Description of document:	**Comparison between two versions of US Air Force Air Mobility Command's Air Mobility Master Plan (AMMP) 2004**
Posted date:	05-October-2007
Source of documents:	HQ AMC/A6OBR (FOIA) 203 West Losey St, Rm 3640 Scott AFB IL 62225-5223 618-229-5402 or 618-229-5710 E-Mail: amca6.a6obr@scott.af.mil HQ AMC/A55PL 402 Scott Drive (Unit 3L3) Scott AFB IL 62225-5307 Phone: 618-229-4671 Fax: 618 256-4017 E-Mail: amc-a55pl@scott.af.mil
Notes:	A copy of this document was released by Air Mobility Command 17-September-2007 and posted on the governmentattic.org web site 05-October-2007. A second version with some redactions removed was subsequently released on appeal. This file shows a side-by-side comparison of pages which differ between the two versions. Both versions of the entire 2004 Mobility Plan are available on governmentattic.org.

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SET TO: “TWO-UP CONTINUOUS”

US Air Force Air Mobility Command's
Air Mobility Master Plan (AMMP) 2004

(first release)

Released date: 17-September-2007
Posted date: 05-October-2007

PAGES DISPLAYED ON THE LEFT
When viewed "two- up continuous"

Inconsequential differences shown in pink outline

US Air Force Air Mobility Command's
Air Mobility Master Plan (AMMP) 2004

(appeal release)

Posted date: 03-February-2008

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Newly released material highlighted in yellow

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C-5 Program/Modifications

Program/Modification	(b)(5)
C-5 Reliability Enhancement and Re-Engining Program (RERP)	
Fuel Flow Transmitter	
Hydraulic Surge Control Valves	
Large Aircraft Advanced Infrared Countermeasures (LAIRCM)	
Troop Floor Corrosion Prevention	
Malfunction Detection, Analysis and Recording System III (MADARS III)	
Link-16, Joint Tactical Radio System (JTRS)	
Emergency Power System Upgrade	
Transponder Upgrade	
Digital Flight Data Recorder (FDR) & Cockpit Voice Recorder (CVR)	
AAR-47 Missile Warning System	
Advanced Situational Awareness and Countermeasures (ASACM)	
Avionics Modernization Program/ Communication, Navigation, Surveillance/ Air Traffic Management (AMP/CNS/ATM) (includes: Data Link Capability, TCAS II, TAWS, UHF SATCOM/ANDVT/DAMA)	

(b)(5)

Modification Explanations

C-5 Reliability Enhancement and Re-Engining Program (RERP)

RERP is a comprehensive modernization of the C-5 that improves aircraft reliability, maintainability, and availability. This effort includes replacing TF-39 engines with a more reliable commercial, off-the-shelf (COTS) turbofan engine with increased take-off thrust, reduced fuel consumption, Stage III noise compliance and FAR 34 emissions compliance. These new engines (along with new pylons, wing attach fittings and upgrades, and thrust reversers) increase payload capability, improve transportation system throughput, and decrease engine removals by five fold. Studies validate that RERP will increase Reliability, Maintainability, and Availability (RM&A) to levels comparable to other AMC aircraft, with substantial increases in aircraft availability and on-time departures. Currently, the TF-39 accounts for over 20% of the C-5 not mission capable (NMC) time. Replacing the aging TF-39 engine fleet with a modified commercial, off-the-shelf (COTS) engine should substantially increase C-5 reliability. Commercial, off-the-shelf engines should increase aircraft departure reliability to 92%. Additional re-engining benefits include a 22% increase in thrust, which will increase wartime mission throughput. The program upgrades numerous subsystems, including auxiliary power units (APUs), electrical, hydraulic, fuel, fire

