

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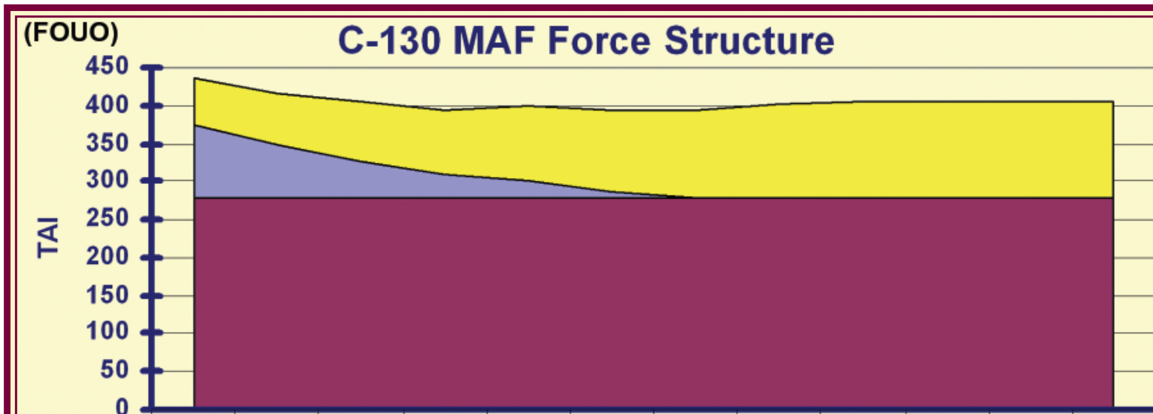

	08	09	10	11	12	13	14	15	16	17	18	19
C-130J	61	67	77	87	99	107	115	123	127	127	127	127
C-130E	95	71	48	29	22	9	0	0	0	0	0	0
C-130H	279	279	279	279	279	279	279	279	279	279	279	279

Fiscal Year

Modification 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 Terrain Awareness and Warning System (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 ultra high frequency (UHF)/very high frequency (VHF) data link. Approximately 222 aircraft will be modified.

CNS/ATM (C-130J)

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.

ALR-69A Precision Location and Identification (PLAID)

(FOUO) 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 geo-location capability for increased situational awareness. The system will also have increased capability to operate in dense-signal environments. A total of 300 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 improves aircraft/aircrew protection by automatically countering advanced infrared (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 approximately 180 C-130 aircraft.

Airborne Network Integration
Refer to C-5 Roadmap for ANI description.

Mobility Air Forces Data Link Integration
Refer to C-5 Roadmap for MAF DLI description.

Center Wing Box Replacement
Due to unique mission requirements and the severity of their flight environment, we began replacing the center wing boxes of special-purpose C-130s in 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. The MC-130H fleet began 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.

Joint Precision Airdrop System - Mission Planning
JPADS-MP is a combat-delivery-enabling system designed to increase aircrew survivability while significantly improving airdrop reliability and accuracy when airdropping payloads from high altitudes and stand-off distances. The system will provide the means to meet the combatant commander's requirement of projecting and sustaining combat power using high-altitude, precision airdrop, as a direct delivery method, into a dynamic, dispersed battlespace. Precision airdrop supports the full spectrum of military operations from humanitarian relief/low-intensity conflict to major theater war. Forcible entry operations, immediate emergency resupply, delivery of resupply and forward caches to maneuvering ground forces, sustainment of small units operating in remote locations, resupply of surrounded forces, and delivery of supplies and equipment near or within urban areas are a few examples of supportable military operations. Accurate aerial delivery minimizes both the on-ground logistic footprint and vehicle convoy vulnerability to enemy attack. The capability to conduct unilateral, Joint, and other DOD combat, resupply, and humanitarian high-altitude airdrop operations —with accuracy standards that meet Army requirements (150 meter accuracy)—will eliminate lost or damaged resupply material and enhance survivability of AMC assets via high-altitude, standoff distances from ground threats.

SAFIRE Look-out Capability
Current procedures require "look-outs" to stand at the troop doors and view out the porthole windows to scan the ground and horizon for SAFIRE launches. Windows used for observation in C-130E and H1-models are approximately nine inches in diameter; restrict the field of view to 110 degrees and the window glass is typically scratched and scuffed to the point that viewing becomes difficult. SAFIRE lookout capability will provide a panoramic view from horizon to at least 45 degrees below horizon (90-degrees objective) between the 3 o'clock to 9 o'clock continuum behind the aircraft, and will provide a personal restraint device certified for use from combat entry checklist through landing, and from takeoff through completion of the combat exit checklist.

Loadmaster Crashworthy Seat
Unlike other AMC aircraft, USAF C-130 aircraft do not have a designated loadmaster seat in the cargo compartment designed to withstand excessive impact or wheels-up landing forces. Yet while carrying troops/passengers in the cargo compartment, the loadmaster is the crewmember responsible for ensuring their safe and expeditious evacuation of the aircraft during emergency egress situations. Study of past Class A mishaps reveal that those crewmembers seated in flight deck-designed seats were able to escape fatal injury when compared to those crewmembers who sat in nylon web seats with only a lap belt.

Joint Tactical Radio Systems
Refer to C-5 Roadmap for JTRS description.

C-27J Roadmap

OPR: AMC/A5Q

Weapon System Assessment

The Army's new Concept of Operations (CONOPS) for smaller, dispersed operations over greater tactical and operational distances gave rise to the Army Future Cargo Aircraft (FCA) program. The FCA was originated to extend the reach of the current C-23 Sherpa fleet and provide compatible transload capability to the CH-47 Chinook. Under Program Decision Memorandum-III in December 2005, the Air Force joined the Army in this endeavor, giving birth to the Joint Cargo Aircraft (JCA) program. In June 2006, the Air Force and Army Vice Chiefs signed a memorandum of agreement (MOA) in which the AF accepted the key performance parameters (KPPs) in the Army's capability development document (CDD); both Services would fly the same aircraft. Additionally, the Air Force commenced analysis with RAND to help quantify the Air Force requirement for JCA under the broader Air Force mission as DOD's provider of intratheater airlift. As a Joint platform, JCA will replace several less-capable Army platforms (i.e., C-23, C-26, and C-12) and will complement existing Air Force capability by adding a more efficient means to move small payloads, shorter distances, into austere locations.

The Army and Air Force jointly selected the C-27J to meet JCA requirements for a light, intratheater airlift capability in support of numerous wartime and peacetime missions in the midst of catastrophic, traditional, disruptive, and irregular challenges. The C-27J will meet JCA payload requirements of three 463L pallets weighing 18,000 pounds. Like the current intratheater fleet of C-130s, the C-27J will possess airdrop and short-, austere-airfield capability and will be able to self-deploy. The C-27J provides the Army with a much more capable platform over the C-23, and it gives the AF an efficient tool to deliver smaller loads down to the "last tactical mile" within the Joint operations area (JOA). This aircraft will complement larger intratheater mobility aircraft performing similar missions. These missions include airdrop and airland delivery, casualty and aeromedical evacuation, combat support, and forward arming and refueling point (FARP) operations. Light intratheater airlift could be especially beneficial in countering 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 effective airpower operations, when facing irregular challenges may be support missions such as transport, reconnaissance, and resupply. Furthermore, since these irregular challenges will likely erupt in second- and third-world countries with limited infrastructure, the aircraft's austere, short-field capabilities along with its small footprint could be especially useful in future warfare scenarios.

In addition to major combat operations (MCO) support, this aircraft will complement Homeland Security mobility operations moving quick-reaction forces and first responders for national emergencies and natural disasters. The C-27J will be able to 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 Army plans to procure their first aircraft in FY07, and the Air Force plans to follow roughly 2 years behind the Army buys, resulting in the first AF C-27J deliveries in FY12. Both JCA training and sustainment (supply chain and maintenance) will be Joint processes. The training and sustainment strategies are to conduct a business case analysis to determine the best Joint solutions. In the interim, training and sustainment will be contracted.

Because the aircraft originated as an Army platform, the current analysis supporting C-27J is primarily focused on JCA's direct support role to organic forces. However, the Air Force believes leveraging the efficiencies of a smaller cargo platform across the spectrum of intratheater lift may complement, but not replace, the existing C-130 fleet. Consequently, the Air Force has contracted RAND to evaluate the right mix of tactical airlift platforms needed to meet the warfighters' evolving battlefield requirements. Ultimately, the Air Force/Army vision for the C-27J is to deliver Joint warfighter support down to the last tactical mile both abroad and at home.

Advanced Joint Air Combat System (AJACS)

OPR: AMC/A8X

Courtesy of Lockheed-Martin Corp.

In the last Air Mobility Master Plan, we discussed the Air Mobility Concept-X (AMC-X), a twenty-first century future theater airlifter designed to eventually replace the venerable C-130 family of aircraft. Since that publication, significant progress has been made on this concept. AMC is currently planning to officially introduce a considerable effort for research and development of the definitive platform in 2010. Air Force Special Operations Command (AFSOC), is keenly interested in, as well as supporting, this research and development effort as they look for a platform (M-X), to replace their aging MC-130 aircraft. To fully define the capabilities, AMC will need in future theater operations, we renamed the concept from AMC-X to AJACS, the Advanced Joint Air Combat System. AJACS capabilities are not drastically different from the AMC-X; a fast, long-range, short take off and landing (STOL), survivable aircraft that can conduct airdrop operations and will carry medium weight payloads (60-80,000 pounds) into and out of unprepared areas. Our future airlift vision has not changed in the last 2 years. To quote the 2006 AMC AMMP:

> "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."

Over the past 2 years, AMC has made progress in further defining AJACS capabilities. Our efforts have focused upon simple questions that have significant impact such as, "What impact will AJACS have in a future theater, (for take-off and landing) how short is short enough, how will AJACS mitigate the threat risk, what additional technologies need to be incorporated in the Air Force Research Laboratory (AFRL) mobility roadmap, and how can we provide the most effective and affordable aircraft?" These questions, and more, will be subsequently answered in greater detail in our analysis of alternatives (AoA). We understand the boundaries of the capabilities we have identified and will be able to further focus the requirements lens before we officially commence the AoA.

Chronologically, we introduced AJACS into the Joint Capabilities Integration and Development System (JCIDS) process in 2006. In conferring with USTRANSCOM about future theater needs, we assisted in development of, and are a key contributor to their Joint Future Theater Airlift Capabilities Assessment (JFTACA), an analysis of future theater needs out to 2024. The qualitative portion of the study is complete, and capability gaps have been formally captured.

On a separate issue, AMC, AFRL, and industry have independently conducted operational analyses on the issues of access (specifically VTOL or STOL) and survivability. Though these analyses need further refinement, we have made some initial observations. Three separate studies have concluded that AJACS can reach the vast majority of the world (and in turn, potential adversaries) by being able to take off and land with payload in 1,500-2,500 feet. With this STOL capability, there are a number of small, fixed locations sufficient enough to be within approximately 100 nautical miles of any location of interest. Further evidence suggests that the capability to operate from unimproved surfaces, when prepared or semi-prepared surfaces are unavailable decreases this distance and increases access, and is more than adequate to support ground forces in their enclaves. Little evidence suggests that investing in landing and taking off in less than 1,500 feet is necessary. In concert with our access studies, we are still determining what level of initial risk mitigation will be adequate for AJACS. Consistent threats we see in the future range from radio frequency (RF) surface-to-air missiles (SAMs) to man-portable air defense systems (MANPADS) to small arms to lasers. Also, the capability to fly long distances unrefueled is even more important due to the threat range that theater ballistic missiles place upon our staging areas. The overall risk assessment is in progress.

Finally, the Secretary of the Air Force-sponsored Advanced Composite Cargo Aircraft (ACCA) has the potential to pay great dividends to the AF, AMC, and AJACS. This multi-phase flight demonstration program is poised to demonstrate how we can design, build, and fly an approximately 50% composite airplane in 17 months. After a competitive, nine-submission analytical review conducted by a team of AFRL, AFSOC, and AMC experts, two contractors have been selected for further design refinement. The present plan is to select one design for a September 2008 first flight. Initially, the importance of the ACCA is not just in flight testing. The importance is what we will learn in rapid-build, composite structures and tooling alternatives. This research may play a substantial role in how industry manufactures future military and commercial aircraft. Research from the ACCA build processes has the potential to reduce the cost of production aircraft by 20%, maybe more. If successful, AJACS could conceivably be produced at a cost significantly less than any aircraft of similar size. ACCA will eventually become an AJACS advanced-technology test bed. Upon successful completion of the initial demonstration, subsequent phases of testing (FY10-12) will be more applicable to AJACS, STOL system integration, risk mitigation, advanced landing gear systems, etc.