C-5 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
C-5 Reliability Enhancement and Re-Engining Program (RERP)	X	X	X	X		
Fuel Flow Transmitter	X	X				
Hydraulic Surge Control Valves	X	X				
Large Aircraft Advanced Infrared Countermeasures (LAIRCM)						
Troop Floor Corrosion Prevention						
Malfunction Detection, Analysis and Recording System III (MADARS III)	X	X				
Link-16, Joint Tactical Radio System (JTRS)						
Emergency Power System Upgrade	X	X				
Transponder Upgrade	X	X				
Digital Flight Data Recorder (FDR) & Cockpit Voice Recorder (CVR)	X	X				
AAR-47 Missile Warning System			X	X		
Advanced Situational Awareness and Countermeasures (ASACM)						
Avionics Modernization Program/ Communication, Navigation, Surveillance/ Air Traffic Management (AMP/CNS/ATM) (includes: Data Link Capability, TCAS II, TAWS, UHF SATCOM/ANDVT/DAMA)	X	X	X	X		
(b)(5)						

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suppression, pressurization/air conditioning systems, landing gear, and the airframe. RERP replaces the Malfunction Detection, Analysis and Recording System III (MADARS III) with an Embedded Diagnostic System (EDS) which will improve maintenance repair time. EDS will provide improved Fault Isolation so that 99% of all faults will be solved using EDS and technical orders. All faults will be presented in English text.

Fuel Flow Transmitter

This modification replaces fuel flow transmitters, the C-5s #1 mission-delay item in FY98. In 1995, the transmitter failed 338 times. Repairing these failures and replacing condemned units is costly in terms of dollars, manpower and reduced mission capability. Replacing these units with more reliable, state-of-the-art units will result in reduced aircraft delays and increased aircraft availability. A total o
Equipment (WRE). (b)(5)
(b)(5)

Hydraulic Surge Control Valves

Hydraulic surge control valves are currently being developed to reduce hydraulic failures associated with system use. Upon activation, the current system instantaneously applies over 3000 psi to the system. The new "slow opening" valves will allow for the even pressure build-up within the system. (b)(5) Kits will be installed by operational units using 3400 funding.

Large Aircraft Advanced Infrared Countermeasures (LAIRCM)

The LAIRCM mod is proposed for a total of 26 C-5Bs as part of a LAIRCM-equipped fleet of 444 MAF aircraft. AMC carried forward an (b)(5) POM initiative which would start development for LAIRCM mods on C-5Bs b ng in (b)(5) and modifying the first 26 aircraft in a single-turret configuration by the end of (b)(5)

Troop Floor Corrosion Prevention

Stress panels in the troop compartment latrine are corroding. To replace the panels, the entire latrine must be removed. This causes a 3-week programmed depot maintenance (PDM) delay. The C-5B-designed latrine will be installed on the C-5A. The C-5B latrine has a one-piece fiberglass floor pan, fiberglass walls, and a larger holding tank. Four C-5A aircraft have prototype kits installed. Fifty-five kits have been purchased. Kit installation will be programmed through the R&PC process. The requirement is approximately (b)(5)

Malfunction Detection, Analysis and Recording System III (MADARS III)

This modification is for the Multi-Function Display Controller Recorder (MDCR) for C-5 aircraft. The MDCR is a flight essential component of the C-5 Malfunction Detection Analysis and Recording System (MADARS II). This modification replaces four obsolete and unsupportable Line Replaceable Units (LRUs) that are currently part of the MADARS II system. MADARS II components replaced are (1) the Display Unit (DU), (2) the Controller (CNTRL), (3) the Maintenance Data Recorder (MDR), and (4) the Printer. In addition, this modification eliminates the current SATCOM laptop computer and printer (located in the C-5 cockpit), and transfers the SATCOM functionality to the MDCR (workstation). This modification consists of the following five LRUs: (1) Uninterruptible Power Supply, (2) Work Station Assembly, (3) Communications Controller (CC), (4) Graphics Print Out Unit, and (5) Voltage converter. The MADARS II MDR and DU functionality are replaced by a ruggedized COTS laptop workstation that records flight data onto a PC card instead of the current MDR magnetic tape. A COTS graphics printer replaces the current POU printer functionality. The Communications Controller (CC) computer replaces the CNTRL functionality and also redundantly records flight data in a real time environment. The CC routes all data to the graphics printer under normal operation and in the event of a workstation malfunction. Flight test of the Prototype was completed (b)(5). The program has (b)(5) in (b)(5) production funding for 112 aircraft. Contract Field team kit installation will begin (b)(5

suppression, pressurization/air conditioning systems, landing gear, and the airframe. RERP replaces the Malfunction Detection, Analysis and Recording System III (MADARS III) with an Embedded Diagnostic System (EDS) which will improve maintenance repair time. EDS will provide improved Fault Isolation so that 99% of all faults will be solved using EDS and technical orders. All faults will be presented in English text.

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Hydraulic Surge Control Valves

Hydraulic surge control valves are currently being developed to reduce hydraulic failures associated with system use. Upon activation, the current system instantaneously applies over 3000 psi to the system. The new "slow opening" valves will allow for the even pressure build-up within the system. Prototype testing was completed in the third quarter of FY03. Kits will be installed by operational units using 3400 funding.

Large Aircraft Advanced Infrared Countermeasures (LAIRCM)

The LAIRCM mod is proposed for a total of 26 C-5Bs as part of a LAIRCM-equipped fleet of 444 MAF aircraft. AMC carried forward an FY06 POM initiative which would start development for LAIRCM mods on C-5Bs b ng in FY05 and modifying the first 26 aircraft in a single-turret configuration by the end of (b)(5)

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(b)(5) and complete in (b)(5)

Link-16, Joint Tactical Radio System (JTRS)

JTRS is a joint program that is using spiral development to produce a software compliant architecture radio supporting multiple waveforms. OSD has issued a mandate that no more aircraft radios can be purchased that are not JTRS or JTRS compliant. They've also tasked the AF to develop a migration schedule to JTRS for all platforms. The AMC plan is to initially migrate to JTRS for Tactical Datalink (Link-16) and Ultra High Frequency (UHF) Satellite Communications (SATCOM). Installation is projected starting in FY08 (JTRS airborne cluster is not available until FY08). JOINT TACTICAL RADIO SYSTEM (JTRS) ORD Version 3.2, JROCM 087-03, 9 April 2003. Advanced Situational Awareness/Countermeasures CDD, Draft, in AFROC Coord.

Emergency Power System Upgrade

C-5 Emergency DC Power System Upgrade provides increased electrical capacity for emergency use. Current system is original system designed 36+ years ago. Load analysis indicates DC power buses exceed emergency generator capacity and are projected to exceed capacity by ~ 25 amps when C-5 AMP is installed. Initiative replaces the current system (3 KVA generator and two 5 amp-hr batteries) with a new 6.5 KVA MOTS generator and one 54 amp-hr battery. The upgrade also adds two new 100-amp Regulated Transformer Rectifier Units (RTRU), a battery charging system, and modifies the Flight Engineers DC Control Panel.

Transponder Upgrade

The addition of SI code capability is an ICAO amendment 73 mandate that must be complied with before March 2009. It is needed to correct current deficiencies in European airspace. The current C-5 APX-100 (IFF transponder) provides an identifier code; however, due to increased airspace utilization and interrogators utilization there currently are not enough identifier codes available. SI codes are basically the same functionality but provide a longer digital word so additional identifier codes can be assigned. Not being assigned an identifier code by ground interrogators creates a situation where ground controllers are unaware of all aircraft in their assigned airspace; thereby, significantly increasing the possibility of mid-air mishaps. The additional extended squitter capability is to automatically provide additional aircraft parameter information to ground controllers. This is also an ICAO amendment 73 mandate that must be complied with before March 2009. This enhancement is designed to improve airspace safety by reducing ground controller workload, which continues to increase exponentially as airspace utilization increases. The current C-5 transponder (APX-100) has the capability to provide some of the needed parameters. To provide the remaining parameter, there is a need to modify the APX-100 software as well as the Flight Management System (FMS) software. Enhanced Surveillance is a new capability that automatically provides flight parameter information to ground controllers. To accomplish this enhancement, the software in the APX-100 (IFF transponder) needs to be updated to send numerous flight parameters to ground controllers every 3 seconds. Additionally, there is a need to modify FMS software and aircraft wiring. There is a military concern that providing this additional information automatically could compromise mission security, and endanger flight crews. The current design standard does not allow for the ability to turn off this signal to meet military needs.