AMC is developing a path to capture a replacement for the legendary C-130. The roadmap for AJACS is in the initial stages. Planned IOC is still 2021. Momentous progress must be made over the next 2 years to accomplish this plan. Through our studies and the ACCA, AMC is strongly positioning itself to acquire, field, and operate AJACS.

MAF Deficiencies/Solutions | **Reference Documents**

KC-10 Roadmap

OPR: AMC/A5Q

Weapon System Assessment

The Global Mobility Concept of Operations (GM 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-10 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-10 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.

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[redacted] (b)(5)

[redacted] (b)(5)

The terminated KC-10 Global Air Traffic Management (GATM) program was based on a 1998 GATM operational requirements document (ORD) and was originally designed to address some of the shortfalls mentioned above. However, continued delays and cost growth in the KC-10 GATM program, coupled with evolving requirements and obsolescence issues, led AMC to reassess the modernization plans for the KC-10 fleet. While the original GATM architecture provided processor growth and throughput to support selected GATM 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, the AMC Commander approved the termination of the KC-10 GATM program and directed the initiation of KC-10 Aircraft Modernization Program (AMP). This program addressed providing net-centric communications, enhanced survivability, capabilities to meet CNS/ATM, survivability, and force protection requirements, as well as improvements in the aircraft's reliability and maintainability. Due to affordability issues, KC-10 AMP was descoped with CNS/ATM addressed under the KC-10 AEP and the remaining capabilities addressed under stand-alone capabilities development documents (CDDs).

More efforts are planned to ensure the KC-10 can provide the required mission capabilities. Defensive systems are required to ensure missions performed in hostile infrared (IR) and radio frequency (RF) threat environments can be performed. With the widespread 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 and biological weapons (see 2008 C-CBRN Roadmap).

- First Flight: 1979
- First Operational Aircraft Delivered: 1981
- Last Operational Aircraft Delivered: 1990
- Average Age of Fleet: 22 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.

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Modification Explanations

Defensive Systems

A system to protect the 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, with installation in the future as funding becomes available. Baseline capability will be the requirements outlined in the Large Aircraft Infrared Countermeasures (LAIRCM) ORD and Advanced Situational Awareness and Countermeasures (ASACM) CDD.

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GATM Stop Gap

The original GATM 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 GATM and made the original GATM program underfunded, unique in design, and inadequate for future requirements of the KC-10. As a result, KC-10 GATM was terminated in April 2004. The stop-gap effort supported several projects with remaining GATM funds which bridged from the terminated KC-10 GATM program to the KC-10 AMP program. 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***
GATM AC Restoration	A5QT	Completed	Funded	Stop Gap	X
Enhanced Mode S	A5QS	FY09	Funded	GATM ORD	X
Restore FTD #1	A3TK	Completed	Funded	Stop Gap	X
Restore FTD #2	A3TK	Completed	Funded	Stop Gap	X
PRNAV Cert	A5QT	Completed	Funded	Stop Gap	X
Iridium Phone Ant	A5QT	ASAP	Funded	1067	X
UHF SATCOM Ant	A3DT	ASAP	Funded	1067	X
Courseware	A3TK	FY09	Funded	Stop Gap	X

KC-10 AMP

HQ AMC, the KC-10 Program Office, and Air Staff representatives conducted a benefit/cost analysis which recommended a competitive acquisition strategy for the KC-10 AMP. AMP was more than an avionics upgrade; it included Joint Requirement Oversight Council (JROC)-validated capabilities beyond an avionics upgrade. Air Refueling Initial Capabilities Document (ICD) supports both KC-10 AMP and KC-X and was JROC-approved 30 November 2004. KC-10 AMP CDD was JROC approved and key performance parameters (KPP) validated on 2 June 2006. The KC-10 AMP CDD addresses global airspace access (Communication, Navigation, Surveillance/Air Traffic Management (CNS/ATM); lack of real-time situation awareness; night vision imaging system; provisions to support defensive systems; and reliability, maintainability, and supportability). Uncertainty in the KC-135 replacement program and length of time necessary to replace over 500 KC-135s, emphasizes need to modernize (to maintain) current tanker capability; the Mobility Capability Study and KC-135 recapitalization analysis of alternatives assume 59 viable KC-10s through 2045. Congressional New Start Approval was received for the KC-10 AMP in FY06. The acquisition program office for KC-10 AMP is the ASC/653d AESS at Wright Patterson AFB OH. The KC-10 AMP is being descoped to KC-10 AEP, with primary focus of resources on CNS/ATM.

Maintenance Training Systems

This effort provides KC-10 maintenance training systems to support AMC/AETC training for world-wide maintenance support of operations. The MTS approach is to develop a balanced on/off aircraft maintenance training capability using interactive multimedia instruction (IMI), part-task trainers (PTTs), limited maintenance training devices (MTDs), and aircraft-implement "blended solution" approach currently used for C-5/C-17 maintenance training systems. MTS will comply with the requirements outlined in the AMC Aircraft MTS CONOPS.

Flight Data Recorder

KC-10 FDRs were declared nonsupportable by the repair vendor and faced near-term obsolescence. Approximately 40% of FDR models used on the KC-10 fleet were not supported by the vendor due to parts obsolescence after January 2006. This effort replaces the old FDR with a new solid-state FDR capable of meeting all future AEP and AIP recording requirements. This modification effort is currently under way with a projected completion date of September 2008.

Airborne Network Integration

Refer to C-5 Roadmap for ANI description.

Mobility Air Forces Data Link Integration

Refer to C-5 Roadmap for MAF DLI description.

Joint Tactical Radio Systems

Refer to C-5 Roadmap for JTRS description.

KC-135 Roadmap

OPR: AMC/A5Q

Weapon System Assessment

The KC-135 Stratotanker is AMC'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 enhances air refueling capabilities and supports deployment, employment, sustainment, and redeployment of Joint forces across the full range of military operations from nuclear warfare to normal and routine military activities. To fully support nuclear and special operations, aircraft are equipped with additional capabilities such as electromagnetic pulse protection and specialized communication equipment. Although not a primary mission, the KC-135 is employed for opportune airlift and aeromedical evacuation.

The aging KC-135 fleet is undergoing modernization to extend its life cycle well into the twenty-first century. 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 overall costs continue to increase. To ensure the aircraft's viability well into the twenty-first century, AMC is supporting an incremental acquisition effort to extend the KC-135 as a viable weapon system through several aircraft extension programs.

The Block 30 modification program was completed in FY02. This upgrade included Pacer CRAG (Compass, Radar, and Global Positioning System), 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; 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 installation included a Traffic Alert and Collision Avoidance System, standby attitude directional indicator, reduced vertical separation minima (RVSM), and navigation and 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.

The Roll-On Beyond-Line-Of-Sight Enhancement (ROBE) program modified 40 KC-135s with tactical datalink (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 and is 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 (C2ISR) mission.

Currently, the KC-135 is undergoing a Block 40 modification, consisting of the Global Air Traffic Management (GATM) system modification and a circuit breaker/transformer rectifier replacement program. The 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 datalink supporting aircraft to air traffic control communications, flight management services, and command/control communications between the aircraft and the Tanker Airlift Control Center. It also adds a second high frequency (HF) 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 ongoing to determine the KC-135 fleet's viability, and more efforts are planned to ensure the KC-135 can provide the required mission capabilities. KC-135s are tasked to operate closer to the front and in more challenging threat environments than in the past; therefore, defensive systems are required to ensure missions in hostile threat environments can be accomplished. With the widespread use of night vision devices (NVDs), KC-135s need to be modified with NVD-compatible interior and external lighting. A primary MAF goal, as described in the AMC Night Vision Devices Concept of Operations (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, nor does it have an aircrew situational awareness capability. 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 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 that 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.

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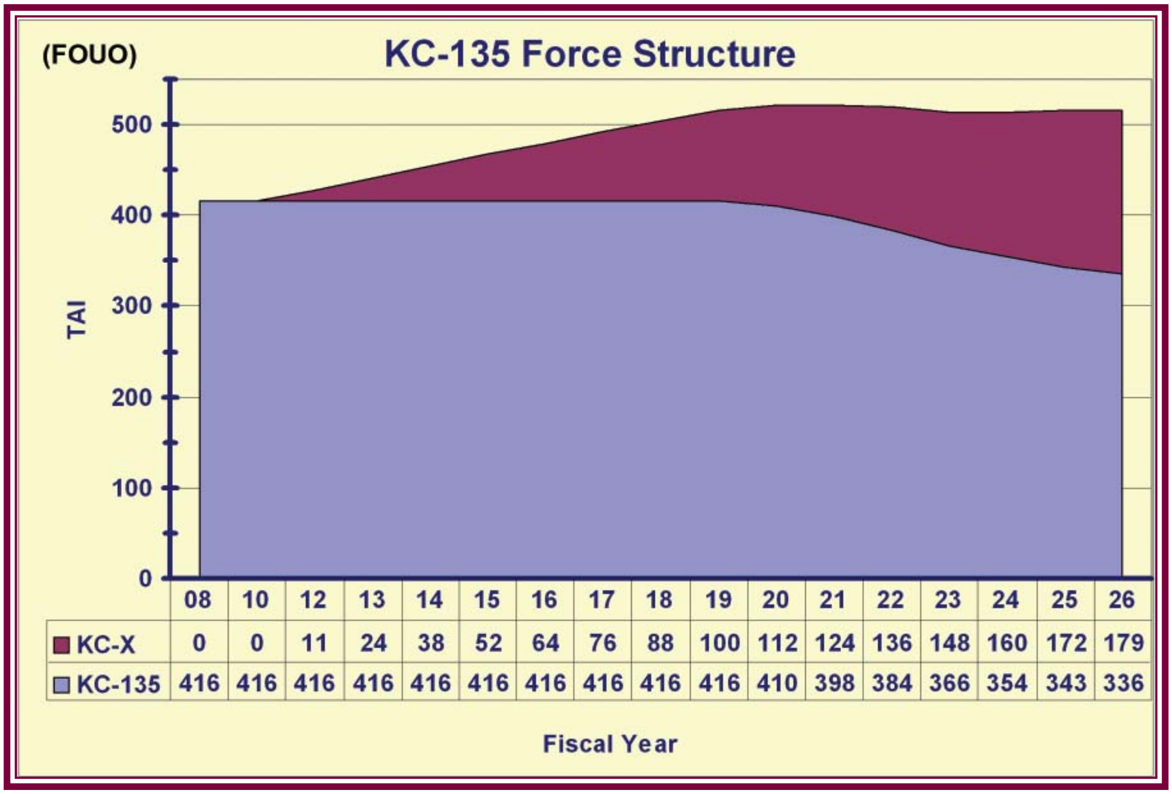
Regardless, we must take steps to ensure the KC-135 fleet remains viable until KC-X can assume global air refueling duties. Consequently, we are in the process of coordinating a KC-135 Aircraft Extension Program (AEP). KC-135 AEP includes Block 45, potential Block 50, as well as initial discussion of future modifications. For the near term, our focus is on the funding, testing, and fielding of Block 45. Block 45 includes a digital integrated flight director (FD), radio altimeter (RA), night vision imaging system (NVIS), external and boom pod lighting, aeromedical evacuation (AE) upgrades (i.e., heating, power, lighting), and aircrew situational awareness Group A. (Group A provides antennas, wiring, a multi-interface panel, and cockpit display mount. Group B provides common radios and an interface processor for tactical data link for the MAF.)

Fleet Facts:

- First Flight: 1956; first operational aircraft delivered: 1957
- Total Aircraft Delivered: 732; average age of fleet: 47 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, 1.75; Air National Guard, 1.8



Key Capability Improvements

The forum for addressing capability improvements is AMC's Requirements and Planning Council (R&PC) process. 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.

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Modification Explanations

KC-135 Aircraft Extension Program

The KC-135 AEP is AMC's latest effort to keep the KC-135 an effective asset through FY 2040. The program will start in FY08 and be delivered in multiple increments:

- Increment 1 - KC-135 Block 45: Digital integrated flight director (FD)/radio altimeter (RA), night vision imaging system (NVIS), external and boom pod lighting, aeromedical evacuation (AE) upgrades (i.e., heating, power, lighting), aircrew situational awareness Group A (e.g., wiring, antennas, cockpit mount, equipment racks, multi-purpose interface panel).
- Increment 2 - KC-135 Block 50: Defensive systems, glass cockpit, autopilot (AP)/angle of attack (AOA) system, digital HF radio; further AE upgrades (aircraft cooling); NVIS compatible cockpit.