Digital Flight Data Recorder (FDR) & Cockpit Voice Recorder (CVR)

FDR and CVR are flight critical systems and required for safety compliance. They capture data used by a crash investigation to determine cause of the incident and to provide recommendations to improve equipment and procedures. FDR and CVR are becoming difficult to support due to parts obsolescence and do not meet current survivability requirements. Mod will replace both line replacable units (LRUs). Executing the modification will reduce combined maintenance man hours (MMH) by 86% (1,184 hrs to 169)(DFDR reduced 90%; CVR reduced 80%). HQ USAF/SE and XO have mandated FDR and CVR on all troop/passenger aircraft.

Qtr/FY03 and complete in FY04.

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AAR-47 Missile Warning System

This modification is applicable to the 50 C-5B and 1 C-5A that currently have the AAR-47 system already installed. The AAR-47 components are: Control Processor (1), Controller Indicator (1), Aft Sensors (2), Fwd Sensors (2), Signal Repeaters (2). To continue to provide protection for AMC C-5 aircraft against infrared (IR) guided surface-to-air missiles and correct system obsolescence issues, the missile warning system must be modified. Older sensors on MWS are degrading and are unable to detect an approaching missile, leaving the aircraft and crew vulnerable. Further, advances in technology have rendered various system components obsolete. Optical sensors chemically decompose, blinding MWS sensors to a threat missiles signature. Failing sensors must be replaced to maintain a missile warning system capable of detecting IR surface-to-air missiles. Obsolete parts must be replaced to ensure the MWS remains logistically supportable. Without a functioning MWS, AMC crews and aircraft are vulnerable to the IR SAM threat. The Navy-managed, optical sensor replacement program replaces all four MWS optical sensors, upgrades the MWS computer processor software and hardware, and provides a new control indicator. AF1067, AMC 01-041.

Advanced Situational Awareness and Countermeasures (ASACM)

ASACM addresses AMC radio frequency countermeasures mission need statement, Nov 00. System will initially provide advanced SA capability for threat avoidance by upgrading RWRs with precision location and identification (PLAID) capability—(b)(5) Adds coordinated countermeasures to limited number of MAF at or degrade (b)(5) (b)(5).

Avionics Modernization Program/ Communication, Navigation, Surveillance/ Air Traffic Management (AMP/CNS/ATM) (includes: Data Link Capability, TCAS II, TAWS, UHF SATCOM/ANDVT/DAMA)

AMP modifications combine two major ORDs for the C-5. Both the CNS/ATM and the All Weather Flight Control System (AWFCS) requirements are included in this program. Some of the CNS/ATM items include: HF, data link capability; upgraded Global Positioning System (GPS) receivers; International Maritime Satellite (INMARSAT) communications (voice and datalink); and a Required Navigation Performance (RNP) certified Flight Management System (FMS). The AWFCS effort replaces low reliability avionics components in the autopilot/flight augmentation systems with new digital systems. It also replaces unsupportable flight and engine instruments with a new digital electronic display suite. Projected reliability of the avionics systems is represented by a five-fold increase in mean time between failure (MTBF). SECDEF directed safety modifications are installed to include both Traffic Alert and Collision Avoidance System II (TCAS II) and Terrain Awareness and Warning System (TAWS). Risk to both program and funding is being mitigated by use of a single (competitive) source for integration development, kits, installation, and options for follow-on support. (b)(5) (b)(5) Installation of new communications and surveillance equipment to improve air traffic management under CNS/ATM will allow the C-5 to take advantage of optimum air routes. Non-CNS/ATM-compliant aircraft will be unable to fly without special approval in European airspace or the oceanic track systems as new CNS/ATM procedures are implemented beginning in March 2005.