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Defensive Systems

This effort will install a system to protect the KC-135 from infrared (IR) and radio frequency threats (RF) to reduce vulnerability from IR and RF guided weapon systems. Large aircraft infrared countermeasures (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. The current requirement calls for equipping all KC-135s with defensive systems, beginning with LAIRCM installation on 22 KC-135s to support special missions. The capabilities outlined in the Advanced Situational Awareness and Countermeasures (ASACM) capability development document (CDD) will provide both situational awareness to the crew in regards to the RF threat environment, and when applicable/installed, RF countermeasures.

Enhanced Surveillance/Mode 5

The current KC-135 APX-100 Mode S 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. Enhanced surveillance will begin fielding no later than FY08 with Mode 5 to follow. The solution is to procure a new APX-119 transponder.

Wheel and Brake System Improvement

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.

Night Vision Imaging System

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 air refueling operations at night. All KC-135 aircraft must have an NVD-compatible cockpit, boom pod, and external lighting. This is included in the Aircraft Extension Program.

Airborne Network Integration

Refer to C-5 Roadmap for ANI description.

Mobility Air Forces Data Link Integration

Refer to C-5 Roadmap for MAF DLI description.

Joint Tactical Radio Systems

Refer to C-5 Roadmap for JTRS description.

KC-135 Replacement Aircraft (KC-X) Roadmap

OPR: AMC/A5Q

Weapon System Assessment

The Capability Gap

The initial capabilities document for air refueling (AR), 27 April 2005, identifies gaps and shortcomings of the existing tanker fleet (KC-135 and KC-10):

Boom/Probe and Drogue Refueling. Permanent probe and drogue capability does not exist on the KC-135. Up to 4% can be configured to accept wing pods. All 59 KC-10 aircraft possess a permanent probe and drogue capability. This shortfall severely limits the flexibility of air operations and mandates using additional air refueling aircraft to cover Joint/coalition missions.

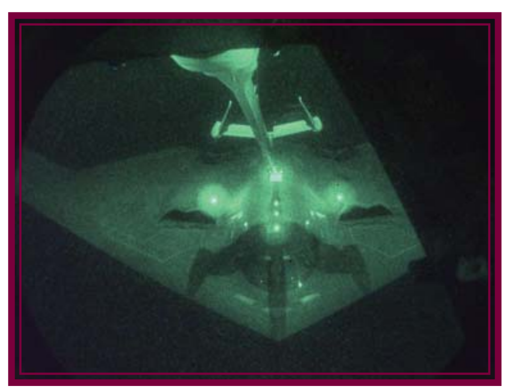
Receiver Capabilities. Only 1.5% (8 aircraft) of the KC-135 fleet has the capability to onload fuel while airborne. Lack of tanker receiver capability prohibits force extension and limits persistence over the battlefield. It also results in inefficient use of valuable/limited AR assets.

Defensive Protection. The current AR fleet lacks any defensive protection capabilities. AR is a worldwide mission and, therefore, must be capable of operating amidst worldwide threats including radar and infrared surface-to-air-missiles, including man-portable air defense systems (MANPADS), antiaircraft artillery, small arms fire and counter air aircraft. Based upon the worldwide proliferation of threat systems, tankers are no longer able to simply avoid hostile environments. They have operated increasingly closer to threats and even within missile engagement zones, especially when tasked as on-scene commander during combat search and rescue missions. This capability becomes more vital in expeditionary operations where tankers are operating out of forward bases closer to potential surface threats.

Communications, Navigation, and Surveillance/Air Traffic Management (CNS/ATM). Some current tanker configurations require significant modifications to meet future Federal Aviation Administration (FAA)/International Civil Aviation Organization (ICAO) CNS/ATM initiatives. These capabilities will be required to gain global access to civil controlled airspace.

Multi-Point Refueling. Simultaneous refueling of two or more aircraft from the same tanker is limited to 35 sets of wing-mounted refueling pods installed on AF tankers. A total of 3.7% (20 aircraft) of the KC-135 fleet with 20 pod sets and 33% (20 aircraft) of the KC-10 fleet with 15 pod sets are available for pod refueling.

Command, Control (C2), Communications, and Computers (C4). Current tankers do not have the required connectivity to C2 agencies and have very limited C4 connectivity to other combat, combat support, and mobility aircraft. Very limited real-time information in the cockpit (RTIC) capability exists.



Night Vision Imaging System (NVIS). Tanker cockpits, boom operator positions, and exterior lighting are not currently NVIS-compatible. This prohibits air refueling in tactical conditions which require NVIS and degrades night AR operations and special operations support.

Capability Assessment

The KC-X capability development document (CDD) identifies capabilities needed in the first increment of a commercial derivative KC-135 replacement aircraft. Future increments identified in subsequent CDDs, if required, will incorporate technology advances and changing military requirements.

The KC-X will be capable of operating in day/night and adverse weather conditions over vast distances to enable the deployment, employment, sustainment and redeployment of US Joint, allied, and coalition forces. The KC-X will have the ability to refuel receptacle- and probe-equipped receiver aircraft on the same sortie. The KC-X will have the necessary navigation and communication equipment for worldwide operations plus have the capability to operate during times of spectrum interference (communication/navigation/radar) and accomplish the mission during Emission Control (EMCON) 4 operations. To assist in airlift operations, the KC-X will have a convertible freighter airlift capability to carry personnel and palletized cargo. The KC-X will have the capability to receive fuel through an air refueling receptacle. The KC-X will be capable of performing mission requirements in chemical, biological, and nuclear environments and will have the capability to operate in low- to medium-threat areas with self-defense/protection (both active and passive) capabilities and necessary battle space awareness to mitigate threats. The KC-X will be provisioned for simultaneous multi-point drogue refueling to meet Navy requirements, as well as have the capability to operate on the ground and in flight in a NVIS environment. The KC-X must be capable of supporting theater air refueling operations from bare base airfields with confined ramp space. As a secondary mission, the KC-X will have the necessary systems to effectively support patient support pallets (PSP) during aeromedical evacuation missions. The KC-X will be able to operate plug-and-play communication "gateway systems."

The Road Ahead

The Air Force acknowledges the air refueling capability gap and has conducted analysis to fully quantify the capability gap and evaluate potential solutions that might fill the gap. Studies are complete and have been incorporated into Joint Capability Integration and Development System (JCIDS) documents necessary to start the acquisition process for procurement of the first increment of KC-X and begin the recapitalization of the KC-135 fleet.

MAF Deficiencies/Solutions

Reference Documents

Operational Support Airlift / Very Important Person Special Air Mission Roadmap

OPR: AMC/A5Q

Weapon System Assessment

The United States Air Force is committed to providing safe, comfortable, and reliable executive airlift transportation. Air Mobility Command is the Air Force's lead command for the operational support airlift (OSA) and very important person special air mission (VIPSAM) fleet. AMC operates and maintains a diverse fleet of OSA and VIPSAM aircraft specifically designed to provide executive transportation for senior US civilian and military officials, as well as foreign dignitaries. Because our senior leaders often require immediate and sometimes simultaneous airlift to carry out their diplomatic missions in an ever-changing political arena, connected distinguished visitor (DV) airlift that is reliable and protected is vital. This is particularly true when such diplomacy and negotiation enable the political instrument of power, becoming critical elements of the National Security Strategy.

The OSA mission is to provide transportation of critical personnel and cargo with time, place, or mission-sensitive requirements. This mission satisfies high-priority, small-volume airlift requirements that cannot be efficiently moved by other means. AMC uses C-21s for the OSA mission.

The Air Force Reserve Command (932 AW) has increased its OSA fleet with three new C-40Cs (all delivered in CY07) to Scott AFB IL. The 375 AW activated an active duty unit in March 2007 to co-fly with the 932 AW.

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. 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. VIPSAM aircraft are the C-9C, C-20B/H, VC-25A, C-32A, C-37A/B, and C-40B/C.

The 89 AW will receive a new C-37B in March 2008 and will provide additional capability to the current VIPSAM fleet. The new C-37B will provide airlift support to the Vice President, cabinet members, Congress, foreign heads of state, senior government/DOD officials, and combatant commanders.

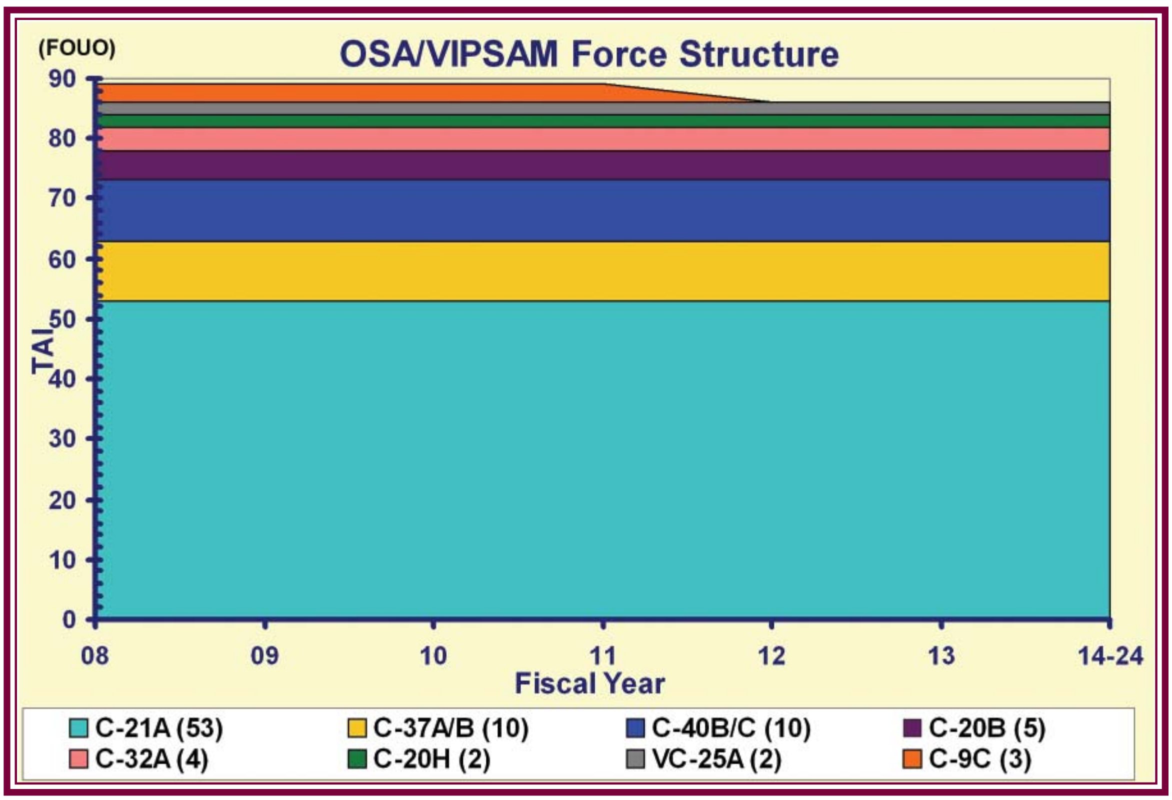
The OSA and VIPSAM fleets serve similar (and sometimes the same) DV airlift customers with some degree of overlap. While aircraft are designated either VIPSAM or OSA, they may each be tasked to support the other's mission: the DOD system prioritizing DV airlift requests ultimately makes excellent use of both fleets. VIPSAM and OSA are primarily differentiated by mission and customer priority. While support for a mission is dictated by mission priority, only certain DV customers may request VIPSAM support. This fits well with OSA's tertiary DV airlift mission: primary OSA missions are combatant commander operational support and pilot seasoning. VIPSAM, on the other hand, is solely dedicated to the highest priority DV airlift.

With the dynamic nature of the world environment and the emerging movement towards a net-centric environment, senior leaders and their staffs require the same information interchanges while traveling as they have in their permanent ground offices. The Senior Leader Communications Upgrade is envisioned to be modular, standardized equipment that will provide protected, expedient, and uninterrupted access for senior leaders to the same type, quality, and reliability of information as they have in their ground environment. The Airborne Information Management System (AIMS) upgrade for the VC-25 addresses specific deficiencies 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 addition to communications upgrades, the OSA/VIPSAM fleet needs several navigational upgrades to keep up with aviation authority regulations. All passenger aircraft need to replace existing Mode A/C transponders with the new Mode S transponder. Enhanced Mode S transmission will be required in Europe by 2009. Current C-21 avionics are unable to support any upgrade to enhanced Mode S. Installation of a new transponder, Flight Management System (FMS), Global Positioning System

(GPS), and heading reference system are required for enhanced Mode S functionality. Additionally, the VC-25 needs 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.

In the years to come, we will continue endeavors to recapitalize the fleet. There are efforts currently under way to replace the VC-25 and C-20B. The C-20B fleet has been in service for 22 years. As an aging aircraft, it is suffering several availability, reliability, capability, and maintainability issues. A review is currently in motion to validate the need to replace the C-20B. We will also retire the last C-9Cs by FY11. At this time, there are no plans to replace the C-21; no requirement document or initiatives are under way to begin a replacement effort. That said, AMC used a 2003 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 the scheduled 20,000-flight hour Safe Life Parts Replacement as listed in the FAA-approved replacement schedule (Chapter 5-11-00) within the C-21A Maintenance Manual (beginning approximately 2012), we should undertake the replacement schedule's 2012 renovation and retire the C-21 sometime around 2020 or begin procurement of another commercial derivative aircraft around 2012. The 2007 Requirements and Planning Council (R&PC) CORT/SORT directed the Systems Program Office (SPO) to perform a business case analysis to determine if the C-21 should be modified or replaced.



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Modification Explanations

Airworthiness Directives/Service Bulletins

The C-20, VC-25, C-32, C-37, and C-40 aircraft follow Federal Aviation Administration (FAA)-certification guidelines and must comply with all FAA Airworthiness Directives.

VC-25 Avionics Modernization Program

AMP replaces an onboard electronic library that includes navigation charts, airport maps, and an enhanced Terrain Awareness and Warning System.

VC-25 Airborne Information Management System

The AIMS program will identify specific requirements for communications switching and delivery of services to the passengers traveling on board 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.

C-32A Power Load Shed

The C-32 is a commercial derivative 757-200 and was not designed to handle the increased demand for power the C-32 requires (communications suite and essential systems). During start-up operations, the C-32 sheds power resulting in shutting down communication capability and essential systems. The power load shed modification will isolate essential systems from being shed, resulting in uninterrupted communications/safety for DVs.

C-20 Defensive Systems
The C-20 needs Large Aircraft Infrared Countermeasures (LAIRCM) for protection against infrared (IR) and manportable air defense systems (MANPADS) missile threats.

Enhanced Mode S
Mode S enhanced 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 was mandated by 2005 with military waivers until 2009.

Flight Management System/Global Positioning System Replacement
FMS on the C-21 is obsolete technology and has significant limitations and insufficient memory capacity. The paired GPS, to include antenna (Trimble TA-6), is out of production and is no longer supported by the manufacturer. The FMS is not capable of remote/oceanic navigation with current GPS sensors and single-FMS installation. This is in addition to the Mode S impacts already described above.

Senior Leader Communications
Senior leader communications will be a scalable, modular, interoperable, and integrated system to be deployed on commercial derivative and specially equipped military aircraft to support senior leader mission areas of responsibility while they are traveling by air.

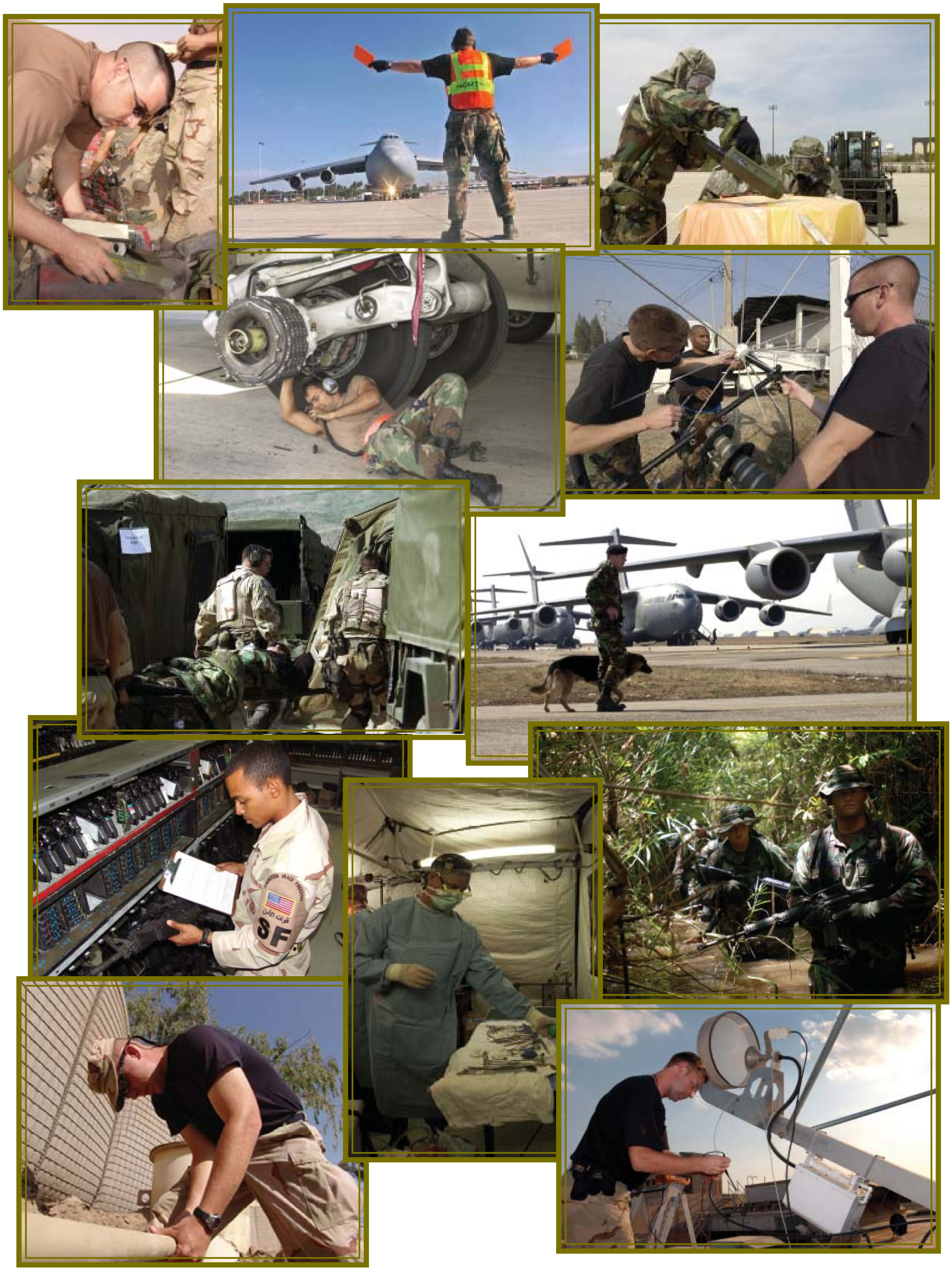
Current Requirements and Planning Council items for senior leader communications are:

- ***C-20B MCS Replacement*** – The current C-20 MCS is challenged with obsolescence issues.
- ***Broadband Solution*** – The C-32A, C-40B, C-37A, C-20B/H, and C-9C require more reliable, higher-speed off-board connectivity that provides greater configuration capability.
- ***Permanent Voice over Internet Protocol*** – The C-32A, C-40B, and C-37A require permanent, state-of-the-art VoIP capability. This system would provide the primary means for a secure voice capability.
- ***TARS Service Replacement*** – The current TARS provider is ending service in 2008. The C-9C, C-20B/H, C-21, C-32, C-37, and C-40B need to find another provider for this radio service.

20,000-Flight Hour Safe Life Parts Replacement
C-21s will require this parts replacement program at 20,000 hours. This requires mandatory replacement of the Safe Life Parts as listed in the FAA-approved replacement schedule (Chapter 5-11-00) within the C-21A Maintenance Manual. SPO anticipates aircraft to start reaching 20,000 hours by FY 2012.

Mobility Air Forces Data Link Integration
The OSA/VIPSAM fleet requires global secure communications to ensure mission accomplishment in support of USAF CONOPS. Currently, AMC is pursuing secure line-of-sight (LOS) (i.e., Link 16), beyond line-of-sight (BLOS), and intelligence-broadcast-receive capabilities, as well as connectivity to the global information grid (GIG) via airborne networking architecture, under the MAF DLI effort.

Chapter 6—Support Roadmaps



Manpower and Personnel Roadmap

OPR: AMC/A1

MAF Capability Statement

Provide the capability to define, shape, develop, and sustain air mobility forces to deliver Global Reach options to the combatant commander, thereby ensuring the right people, to the right place, at the right time, along with the Manpower and Personnel services to support them, across the range of military operations and in all operating environments.

Roadmap Assessment

The AMC Manpower and Personnel community is partnering with MAF commanders to solve human capital issues so the MAF can be prepared to accomplish its missions. Since many manpower and personnel issues impacting the MAF are not directly controlled by the command, it is critical that AMC clearly identifies and communicates its human capital needs to decision makers at higher headquarters, ensuring MAF Manpower and Personnel issues are adequately addressed. AMC is working to ensure its MAF Manpower and Personnel Services provide the command's number one resource, "Our People," the technical skills, knowledge, and experience they need to perform their duties, while at home and deployed, including operations in the Joint environment. Through education and training, AMC is committed to providing MAF personnel every opportunity to excel in their respective careers. This commitment extends to the MAF "Total Force," including active duty officer, enlisted, Guard, Reserve, and civilian workforce.

Approaches

In support of the Air Force Manpower and Personnel Roadmap, AMC is taking a five-prong approach to ensure that, when called upon, the MAF can provide combatant commanders the right people, to the right place, at the right time, both now and in the future. AMC's approach is described below:

Define the Force: MAF manpower requirements must be accurately defined and programmed as well as have optimally designed MAF organizations, resulting from adhering to disciplined manpower methodologies and an integrated planning, programming, budgeting and execution (PPBE) process that adequately addresses MAF Manpower and Personnel issues.

Shape the Force: The MAF "Total Force" is sourced and shaped to match defined skills, competencies, and grades with capabilities-based Expeditionary Aerospace Force requirements that support MAF operations and the combatant commands.

Develop the Force: The right combination of learning experiences is essential—accession, training, education and experience—which deliberately develops the MAF "Total Force" with AF- and MAF-required competencies.

Sustain the Force: A ready MAF "Total Force" that internalizes AF Core Values and whose basic physical, moral, and family needs are sustained is cardinal.

Deliver Airman (Active Duty Officer, Enlisted, Guard, Reserve, and Civilian) Capability and Personnel Services: A MAF Manpower and Personnel system must accurately account for every Airman to ensure the right person is readily available for delivery to combatant commanders at the right place and time, and that AMC effectively delivers timely services to every member of the MAF family.

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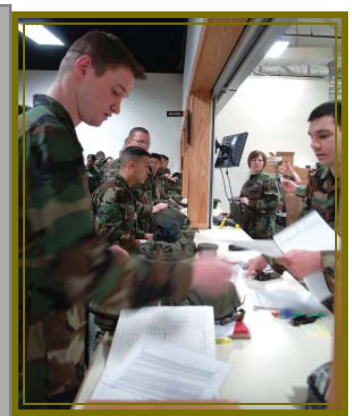

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Manpower/Personnel Deficiencies/Solutions | MAF Deficiencies/Solutions | Reference Documents

Total Force Integration Roadmap

OPR: AMC/A8X

Roadmap Assessment

The Air Force faces increasing recapitalization challenges and strained budget realities. We possess weapons systems to meet today's challenges, are investing in cutting-edge technology, and training highly capable personnel; however, we must continue transformational changes to maximize the advances these capabilities give us. Total Force Integration provides the Mobility Air Forces the means to enable these changes. Integration of our active duty, Guard, and Reserve personnel improves overall combat capabilities and continues to be a primary enabler in Joint operations.

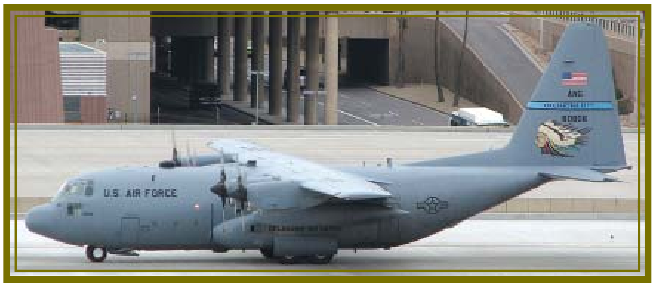
The MAF has benefited from over 30 years of Associate experience in sharing all of our missions. Where the benefits of integrations are numerous, we are just beginning to see the effects of new associations. Personnel and divestiture savings will aid our modernization and recapitalization efforts. During this period of high operations tempo, Associate aircrews flying the principal unit's aircraft significantly increases aircraft utilization and our air mobility capability. We commonly think of Associate units with a flying mission; however, associations are taking place across the full spectrum of support operations as well; from intelligence squadrons, and distributed ground systems, to logistics support centers, security forces, contingency response groups, expeditionary combat support forces, and air mobility divisions within the Air and Space Operations Center. We will continue to explore other areas to make more efficient use of our assets and people. One area that pays big dividends is transferring some training functions to experienced Guard and Reserve units. This provides excellent training for new crewmembers and returns active duty crews to operational cockpits. Two examples are the C-130 formal training unit (FTU) at Little Rock and the C-5 FTU at Lackland AFB.