AAR-47 Missile Warning System

This modification is applicable to the 50 C-5B and 1 C-5A that currently have the AAR-47 system already installed. The AAR-47 components are: Control Processor (1), Controller Indicator (1), Aft Sensors (2), Fwd Sensors (2), Signal Repeaters (2). To continue to provide protection for AMC C-5 aircraft against infrared (IR) guided surface-to-air missiles and correct system obsolescence issues, the missile warning system must be modified. Older sensors on MWS are degrading and are unable to detect an approaching missile, leaving the aircraft and crew vulnerable. Further, advances in technology have rendered various system components obsolete. Optical sensors chemically decompose, blinding MWS sensors to a threat missiles signature. Failing sensors must be replaced to maintain a missile warning system capable of detecting IR surface-to-air missiles. Obsolete parts must be replaced to ensure the MWS remains logistically supportable. Without a functioning MWS, AMC crews and aircraft are vulnerable to the IR SAM threat. The Navy-managed, optical sensor replacement program replaces all four MWS optical sensors, upgrades the MWS computer processor software and hardware, and provides a new control indicator. AF1067, AMC 01-041.

Advanced Situational Awareness and Countermeasures (ASACM)

ASACM addresses AMC radio frequency countermeasures mission need statement, Nov 00. System will initially provide advanced SA capability for threat avoidance by upgrading RWRs with precision location and identification (PLAID) capability—anticipated fielding in FY06. Adds coordinated countermeasures to limited number of MAF aircraft for response to defeat or degrade threat systems if avoidance is impossible. Presently is an unfunded POM initiative with an anticipated CDD approval beginning in Jan 05.

Avionics Modernization Program/ Communication, Navigation, Surveillance/ Air Traffic Management (AMP/CNS/ATM) (includes: Data Link Capability, TCAS II, TAWS, UHF SATCOM/ANDVT/DAMA)

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2.3.8 C-9 Roadmap

OPR: AMC/A58

Weapon System Assessment

The mission of the C-9C is to provide first-class operational support airlift of very important persons (VIPs), travel teams, and critical mission support items supporting war, peacetime, homeland defense and contingency requirements. Additionally, the C-9C enhances the flexibility of the combatant commander travel support aircraft pool by providing a medium volume/range alternative. The C-9 is a twin-engine, T-tailed, medium-range, swept-wing jet aircraft based on the commercial DC-9-30. Air Force Reserve Command (AFRC) currently possesses 3 C-9A's stationed at Scott AFB.

The current fleet of C-9Cs received funding from Congress to modify them with hush kits. This will allow the aircraft to become Stage III compliant and reduce engine noise emissions. The way ahead for this airframe is to transfer the C-9Cs from Andrews AFB to Scott as the C-40Bs are delivered to Andrews. The C-9Cs would replace the C-9A's on a one-for-one basis between (b)(5)

-- First Operational Aircraft Delivered: August 1968.
-- Average Age Fleet: 30 years.
-- Range: 1,739 nautical miles (NM).
-- Crew Ratio: Active Duty, 2.0 for C-9C; Air Force Reserve Command (AFRC), 2.1.

(b)(5)

2.3.8 C-9 Roadmap

OPR: AMC/A58

Weapon System Assessment

The mission of the C-9C is to provide first-class operational support airlift of very important persons (VIPs), travel teams, and critical mission support items supporting war, peacetime, homeland defense and contingency requirements. Additionally, the C-9C enhances the flexibility of the combatant commander travel support aircraft pool by providing a medium volume/range alternative. The C-9 is a twin-engine, T-tailed, medium-range, swept-wing jet aircraft based on the commercial DC-9-30. Air Force Reserve Command (AFRC) currently possesses 3 C-9A's stationed at Scott AFB.

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-- Average Age Fleet: 30 years.
-- Range: 1,739 nautical miles (NM).
-- Crew Ratio: Active Duty, 2.0 for C-9C; Air Force Reserve Command (AFRC), 2.1.

(b)(5)

C-9 Program/Modifications

Program/Modification	(b)(5)
Airworthiness Directives/Service Bulletins	(b)(5)

Modification Explanations

Airworthiness Directives/Service Bulletins

The C-9 is a FAA-certified aircraft. Consequently, it is required to comply with all FAA airworthiness directives. Service bulletins affect safety, product improvement, maintenance, and reliability and are necessary to comply with and maintain FAA certification and compliance.