Historically, the Mobility Air Forces led the Services in implementing innovative organizational structures to capitalize on the synergies gained from an integrated force. We also learned that "one size does not fit all" when it comes to force integration. The following is an overview of models currently in use, as well as some alternative concepts currently being considered for possible implementation. Realistically, there may be as many ways to approach integration as there are missions—both flying and nonflying. The key to integration is leveraging the strengths of the individual components to meet the mission requirements. Matching these mission requirements to an appropriate integration model is crucial. The following section describes the various Associate programs that are in use or planned for the near future.

ASSOCIATIONS

The classic Associate organization is an integration model where an active duty component unit retains principal responsibility for weapon system or systems, which it shares with one or more Reserve component units. Importantly, active and Reserve component units retain separate organizational structures and chains of command. Legacy examples include Air Force Reserve Command (AFRC)

Associations at McGuire AFB NJ, Travis AFB CA, Charleston AFB SC, and McChord AFB WA. AMC is pursuing an Air National Guard (ANG) relationship under the same template at Fairchild AFB WA. As well, AMC is partnering with AFRC at MacDill AFB FL.



The active Associate organization is an integration model where a Reserve component unit has principal responsibility for the weapon system or systems which it shares with one or more regular units. Again, the Reserve and active component units retain separate organizational structures and their own chains of command. We stood up our first C-130 active Association during the summer of 2006 at Cheyenne, Wyoming. Of historical note, this association was the first relationship between the active duty and ANG. Future AFRC/active Associations include Peterson AFB CO and Pope AFB NC.

The type of associations and prospective locations became points of discussion which required a centralized document all interested parties could use for coordination. This list eventually became the Phase IV list.

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The Road Ahead

The future is bright for Total Force Integration, and it looks like we are only beginning to realize the potential benefits that innovative organizational constructs and new concepts of operation will bring. We have long seen that the Associate programs produce high aircraft utilization rates; mobilization requirements may be minimized; and the use of mixed aircrews, from the active and reserve units, has increased the level of standardization between all aircrews.

We will continue to raise the bar by exploring Associations across the operational and training spectrum with all our ARC counterparts. AMC is making great progress by acting in concert with AFRC and ANG for more efficient and streamlined organizations. Maximizing transformational changes will provide the combatant commanders the mobility tools necessary for fighting the Global War on Terror.

MAF Deficiencies/Solutions

Reference Documents

Installations and Expeditionary Combat Support Roadmap

OPR: AMC/A7Z

MAF Capability Statement

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

Roadmap Assessment

Installations and Expeditionary Combat Support (ECS) will experience challenges integrating ECS efforts across the command. Proactive cross-functional interface is needed in ECS planning and garrison excellence matters for the 26 ECS functional areas to achieve total force integration and the global mobility effect.

Installations and Expeditionary Combat Support will experience challenges in providing suitable warfighting doctrine for ECS forces in the short term. The Establish Operating Location (EOL) Concept of Operations is being developed to integrate lighter, leaner force capabilities and a more responsive planning process to create a power projection platform for the full range of military operations. Efficiencies must be gained through more effective combat support planning and execution to achieve the desired effects of the combatant commander.

Installations and expeditionary combat support will also experience significant challenges in the short term because of the impact of chemical, biological, radiological, and nuclear (CBRN) shortcomings. Deficiencies exist in detection, protection, decontamination, and in operations in CBRN environments.

Installations and expeditionary combat support infrastructure will continue to face significant challenges. Funding shortfalls will continue to lead to increased infrastructure and facilities degradation. An increased gap in recapitalization funding deficiencies exists for current mission infrastructure, new mission beddown, base realignment and closure, capital construction, and in operations and maintenance. These cuts drive high maintenance expenses and unsustainable operations tempo attempting to keep older facilities and infrastructure operational.

Milestones

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Logistics Roadmap

OPR: AMC/A4X

MAF 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) increasing mission demands upon operational aircraft requiring the MAF to modernize aircraft technical data presentation/distribution to electronically operate in a comm/comm-out environment at the point of maintenance; 2) 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; 3) C-130 defensive systems support equipment for ground checks before missions; repair enterprise 21 (RE21) avionics for C-130, and sustainment of aging C-130E fleet; 4) ground cooling for KC-135s to support aeromedical evacuation missions and standard ground operations; 5) necessary technology for alternate fuel for aerospace ground equipment (AGE) and increased spares for existing AGE; 6) congressionally added C-130Js without sufficient funds for associated spares and necessary logistics support; 7) obsolete capabilities for anti-icing aircraft that do not support MAF requirements for high-throughput locations; 8) C-5 isochronal (ISO) inspection regionalization, Reliability Enhancement and Re-engining Program (RERP), RE21 for C-5 avionics; 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 and fill open authorizations/requirements; and 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 Roadmaps).

The Global Logistics Support Center (GLSC) and the Expeditionary Combat Support System (ECSS) will play key roles in improving MAF Logistical Capabilities. The GLSC has three primary functions: 1) The enterprise-wide planning of the Air Force supply chain including planning for material, maintenance and distribution. 2) The GLSC will exercise command and control as a single point of contact for customers to resolve immediate logistics issues at the point of execution. 3) The GLSC will be the single point of entry and authority for enterprise supply chain information management. This will include the management of business rules, policies and procedures, providing functional requirements for supply chain systems and measuring, assessing and taking action to improve supply chain performance through enterprise metrics and analysis capability. ECSS improves warfighter capability by transforming AF Logistics business processes, accomplished through: 1) improvement in the synchronization of operations/logistics planning and execution 2) improving command and control 3) providing near real-time worldwide visibility of assets, and 4) embracing updated best business practices. Improvements are projected to continue into the mid- and long-term; however, without adequate funding to overcome deficiencies, MAF Logistics capability could deteriorate rather than improve.

Milestones

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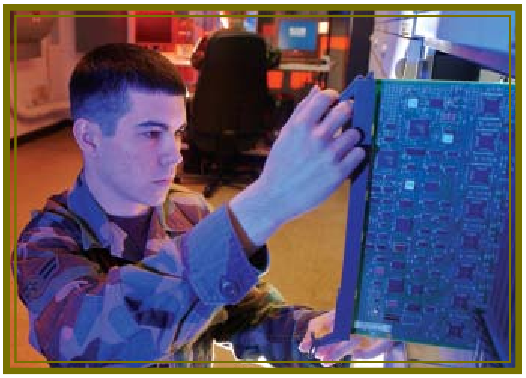
Communications and Computers Integrated Roadmap

OPR: AMC/A6

OCR: AMC/A1/A2/A3/A4/A5/8/A7/A9/FM/18 AF

MAF Capability Statement



Provide effective, secure, agile, interoperable, and reliable/redundant communications and computer systems infrastructures that carry voice, video, and data to conduct air, space, and cyberspace operations (CASCO) and mission support functions. These systems must be networked to enable leaders to exercise command and control (C2) by taking into account intelligence and weather information, logistical information (i.e., maintenance and supply), installations management information (i.e., firefighting capability), personnel, communications systems status, force protection, and medical and financial management information. C2 is a human function based on commanders' vested authority, judgment, and decisions. However, communications and computer systems infrastructures help commanders get the information they need sooner and more reliably. These systems are tools which enable commanders to shorten their decision cycle and relay their intentions up and down the chain of command and across functional lines when necessary.

Roadmap Assessment

Under the capabilities-based planning (CBP) construct, our functional capabilities team (FCT) conducted a functional area analysis (FAA). From there the FCT conducted a functional needs analysis (FNA). Functional solutions analysis (FSA) is a continuous process and our FCT remains fully engaged. We are pioneers in this area and lead the Air Force in conducting an enterprise-wide FAA for communications, computers, and net-centric operations. Air Combat Command (ACC) is responsible for providing the backbone of our communications infrastructure to link to the AF outside of the MAF. We will work with ACC to achieve functionality to meet our needs.

It is critical for the MAF to acquire and deploy an effective blend of secure global long-range communications systems and computer systems. The MAF needs tactical data link, identification friend-or-foe mode S, voice, and video communications, networking, antennas, and other required equipment to ensure uninterrupted worldwide connectivity between the MAF operations and supporting (O&S) C2 systems. These systems will connect both fixed and mobile sites, the MAF aircraft fleet, and all mission support elements. This communications connectivity, embodied in MAF Data Link Integration (DLI) and the Advanced Situational Awareness and Countermeasures (ASACM) programs, is needed to efficiently move high-volume flows of enterprise data, in near real time, to the MAF high-speed O&S C2 systems.

In addition, supporting information systems will be linked to enable the supporting functions to provide mission impact data for effective C2 and resource management. Since communications and computers form the backbone of our C2 capabilities, cooperation among and between the functional area subject matter experts (SME) and the A6 community is mandatory. The A6 community oversees the systems and their connectivity; the SMEs must ensure interoperability across functional areas as solutions are developed.

Data communications capabilities are essential to support real-time and near-real-time exchange of time-critical information throughout the AMC O&S C2 system from major commands' headquarters to our deployed contingency response elements (CREs). 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.

Information Assurance and Connectivity

Adversaries are constantly exploring disruptive capabilities to infiltrate network security systems. The MAF, in conjunction with the USAF and DOD, must effectively address information assurance (IA) as a critical focus area and stay ahead new threats. MAF IA must be capable of providing security of the MAF information infrastructures, 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. The output of these diagnostics must also be available for origination and trend analysis for forecasting and anticipating future attacks. This capability is critical to assure uninterrupted operations. An improved 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 actions. These systems are kept secure and operational through network defense activities from the MAJCOM level down to the end-user level and through close coordination with the Air Force Network Operations (AFNETOPS) community.

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 affordable, expeditious, and consistent ways to extract and distribute unclassified, actionable information from classified sources. 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 net-centric enterprise services (NCES) as they become available to enable secure enterprise-level views and self-synchronizing collaboration capabilities.

An additional IA issue for MAF networks will be the need to interconnect with those in the civilian sector. Civilian use of similar commercial, off-the-shelf hardware or software will require the MAF to risk being susceptible to any vulnerability accessed through these civilian nodes. Thus, cyber security in the civilian and MAF systems are 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.

Secure wireless communications and associated mobile devices are essential. Fixed and deployed locations will require secure wireless access to classified information, and protecting it poses unique challenges. Wireless operations will drive the need for encryption while transmitting or receiving on all electronic devices. This includes using multi-level passwords, encryption of data at rest while residing on the devices, the ability to remotely zero the data on a device, and the ability to rapidly delete the data if the device has been or will be compromised.

Finally the MAF must be able to operate with a full-up continuity of operations and disaster recovery capabilities. The MAF communications and computer systems must be redundant and geographically separated to reduce susceptibility to attack or degradation from other environmental stress conditions. The MAF global mobility Air and Space Operations Center (AOC) must be able to transfer the workload to its alternate and/or the Air Mobility Control Centers (AMCCs) while moving operations to either the alternate or rollout facility.

New data link and network connections are essential to enable access to key sources of MAF mission and pertinent support information to streamline mission responsiveness, operational situational awareness (SA) and situational understanding (SU), 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 O&S C2 and SA/SU and fill the void until JTRS-based solutions can be fielded. In parallel, the MAF must continue to update and support a coherent Airborne Networking/Data Link Integration 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. Program solutions must reach a point where they are interoperable with the USAF Airborne Network Integration, AF C2 Constellation, 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.

Understanding what the essential pieces of data are and their relationship to the various systems and data sources of the MAF O&S C2 systems is a key aspect in effectively developing the MAF enterprise information technology (IT) architecture. Another key in data development is connecting to data mines 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 O&S 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.

Mission Support Operations

MAF C2 system connectivity to this mission support information becomes the accelerant to improve next-station aircraft turn-around and to improve logistics support, intransit visibility, and by extension, productivity. Specifically, our vision for the twenty-first century requires the aircraft on-board fault and diagnostic capabilities, as well as system health and performance, and mission data (cargo and passenger on/offloads, air refueling 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 618 Tanker Airlift Control Center (TACC). In turn the ground C2 system node transmits this data to the appropriate 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.

Knowledge Management

The MAF will require improved computational and communications abilities to leverage knowledge management (KM). Conceptually, KM can be thought of as mature, blended operations to generate battlespace forecasting and supporting products/reports. KM would draw from areas such as intelligence, weather, logistics, financial management, etc., and fuse them at the operational level in the 618 TACC. An essential element is to ensure the system or family of interoperable and compatible systems will allow authorized users to access the data, while still ensuring measured levels of access permissions to users. Key focus areas will be on operational mission execution, airspace control, maintenance, logistics, and financial data resulting from operations. Additional key focus areas are:

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, user-filterable, and able to search, find, and fuse 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. Expertise-location tools can link people working on related projects, even if they are not searching for each other and alert the owner of the information to validate the need to know.

Network collaboration tools such as online workspaces, messaging, and web conferencing will facilitate connecting 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 SME to work the issue. A global interactive and secure 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.

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 core enterprise functions that minimizes the seam between the MAF and stakeholder data exchanges. The MAF must effectively team with Air Force Research Laboratory (AFRL), the other service labs, Defense Advanced Research Projects Agency, academia, and industry to coordinate, leverage, and influence technical development efforts. Simultaneously, the MAF must foster an environment that continually accesses and adopts process and technology advancements to improve information sharing across jurisdictions and command lines. The MAF must exploit a series of advanced technology demonstrations and technology initiatives focused on finding solutions for communications and computer technology gaps.

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 US Transportation Command (USTRANSCOM) and DOD command, control, communications, computers and intelligence (C4I) and information operations (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.

Milestones

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Command and Control (C2) Integrated Roadmap

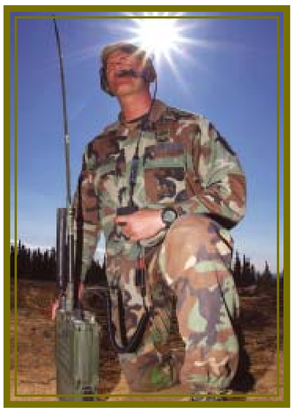
OPR: AMC/A3R

OCR: AMC/A2/A3A/A3D/A3W/A4/A6/FM/18 AF

MAF Capability Statement

Collaborative and agile C2 is imperative for commanders to make and execute timely and accurate decisions throughout all levels of conflict. Tomorrow's mobility leaders need capabilities covering the full C2 mission spectrum of monitor, assess, plan, and execute. In addition, they require greater access to information and systems that are able to provide the real-time data transmission and display necessary to effectively enable C2 decisions and actions. This C2 vision draws from the MAF C2 framework as well as the MAF C2 Functional Area Analysis (FAA) and MAF C2 Functional Needs Analysis (FNA) to provide overarching guidance for mobility decision makers with regards to achieving necessary C2 capability in all capability areas.

Roadmap Assessment



Tomorrow's decision makers will need greater access to fused information, greater situational understanding, and a need to be able to make decisions faster and more accurately. However, C2 must not be confused with the tools (systems and software) that enable the C2 process and allow commanders to direct mission activities. The MAF C2 environment must enhance ways to develop courses of action, improve resource allocation, as well as coordinate and synchronize operations, processes, and supporting disciplines, in the face of continuing technical challenges. The specific C2 challenges and their solutions are identified through the capabilities-based planning (CBP) process via the MAF C2 functional capabilities team (FCT) and its resultant products: the MAF C2 functional area analysis (FAA), the MAF C2 functional needs analysis (FNA), and the MAF C2 functional solutions analysis (FSA).

MAF C2 challenges are found in several areas:

- Effectiveness in delivery of mobility capabilities, the right fuel and/or cargo to the right place at the right time
- Efficiency without degrading effectiveness
- Improved course of action development and resource allocation
- Ability to operate in a multi-agency global environment (domestic and foreign civilian government and nongovernment organizations), with vigorous reachback capability
- Ability to be fully informed, responsive, and agile
- Ability to organize differently including processes, procedures, and doctrine
- Acquisition of materiel solutions to enhance C2 functions (monitor, assess, plan, execute)
- Movement toward net-centric operations
- Training and exercises in the C2 realm
- Seamless C2 integration with combat air forces and coalition air forces

The MAF also faces significant C2 systems integration challenges in the near-, mid-, and long-term. One key challenge will be to fully provide the right levels of systems security between military echelons, civil aviation control authorities and other MAF partners. As mentioned above, communications and C2 systems enable the command and control process. Achieving C2 system interoperability must be achieved starting at the data level with accurate, automated data capture the first time, and clear, consistent data standards designed to support well-defined mission workflow processes. Initial efforts should focus on MAF and Combat Air Forces (CAF) systems being connected and interoperable at the data level to attain the goal of C2 oversight of the total MAF/CAF mission event. Information assurance must be designed in from the start, and data security and enterprise-wide secure information management will be critical.

Future requirements to integrate MAF assets into the overall net-centric environment, especially data link, will greatly expand MAF C2 asset responsiveness in executing national, strategic, operational and tactical-level objectives. The intransit visibility and connectivity MAF Data Link Integration (DLI) is forecast to provide will allow Global Mobility to further empower Global Strike/Power force projection operations in a dynamic environment. In the short term, this need is being partially met by Combat Track II, a secure SATCOM text chat, position and threat update software that is overlaid on a moving map display. Although not fully implemented, Combat Track II is a critical interim resource that is needed to meet warfighter needs.

The 618 Tanker Airlift Control Center (TACC) must continue to mature and evolve as the operational controlling organization, especially as MAF operations push the envelope to perform in more austere conditions with fewer forward deployed forces and as an element of expeditionary air forces. The MAF's central global mobility Air and Space Operations Center (AOC), Air Mobility Divisions (AMDs), Contingency Response Groups (CRGs), and Contingency Response Elements (CREs) must be networked together to achieve near-real-time functionality. This poses major challenges in linking key functions throughout the MAF structure as well as building organizational relationships and a collaborative environment between MAF partners. Both of these requirements are outlined in the MAF C2 FAA capabilities list.

The MAF C2 FCT will ensure C2 needs are continuously reviewed and that the most pressing needs drive technology. The FCT will determine capability deficiencies and update/ advise leaders of needed capabilities. AMC/A3, the MAF C2 owner, will maintain a continuous, robust working relationship with AMC/A6 to leverage future technologies. Additionally, A3 will be fully engaged in doctrine development to ensure MAF C2 processes are promulgated throughout the AF and Joint communities, as appropriate.

Milestones

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Intelligence Roadmap

OPR: AMC/A2

OCR: AMC/A3/A4/A6/A7F/18 AF

MAF Capability Statement

Provide an active integrated presence within the global mobility Air and Space Operations Center (AOC) planning and execution processes to assist the commander in achieving predictive battlespace awareness. This, in turn, will enable leaders to exercise better command and control (C2) when they conduct air, space, and cyberspace operations (CASCO). Continue developing robust and advanced intelligence capabilities at the unit level to support mobility operations in the current and future higher threat operating environments.

Roadmap Assessment

The MAF transformed from a risk-avoidance culture to a risk-managed culture. We now routinely fly through threats and into areas that just a few years ago would have been forbidden. With that transformation comes a requirement for focused and more relevant intelligence.

Under the capabilities-based planning (CBP) construct, our functional capabilities team (FCT) conducted a functional area analysis (FAA). From there, the FCT conducted a functional needs analysis (FNA). Functional solutions analysis (FSA) is a continuous process, and our FCT remains fully engaged.

MAF Intelligence must deliver critical threat information at the right time and place and provide MAF resources the most complete threat situational awareness possible throughout the MAF planning and execution process. To achieve these requirements, MAF Intelligence has pursued initiatives on several fronts.

An intelligence presence has been established on the 618 Tanker Airlift Control Center (TACC) operations floor and intelligence headquarters divisions have been restructured to more closely resemble an AOC Intelligence, Surveillance, and Reconnaissance Division (ISRD). Much remains to be done in appropriately manning these organizations, but the framework is now in place. We must continue to pursue better predictive battlespace awareness processes to forecast changing environments and threats associated with future destinations and operations. We must continue, in coordination with the MAF C2 community to acquire secure global voice and data communications with aircrews throughout the world. Initiatives such as the MAF Data Link Integration (DLI) and Advanced Situational Awareness and Counter Measures (ASACM) are key to providing improved situational awareness and threat warning to en route aircrews. We must develop our defensive systems capabilities to record and report details of events in near real time.

Simultaneously, a net-centric capability will provide improved secure collaborative networks critical for processing and disseminating the best available intelligence information to deployed MAF operations throughout the world. These same collaborative networks will link the frontline intelligence, surveillance, and reconnaissance (ISR) producers and analysts with the analysts networked through the AOCs and ultimately with the decision makers in all theaters and at all levels supporting all critical operational decision making processes.

Finally, the key to staying ahead of enemy or crisis decision making will be our ability to develop and use automated knowledge-based reasoning, fusion technologies, and nontraditional intelligence sources to expedite our own decision making cycle across the full range of military and stability operations. The ability to accomplish this function hinges upon the MAF's ability to tie into the communications and computer networking capability that will link the Intelligence and C2 communities.

Milestones

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Information Operations Roadmap

OPR: AMC/A3D

OCR: AMC/A2/A3R/A6/18 AF

MAF Capability Statement

Plan, execute, monitor, and assess information operations (IO) within the global mobility Air and Space Operations Center (AOC) processes to collaborate in real-time with Falconer and Functional AOCs and with Joint Service IO planning and operations centers. This includes the ability to collaborate using multi-level security across classification domains seamlessly, while maintaining the integrity of the classification level of the original product, the appropriate classification of combined data, and limiting access to the IO plan for only those persons with a need to know. IO planning and execution must be associated with special technical operations (STO). Collaboration with and between the A2, J2, and counterintelligence communities is essential to keep abreast of threats to friendly IO, and to determine the success of friendly IO. In addition, collaboration and coordination with and between the A6 and J6 communities will be essential to ensure IO systems compatibility and interoperability in the cyber domain.

Roadmap Assessment

The ultimate aim of warfare has been to alter the behavior of the adversary through destructive means. IO leverages the synergistic approach of network warfare operation (NWO), electronic warfare operations (EWO), and influence operations (IFO) to alter the adversary's behavior through nonkinetic means, either solely or in conjunction with kinetic weapons. IFO requires the integration and employment of operations security (OPSEC), military deception (MILDEC), psychological operations (PSYOP), public affairs/counterpropaganda, and counterintelligence capabilities to affect behaviors, protect operations, communicate commander's intent, and project accurate information to achieve desired effects across the cognitive domain. These effects should result in differing behavior or a change in the adversary decision cycle, which aligns with the friendly commander's objectives. Through collaboration, the 618 Tanker Airlift Control Center (TACC) and other operations centers can plan and execute the use of EWO to affect the electromagnetic domain, NWO to affect the cyberspace domain, and IFO to affect behavior of targeted audiences in the cognitive domain. IO conducted at the operational and tactical levels may be capable of creating effects at the strategic level and may require coordination with other national agencies.

While the offensive role of EWO and NWO is left to the Combat Air Forces (CAF), the MAF has a definite role in IFO. The collaboration between the MAF/CAF IO entities from other Services and agencies is essential to produce an IO plan that is synchronized with the campaign or contingency operation. IFO by itself can have only limited success; the same is true when NWO or EWO are not combined with the other two pillars of IO. Real-time events can affect the success of any of the three IO pillars. Thus, collaboration between IO centers is essential. Only through the secure collaborative process can planners react to these events according to the commander's intent and approved IO courses of action.

Successfully leveraging MAF capabilities in IO planning and execution will require interwoven coordination with public affairs and intelligence providers, partnered air operations centers, and communications and computer experts. Planners cannot accomplish timely IO without a robust, secure, networked communications and computer systems infrastructure, hardware, and software.

Under the capabilities-based planning (CBP) construct, our functional capabilities team (FCT) conducted a functional area analysis (FAA). From there, the FCT conducted a functional needs analysis (FNA). Functional solutions analysis (FSA) is a continuous process, and our FCT remains fully engaged. Together with efforts of ACC/A3 as the Air Force IO lead command, AMC/A3 is leveraging common AF IO needs for the MAF as MAF IO lead.

Milestones

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Information Ops Deficiencies/Solutions | MAF Deficiencies/Solutions | Reference Documents

Counter-CBRN Roadmap

OPR: AMC/A3X

MAF Capability Statement

Provide worldwide capability to fully support combatant commanders' wartime and peacetime mobility operation in a chemical, biological, radiological, and nuclear (CBRN) threat environment.