C-9 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed Funding		Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)
Airworthiness Directives/Service Bulletins	X	X			
(b)(5)					

Modification Explanations

Airworthiness Directives/Service Bulletins

The C-9 is a FAA-certified aircraft. Consequently, it is required to comply with all FAA airworthiness directives. Service bulletins affect safety, product improvement, maintenance, and reliability and are necessary to comply with and maintain FAA certification and compliance.

C-12 Program/Modifications

Program/Modification	(b)(5)
Electronic Flight Instrument Program (EFIS)	
Countermeasures	
Raisbeck Enhanced Performance Package	
Simulator Upgrades	
Low Cost Modifications	
Service Bulletins	

(b)(5)

Modification Explanations

Electronic Flight Instrument Program (EFIS)

This approach meets USAF and long-term communication, navigation, surveillance/air traffic management (CNS/ATM) requirements such as Required Navigation Performance (RNP), Precise Positioning Service (PPS), Global Positioning System (GPS), Traffic Alert and Collision Avoidance System (TCAS) II and Terrain Awareness and Warning System (TAWS). It also employs a high-fidelity large-format display system, a data link-based flight management system, and a radio tuning system. It also retains existing baseline avionics recently modified by the USAF that satisfy the USAF and CNS/ATM requirements specified, thereby maximizing the USAF investment in these avionics.

Countermeasures

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

Raisbeck Enhanced Performance Package

This commercial modification significantly improves the aircraft in one or more of these areas: Payload, Range, Block Speed, Operational Flexibility, Economy, and Style. It consists of quiet turbofan propellers, ram air recovery system, high floatation gear doors, nacelle wing lockers, enhanced performance leading edges and dual aft body strakes.

Simulator Upgrades

No additional information available.

Low Cost Modifications

Aircraft procurement (3010) funds for small mods where costs do not exceed $2.0M each year.

Service Bulletins

The C-12 fleet requires funding to comply with contractor product improvements incorporating Raytheon and other outside organizations' service bulletins, identified as items recommended for USAF compliance. (b)(5)

C-12 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
Electronic Flight Instrument Program (EFIS)	X	X	X			
Countermeasures						
Raisbeck Enhanced Performance Package						
Simulator Upgrades	X	X	X	X		
Low Cost Modifications	X	X	X	X		
Service Bulletins	X	X	X	X		

(b)(5)

Modification Explanations

Electronic Flight Instrument Program (EFIS)

This approach meets USAF and long-term communication, navigation, surveillance/air traffic management (CNS/ATM) requirements such as Required Navigation Performance (RNP), Precise Positioning Service (PPS), Global Positioning System (GPS), Traffic Alert and Collision Avoidance System (TCAS) II and Terrain Awareness and Warning System (TAWS). It also employs a high-fidelity large-format display system, a data link-based flight management system, and a radio tuning system. It also retains existing baseline avionics recently modified by the USAF that satisfy the USAF and CNS/ATM requirements specified, thereby maximizing the USAF investment in these avionics.

Countermeasures

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

Raisbeck Enhanced Performance Package

This commercial modification significantly improves the aircraft in one or more of these areas: Payload, Range, Block Speed, Operational Flexibility, Economy, and Style. It consists of quiet turbofan propellers, ram air recovery system, high floatation gear doors, nacelle wing lockers, enhanced performance leading edges and dual aft body strakes.

Simulator Upgrades

No additional information available.

Low Cost Modifications

Aircraft procurement (3010) funds for small mods where costs do not exceed $2.0M each year.