Roadmap Assessment

> ***"Potential adversaries may be deterred if they recognize that the costs of WMD [Weapons of Mass Destruction] employment significantly outweigh the gains. This is achieved by AMC's clear determination to meet the CBRN challenge and our demonstrated capability not only to survive a CBRN attack, but also to continue critical missions in the face of chemical, biological , or radiological contamination."***
>
> **Lieutenant General Chris Kelly, AMC/CV**
> **AMC C-CBRN Concept of Operations, 2007**

The proliferation of chemical, biological, radiological, and nuclear weapons and the methods to deliver them presents a serious security threat to US forces, allies, and interests around the world. Even limited numbers of CBRN weapons could inflict heavy casualties on military forces and civilian populations, degrade the effectiveness of US combat and combat supports units, and counter US conventional military superiority. This Counter-CBRN (C-CBRN) Roadmap addresses the CBRN threat, airlift of contaminated patients/remains, the road ahead outlining what is needed, and milestones to ensure velocity toward those requirements.

CBRN Threat

The CBRN threat presents serious, yet doable, challenges to air mobility operations. Although much progress has been made in the past few years, significant strides are needed to understand and to plan for current threats to AMC operations, then to mitigate those threats ensuring continued, unrestricted global airlift operations in a contaminated environment.

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In addition, according to Air Force Doctrine Document (AFDD) 2-1.8, "Until large-frame aircraft decontamination is technically feasible, contaminated aircraft should be segregated from the airlift flow."

With the vast majority of troops being transported by commercial aviation the impact of CBRN weapons is immediate and significant on AMC aircraft. IAW AFDD 2-1.8, page 48, ***"Civilian aircraft under DOD contracts and the CRAF may be deployed on a voluntary basis, but will not conduct operations on an air base that is under attack, potentially under attack, and/or contaminated at the time of flight arrival."*** The rapid movement of troops would then fall on AMC aircraft at the expense of cargo, resulting in a slowdown of timed-phased force and deployment list (TPFDL) troops and material into an area of responsibility (AOR).

Mitigation of the Threat

Avoidance, Protection, and Containment

It is Air Force and AMC policy that the key to mitigating the threat is through 1) contamination avoidance; 2) protection; and 3) contamination control.

Contamination Avoidance: Successful avoidance, such as delayed landing, landing at alternate locations, airdropping, etc., will prevent personnel, equipment, vehicles, aircraft, and cargo contamination.

Protection: When contamination cannot be avoided, or is necessary due to the critical nature of the cargo or passengers, protection provides the force with survival and containment measures to operate in a CBRN environment.

Contamination Control: When avoidance and protection are unsuccessful, contamination control provides a combination of standard disease prevention measures and attempts at decontamination.

Airlift of Contaminated Patients/Remains

To mitigate the threat to AMC operations through the movement of contaminated/contagious patients or remains, current procedures are to:

1) Provide treatment-in-place to patients.
2) Decontaminate patient/remains prior to entry into the Aeromedical Evacuation (AE) system.
3) Consider systems such as the Patient Isolation Unit (PIU) for airlift of limited numbers of patients/remains or "index cases."
4) Request appropriate waivers.

Further information on these and other means to mitigate the threat can be located in the ***"AMC C-CBRN CONOPS,"*** available from HQ AMC/A3XC, 618-229-3798 (DSN 779).

The Road Ahead

The road ahead needs to continue to concentrate on: 1) standoff detection; 2) protection; and 3) clearance decontamination.

Standoff Detection: Standoff detection, which also needs to include identification of the chemical and/or biological/infectious agent, is necessary to provide a "detect-to-warn" capability.

Protection: If avoidance is not possible then protection of the individual, aircraft, and air mobility network are vital.

Decontamination: The goal of decontamination is to achieve "clearance decontamination," which is defined as "decontamination to a level that allows unrestricted transportation, maintenance, employment, and disposal of assets."

Milestones

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Force Protection Roadmap

OPR: AMC/A7S

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; Command and Control; Intelligence; and Information Operations.

Force Protection lacks adequate less-than-lethal 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), additional portable defensive fighting positions, intersquad communication capability, counter-battery capability, and close precision engagement 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. The Air Force Office of Special Investigations (OSI) is responsible for counter-intelligence 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.

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Greatly overlooked is the capability for Airbase Ground Defense (ABD) and Phoenix Raven Support. ABD supports Air Force air base defense forces that are tasked to secure air bases, resources and personnel; deter, detect and defeat threats; provide law enforcement functions during wartime, contingency operations and/or humanitarian relief missions. ABD and Phoenix Raven program also provide global security support for AMC Missions to hostile or unknown threat environments with security forces that are properly trained and equipped to meet the challenges of protecting and securing AF assets in support of contingency and day-to-day operations

Another challenge for Force Protection is the development of a standardized risk management tool. While many installations are using Force Protection analysis tools such as Criticality, Accessibility, Recuperability, Vulnerability, Effect, and Recognizability Factor (CARVER) and Mission, Symbolism, History, Accessibility, Recognizability, Population, and Proximity (MSHARPPB), these tools only provide a limited analysis of the elements (threat, criticality and vulnerability assessments) associated with the risk management process. A management tool such as FORCEPRO4 (a computer program designed by AFRL) fuses data from all the elements and provides commanders an ability to weigh risk versus benefits and make and/or implement decisions to eliminate unacceptable levels of risk. The other benefit of a standardized risk management tool with standardized application guidelines and methodologies will be the improved ability of the major commands to develop resource generation strategies and friendly courses of action that mitigate or reduce systemic vulnerabilities. Additionally, Core Vulnerability Assessment Management Program (CVAMP) provides each Service, Unified Combatant Command, DOD agency and field activity with a web-based system to identify, track, and manage vulnerabilities throughout the chain of command.

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

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Force Protection Deficiencies/Solutions | MAF Deficiencies/Solutions | Reference Documents

Medical Roadmap

OPR: AMC/SG

MAF Capability Statement

"Unrivaled Medical Support for America's Global Reach…Always!" is the AMC Surgeon General's vision. The mission is to plan, organize, train, and equip forces, and provide medical counsel to maximize operational effects in support of rapid, precise global air mobility. Primary capabilities include medical care and support for AMC operations and beneficiary population; care-in-the-air (aeromedical evacuation) system; force wellness and health protection; human performance enhancement; and the medical aspects of AMC operations in a chemical, biological, radiological, or nuclear (CBRN) environment, homeland security, and global stability operations.

Roadmap Assessment

AMC medical capabilities and continuing support are critical to the MAF's global air mobility mission and this Nation. Ready forces across AMC, both line and medical, prepared and fully capable to serve in the prosecution of the Global War On Terror or support homeland operations, are essential. A robust, effective, and fully capable aeromedical evacuation (AE) system providing leading-edge care for the Nation's wounded heroes is the expectation. Thorough analysis and professionalism will be necessary to mitigate the impact of military medical system transformation to ensure care remains high quality. It will be necessary to incorporate capabilities-based planning and modernization to leverage AMC medical capabilities through Line and Defense Health Program funding sources.

Milestones

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Modeling, Simulation, and Analysis Roadmap

OPR: AMC/A9

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 and in all operating and training environments, to include those in a chemical, biological, radiological, and nuclear (CBRN) environment (see C-CBRN Roadmap), through live, virtual, and constructive simulations. Capability must also include modeling of concepts included beneath the Joint Deployment and Distribution Enterprise (JDDE), such as end-to-end supply chain modeling. These concepts are growing in importance for both AMC and the US Transportation Command (USTRANSCOM) Joint Distribution Process Analysis Center (JDPAC), of which AMC provides the air component, to include modeling and simulation of end-to-end distribution using the air component. 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 provide support to capabilities-based planning (CBP) efforts by developing and maintaining an AMC/MAF value hierarchy using value-focused thinking (VFT) techniques through the four MAF functional capability teams (FCTs). 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 the CBP and planning, programming, budgeting and execution (PPBE) processes. MS&A outputs must enable robust and timely analyses to support decision makers and effects-based operations, and assure the most effective decisions for utilization of the MAF. This MS&A capability should prepare, equip, and transform the MAF 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. With the advent of the JDPAC and a new emphasis on the JDDE, MS&A will need an end-to-end supply chain management analysis capability coupled to current simulations. In addition, MS&A is extensively used in exercises and war games for mobility and tanker simulations, and visualizations for red, blue, and neutral players. The near-term vision for mobility MS&A is to provide a more detailed and robust capability for process analysis of materiel 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 of their constructive information within Air Force DMO efforts.

Milestones

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Global En Route Support Roadmap

OPR: AMC/A8X

MAF Capability Statement

Provide worldwide capability to support combatant commanders' wartime and peacetime mobility requirements. From point of upload to point of download, use established or expeditionary en route airfields, capable of supporting sustained mobility operations, where possible. Ensure this capability is available anywhere 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. It must exist at any airfield—military, commercial, or remote locations—where mobility aircraft transit in support of national objectives. The capabilities of peacetime/steady state en route locations vary from bases with fully manned air mobility squadrons to small, commercial air terminal operations, or commercial airports with cargo operations or passenger services provided by commercial vendors. GERS includes the ability to provide aircraft refueling, air mobility command and control, aerial port operations, and aircraft maintenance.

Global en route support is anchored from 13 strategically located en route bases. These bases enable a full range of mobility operations as well as maintain deployable mobility assets and personnel. They are capable of rapidly opening and operating austere, bare-base locations to assist forward air mobility expeditionary airfields.

In support of the global en route system, the following forums were established to advocate for projects that impact GERS:

- European En Route Infrastructure Steering Committee (EERISC); established in 1996
- Pacific En Route Infrastructure Steering Committee (PERISC); established in 1999
- Global En Route Infrastructure Steering Committee (GERISC); established in 2006
- CENTCOM En Route Infrastructure Steering Committee (CERISC); established in 2006

GERS will face the following challenges in the short term: rapidly aging AMC aircraft fleet; insufficient maintenance manpower to support aircraft defensive systems; an inability to meet Global Reach Laydown-deployable equipment requirements including communications, weather, intelligence, intransit visibility, medical support, 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.

Since 1991, 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—had deteriorated, jeopardizing AMC's and the United States Transportation Command's (USTRANSCOM) ability to provide adequate support to the warfighter. AMC and USTRANSCOM proactively surveyed, analyzed, planned, and programmed improvements to GERS to meet wartime requirements at the 13 anchor en route bases. To date, almost 78% of the projects have been completed. Multiple projects, such as the Rota ramp/hydrant and Hickam hydrant projects, have become a reality as a result of combatant commander letters, the integrated priority list, posture statements, and applicable regional En Route Infrastructure Steering Committee advocacy.

The Way Ahead

Our GERS vision is to continually assess the evolving en route strategy. Today, our en route enterprise is made up of 13 existing en routes, as well as newly identified cooperative security locations (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 dollars will likely be used in a limited fashion to enhance current capabilities.

Therefore, our way ahead is two fold. First, we need to identify, verify, and validate CSLs. Potential CSLs, which may offer strategic/operational/tactical capability to support the intertheater/intratheater wartime/peacetime/steady state requirements, are identified by the combatant commanders. These CSLs are then verified for throughput, and the initial groundwork to lay in host-nation/organization agreements is accomplished. USTRANSCOM will visit each location, perform a throughput analysis on each field, and determine if one or more of the locations, in aggregate fashion, are needed to meet the theater's anticipated mobility 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 day-to-day/contingency basis. This CSL identification, verification, and validation process will assure global reach laydown to all corners of the world, making the current global en route enterprise truly global (the ultimate goal). To ensure this CSL initiative remains on track, the GERISC will provide advocacy support.

Second, we need to reassess/revalidate the en route strategy. Factors include initiatives prescribed in the Integrated Global Presence Basing Strategy (IGPBS) such as the Guam Integrated Military Development Plan (GIMDP). Additionally, the strategy needs to be flexible to accommodate the establishment of additional regional combatant commands, e.g., Africa Command (AFRICOM), and future technology extending the range of our aircraft fleet.