Service Bulletins

The C-12 fleet requires funding to comply with contractor product improvements incorporating Raytheon and other outside organizations' service bulletins, identified as items recommended for USAF compliance. (b)(5)

C-17 Program/Modifications

Program/Modification	(b)(5)
AN/AAR-47 Sensor Upgrade Program	
On Board Inert Gas Generating System (OBIGGS)-II	
Large Aircraft Advanced Infrared Countermeasures (LAIRCM)	
Fuel System Redesign	
Joint Precision Airdrop System (JPADS)	
Combat Lighting	
Airborne Network Integration (ANI)	
Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM)	
Radar Warning and Countermeasures Capability	

(b)(5)

Modification Explanations

AN/AAR-47 Sensor Upgrade Program

Commodity modification to AN/AAR-47 processors procured prior to FY99 buy. Improve throughput and memory reserves. Improve probability of detection, increase warning times, reduce false alarms, add new threats to be detected, and add Mil-Std-1553 interface. Update software to Ada. Provides for recurring flight test efforts required by Group B GFE software block cycle updates. Provides for WR-ALC installation costs of ALE-47 and AAR-47 hardware and software updates (memory & processor). Provides for study of alternate MWS(s) to replace the AAR-47 in FY-2000 to address FOT&E MWS deficiencies. Provides for Boeing's participation in the Air Force Labs Large Aircraft IRCM (LAIRCM) ATD (LIFE).
Impact: No memory reserve for software upgrades. Limited ability to improve threat detection and false alarm performance. Incompatible with future sensor upgrade.
Fix: Install new processor circuit card, mother board in Lot I, II, & III boxes, install Ada S/W.
Status: Fielding underway (P-113 cut in). Navy is lead service.

On Board Inert Gas Generating System (OBIGGS)-II

OBIGGS improvements needed to decrease crew workload, improve suitability, operational capability, survivability, and reliability. Impact: The current system requires flight crew preflight mission planning to ensure the aircraft profile does not place excessive demands on the OBIGGS system resulting in explosive vapors in the fuel tank ullage area. System improvements are also needed to reduce ground servicing times and servicing requirements. Lastly, all system modifications must improve current system reliability. Fix: Improve system operational capability, suitability, and reliability. Status: SPO is pursuing two courses of action: the first is to retrofit current system reliability upgrades (P-100 cut in) and the second is to complete development of the final OBIGGS-II solution (P-138 cut in).

C-17 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
AN/AAR-47 Sensor Upgrade Program	X	X	X	X		
On Board Inert Gas Generating System (OBIGGS)-II	X	X	X	X		
Large Aircraft Advanced Infrared Countermeasures (LAIRCM)	X	X	X	X		
Fuel System Redesign	X	X	X	X		
Joint Precision Airdrop System (JPADS)						
Combat Lighting	X	X	X	X		
Airborne Network Integration (ANI)						
Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM)	X	X	X	X		
Radar Warning and Countermeasures Capability						

(b)(5)

Modification Explanations

AN/AAR-47 Sensor Upgrade Program

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Large Aircraft Advanced Infrared Countermeasures (LAIRCM)

LAIRCM provides a highly effective defensive system capability for transport and tanker aircraft against IR SAMs, including the proliferating IR Man-portable Air Defense Systems (MANPADS) threat. The LAIRCM system consists of an improved missile warning system and directed laser countermeasures system. .
Impact: Without upgraded systems, aircraft will not have the capability to address future threats. This upgrade will also help defeat threats during SOLL II operations.
Fix: Develop a Large Aircraft Infrared Countermeasures (LAIRCM) system. Should include advanced missile warning, er, and improved flares.
Status: 12 aircraft fielded; (b)(5)

Fuel System Redesign

Fuel system redesign is needed to eliminate unreliable fuel quantity indications and increase reliability of fuel system components. Furthermore fuel system deficiencies have led to contaminated fuel tanks, fuel venting which leads to environmental concerns, mission and maintenance impacts; and aircraft performance penalties. Impact: Apple jelly (viscous mix of icing inhibitor and water) and water accumulation have resulted in fuel tank contamination and gauging inaccuracies. The contamination causes the compensators to give erroneous readings resulting in fuel overfills and also corrodes the fuel system structure and components. Excessive water also introduces the possibility of icing at the pumps inlet, which could result in engine flameouts. As a result of the contamination, there has been increased maintenance activity such as BPO sumping, compensator washes and fuel spill clean ups. The flight crews are required to manually manage fuel loads above 135K and include a gross take-off weight penalty due to the gauging inaccuracies.
Fix: Redesign fuel system and fuel quantity gauging system.
Status: Production cut-in at P-100 (Mar 03). (b)(5)

Joint Precision Airdrop System (JPADS)

JPADS will provide the means to meet the COCOM requirement of sustaining combat power using high altitude, precision airdrop, as a direct and theater delivery method, into a dynamic, dispersed, and unsecure battlespace. This must be done with speed and flexibility to provide an optional capability previously unavailable to the COCOM, and to enable decisive operational superiority.