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Acronym	Definition
A/JCTD	Advanced/Joint Concept Technology Demonstrations
AAA	Anti-Aircraft Artillery
AALC	Autonomous Approach and Landing Capability
ACAS	Aircraft Collision Avoidance System
ACC	Air Combat Command
ACCA	Aircrew Contamination Control Area
ACCA	Advanced Composite Cargo Aircraft
ACS	Agile Combat Support
ACSG	Aircraft Sustainment Group
ACTD	Advanced Concept Technology Demonstration
AE	Aeromedical Evacuation
AEF	Air and Space Expeditionary Force
AEG	Air Expeditionary Group
AEP	Aircraft Extension Program
AETC	Air Education and Training Command
AETF	Air and Space Expeditionary Task Force
AEW	Air Expeditionary Wing
AF	Air Force
AFDD	Air Force Doctrine Document
AFMC	Air Force Materiel Command
AFNETOPS	Air Force Network Operations
AFRC	Air Force Reserve Command
AFRICOM	Africa Command
AFRL	Air Force Research Laboratory
AFSO 21	Air Force Smart Operations for the Twenty-First Century
AFSOC	Air Force Special Operations Command
AFSOF	Air Force Special Operations Forces
AGE	Aerospace Ground Equipment
AI	Airborne Interceptors
AIMS	Airborne Information Management System
AJACS	Advanced Joint Air Combat System
AJACS-T	AJACS Tanker
AMB	Air Mobility Battlelab
AMC	Air Mobility Command
AMCC	Air Mobility Control Center
AMC-X	Air Mobility Concept-X
AMD	Air Mobility Division
AMMP	Air Mobility Master Plan
AMOCC	Air Mobility Operations Control Center
AMOS	Air Mobility Operations Simulation

Acronym	Definition
AMP	Aircraft Modernization Program
AN	Airborne Networking
ANG	Air National Guard
ANI	Airborne Network Integration
AoA	Analysis of Alternatives
AOA	Angle of Attack
AOC	Air and Space Operations Center
AOR	Area of Responsibility
AP	Autopilot
AR	Air Refueling
ARC	Air Reserve Component
ASACM	Advanced Situational Awareness and Countermeasures
ASIIS	Aerospace Integrated Investment Software
ATD	Advanced Technology Demonstration
ATM	Air Traffic Management
AWFCS	All Weather Flight Control System
BFT	Blue Force Tracking
BLOS	Beyond-Line-of-Sight
BRAC	Base Realignment and Closure
C2	Command and Control
C4	Command, Control, Communications, and Computers
C4I	Command, Control, Communications, Computers, and Intelligence
C4I & IO	C4I and Information Operations
CAF	Combat Air Forces
CARVER	Criticality, Accessibility, Recuperability, Vulnerability, Effect, and Recognizability
CASCO	Conduct Air, Space, and Cyberspace Operations
CBP	Capabilities Based Planning
CBRN	Chemical, Biological, Radiological, and Nuclear
CCATT	Critical Care Air Transport Team
C-CBRN	Counter Chemical, Biological, Radiological, and Nuclear
CCM	Command and Control Module
CDD	Capabilities Development Document
CDM	Constant Deployer Model
CE	Critical Experiment
CERISC	CENTCOM En Route Infrastructure Steering Committee
CIP	Core Integrated Processor
CNS/ATM	Communication, Navigation, Surveillance/Air Traffic Management
COA	Course of Action
COCOMS	Combatant Commands
CONOPS	Concept of Operations

Acronym	Definition
CONUS	Continental United States
COP	Common Operational Picture
COTS	Commercial, Off-the-Shelf
CRAF	Civil Reserve Air Fleet
CRE	Contingency Response Element (Formerly TALCEs)
CRG	Contingency Response Group
CRRA	Capabilities Review and Risk Assessment
CRW	Contingency Response Wing
CSAF	Air Force Chief of Staff
CSL	Cooperative Security Location
CVAMP	Core Vulnerability Assessment Management Program JP 1-02
CWB	Center Wing Box
DFDR/CVR	Digital Flight Data Recorder/Cockpit Voice Recorder
DLI	Data Link Integration
DMO	Distributed Mission Operations
DOD	Department of Defense
DOTMLPF	Doctrine, Organization, Training, Material, Leadership and Education, Personnel, and Facilities
DPO	Distribution Process Owner
DS	Defensive System
DSB	Defense Science Board
DTS	Defense Transportation System
DV	Distinguished Visitor
ECS	Expeditionary Combat Support
ECSS	Expeditionary Combat Support System
EDS	Embedded Diagnostic System
EERISC	European En Route Infrastructure Steering Committee
EHS	Enhanced Surveillance
EMCON	Emission Control
EMP	Electromagnetic Pulse
EOD	Explosive Ordnance Disposal
EOL	Establish Operating Location
ER	Extended Range
ERS	En Route System
EWO	Electronic Warfare Operations
FAA	Federal Aviation Administration
FAA	Functional Area Analysis
FAR	Federal Aviation Regulations
FARP	Forward Arming and Refueling Point
FCA	Future Cargo Aircraft

Acronym	Definition
FCT	Functional Capability Team
FD	Flight Director
FDR	Flight Data Recorder
FFS	Formation Flight System
FMS	Flight Management System
FNA	Functional Needs Analysis
FORCEPRO	Computer Program Designed by AFRL
FSA	Functional Solutions Analysis
FTD	Field Training Device
FTU	Field Training Unit
GATM	Global Air Traffic Management
GDSS	Global Decision Support System
GERISC	Global En Route Infrastructure Steering Committee
GERS	Global En Route Support
GIG	Global Information Grid
GIMDP	Guam Integrated Military Development Plan
GLSC	Global Logistics Support Center
GM CONOPS	Global Mobility Concept of Operations
GP	General Purpose
GPS	Global Positioning System
GRIP	Global Reach Improvement Program
GRL	Global Reach Laydown
GWOT	Global War on Terrorism
HF	High Frequency
HFDL	High-Frequency Data Link
HUMRO	Humanitarian Relief Operations
IA	Information Assurance
IADS	Integrated Air Defense System
ICAO	International Civil Aviation Organization
ICD	Initial Capabilities Document
IFF	Identification Friend or Foe
IFO	Influence Operations
IGPBS	Integrated Global Presence Basing Strategy
IMC	Instrument Meteorology Conditions
IO	Information Operations
IOC	Initial Operational Capability
IP	Internet Protocol
IR	Infrared
ISR	Intelligence, Surveillance, and Reconnaissance
IT	Information Technology

Acronym	Definition
ITV	Intransit Visibility
JA/ATT	Joint Airborne/Air Transportability Training
JCA	Joint Cargo Aircraft
JCIDS	Joint Capabilities Integration and Development System
JCS	Joint Chiefs of Staff
JDDE	Joint Deployment and Distribution Enterprise
JDPAC	Joint Distribution Process Analysis Center
JFAST	Joint Flow and Analysis System for Transportation
JFTACA	Joint Future Theater Airlift Capabilities Assessment
JOA	Joint Operations Area
JOC	Joint Operations Centers
JPADS	Joint Precision Airdrop System
JPADS-MP	Joint Precision Airdrop System-Mission Planning
JROC	Joint Requirements Oversight Council
JTRS	Joint Tactical Radio System
J-UCAS	Joint Unmanned Combat Air Systems
KM	Knowledge Management
KPP	Key Performance Parameter
KVA	Kilovolt-Ampere
LAIRCM	Large Aircraft Infrared Countermeasures
LFA	Large Frame Aircraft
LFADD	Large Frame Aircraft Decontamination Demonstration
LOS	Line-of-Sight
LRU	Line Replaceable Unit
MAF	Mobility Air Forces
MAJCOM	Major Command
MANPADS	Man-Portable Air Defense Systems
MC	Mission Capable
MCO	Major Combat Operations
MCS	Mobility Capabilities Study
MCS	Mission Communication System
MHE	Materials Handling Equipment
MILCON	Military Construction
MILDEC	Military Deception
MIS	Maintenance Information System
MOPP	Mission-Oriented Protective Posture
MOU	Memorandum of Understanding
MRS-05	Mobility Requirements Study 2005
MS&A	Modeling, Simulation, and Analysis

Acronym	Definition
MSHARPPB	Mission, Symbolism, History, Accessibility, Recognizability, Population, and Proximity
MTD	Maintenance Training Device
MTM/D	Million Ton-Miles Per Day
MTS	Maintenance Training System
Nav-Safety	Navigation Safety
NCES	Net-Centric Enterprise Services
NCO	Network-Centric Operations
NDS	National Defense Strategy
NGA	National Geospatial-Intelligence Agency
NM	Nautical Miles
NMS	National Military Strategy
NOW	Network Warfare Operation
NSS	National Security Strategy
NVD	Night Vision Device
NVG	Night Vision Goggle
NVIS	Night Vision Imaging System
O&S	Operations and Supporting
OBIGGS II	Second-Generation On-Board Inert Gas Generating System
OCC	Operations Control Center
OCONUS	Outside of the CONUS
OPSEC	Operations Security
OPTEMPO	Operating/Operations Tempo
ORD	Operational Requirements Document
OSA	Operational Support Airlift
OSI	Office of Special Investigations
PACAF	Pacific Air Forces
Pacer CRAG	Pacer Compass, Radar, and Global Positioning System
PDM	Programmed Depot Maintenance
PDM	Program Decision Memorandum
PERISC	PACOM En Route Infrastructure Steering Committee
PLAID	Precision Location and Identification
PMI	Patient Movement Item
POE	Point of Embarkation
POM	Program Objective Memorandum
PPBE	Planning, Programming, Budgeting and Execution
PPS	Precise Positioning Service
PRNAV	Precision Area Navigation
PSD-T	Personnel Service Delivery-Transformation
PSYOP	Psychological Operations

Acronym	Definition
QDR	Quadrennial Defense Review
R&PC	Requirements and Planning Council
RA	Radio Altimeter
RDT&E	Research, Development, Test and Evaluation
RE21	Repair Enterprise 21
RERP	Reliability Enhancement and Re-engining Program
RF	Radio Frequency
RFCM	Radio Frequency Countermeasures
RM&A	Reliability, Maintainability, and Availability
RM&S	Reliability, Maintainability, and Supportability
RNP	Required Navigation Performance
RNPI	Required Navigation Performance Improvement
ROBE	Roll-On Beyond-Line-Of-Sight Enhancement
RSP	Readiness Spares Packages
RTIC	Real-Time Information in the Cockpit
RVSM	Reduced Vertical Separation Minima
S&T	Science and Technology
SA	Situational Awareness
SAASM	Selective Availability Anti-Spoofing Module
SAFIRE	Surface-to-Air Fire
SAM	Special Air Mission
SATCOM	Satellite Communications
SBA	Strategic Brigade Airdrop
SCA	Software Communications Architecture
SCC	Stress Corrosion Crack
SEAD	Suppression of Enemy Air Defenses
SECDEF	Secretary of Defense
SHORAD	Short-Range Air Defense
SKE	Station Keeping Equipment
SMART	Scalable, Multi-Function, Automated Relay Terminals
SME	Subject Matter Expert
SOAR	Special Operations Air Refueling
SOCOM	Special Operations Command
SOF	Special Operations Forces
SPO	Systems Program Office
SSC	Small-Scale Contingencies
STO	Special Technical Operations
STOL	Short Takeoff and Landing
STWG	Science and Technology Working Group
SU	Situational Understanding

Acronym	Definition
TACC	Tanker Airlift Control Center
TARS	Terrestrial Aeronautical Radiophone System
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
TCTO	Time Compliance Technical Order
TDL	Tactical Data Link
TPFDL	Timed Phased Force and Deployment List
TRS-05	Tanker Requirements Study-2005
UAV	Unmanned Air Vehicles
UE	Unit Equipped
UHF	Ultra High Frequency
US	United States
USAF	United States Air Force
USAFE	United States Air Forces, Europe
USEUCOM	United States European Command
USSOCOM	United States Special Operations Command
USSTRATCOM	United States Strategic Command
USTRANSCOM	United States Transportation Command
UTC	Unit Type Code
V2D	Voice, Video, and Data
VFT	Value-Focused Thinking
VHF	Very High Frequency
VIA/AIU	Versatile Integrated Avionics/Auxiliary Interface Unit
VIPSAM	Very Important Person Special Air Mission
VTOL	Vertical Takeoff and Landing
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)
- United States Transportation Command Strategic Plan

Air Force Guidance

- Air Force Vision
- Air Force Vision 2020
- Air Force Posture Statement 2007
- Air Force Roadmap 2006-2025
- Air Force Strategic Plan
- Air Force Strategic Planning Directive
- Air Force Capstone Concept for Joint Operations (AFCCJO)

AF CONOPS Community of Practice Weblink

- 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 AIAA Paper
- Effects-Based Operations and Mobility Operations - Strategic Plan | White Paper
- Capability Development Document for MAF C2 Framework, 15 March 2006
- AMC C-CBRN CONOPS, 1 June 2007
- En Route Info - En Route Strategic Plan | En Route Bases | PERISC Charter | EERISC Charter

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