C-17 requires capability to conduct unilateral, joint, and other DOD combat, resupply, and humanitarian high altitude airdrop operations with accuracy standards that meet Army requirements (100 meter accuracy) and enhance survivability of AMC assets (stand-off and altitude – greater than 2000 ft and up to FL350). There is insufficient equipment onboard to permit accurate airdrops from high altitudes. Reference: JPADS Advanced Concept Technology Demonstration Implementation Directive, 17 Nov 03.

Combat Lighting

Current NVG capabilities are limited and increase aircraft vulnerability. Most cockpit lighting is NVIS compatible and meets aircrew and customer requirements. However, none of the exterior lights or cargo compartment lights are NVIS compatible or covert. Exterior IR lighting, including anti-collision beacons, landing/taxi lights, and formation lights, will be controllable from a single switch in the cockpit. At the flip of a switch, the crew could extinguish all exterior overt light sources and illuminate the above-mentioned light sources. In addition to these exterior lights, the cargo compartment must also have NVIS compatible lights, also controlled from a single switch. Cargo compartment lighting must be able to be controlled by forward, middle, and aft sections. Exterior lighting must have the capability to select either an NVIS-compatible, FAA-compliant mode or a covert lighting mode. Impact: Lighting for SOLL II, airdrop, and air-land wartime/training mission requirements not met. Fix: Procure lights that meet C-17 NVG lighting requirements. Require all future aircraft procurements to be NVG compatible in all respects. Status: Cargo

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Fix: Redesign fuel system and fuel quantity gauging system.
Status: Production cut-in at P-100 (Mar 03). Retrofit complete by Dec 06.

Joint Precision Airdrop System (JPADS)

JPADS will provide the means to meet the COCOM requirement of sustaining combat power using high altitude, precision airdrop, as a direct and theater delivery method, into a dynamic, dispersed, and unsecure battlespace. This must be done with speed and flexibility to provide an optional capability previously unavailable to the COCOM, and to enable decisive operational superiority.

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compartment covert and NVIS-compatible lighting cut-in at P-127, fleet retrofit (b)(5)
External combat lighting production cut-in at P-153.

Airborne Network Integration (ANI)

AMC has a global secure and non-secure communications requirement to meet AMC missions in support of the USAF CONOPS. ANI upgrade will provide integrated access to the Global Information Grid (GIG) to support C2 voice and data requirements, transfer aircraft status and position information to secure TDL, and provide aircraft IP addressability within the GIG for sharing of operational data. AMC's plan is to use JTRS Program radios to provide required capabilities not provided by Global Air Traffic Management modifications or Avionics Modernization Programs (e.g. Airborne Networking, wide-band applications, etc). ANI will satisfy requirements in Real Time Information to the Cockpit (RTIC) AMC MNS 002-93, Global Mobility CONOPS (Sec 5.3), Joint Tactical Radio System (JTRS) ORD Version 3.2, JROCM 087-03, 9 April 2003, and Advanced Situational Awareness and Countermeasures (ASACM) CDD (Draft currently in AFROC coordination). ANI development is contingent upon availability of JTRS low rate initial production projected in late FY08.

Communications, Navigation, Surveillance/Air Traffic Management (CNS/ATM)

The future air traffic control system will require significant upgrades to today's aircraft to increase system capacity and flight efficiency while continuing to meet flight safety standards. New architecture takes advantage of emerging technologies in communication, navigation, and surveillance to improve air traffic management (ATM). 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.

Radar Warning and Countermeasures Capability

A radar warning and countermeasure system is needed on the C-17 to alert the crew of acquisition by air and ground-based enemy target tracking by threat systems and to defeat the incoming threat.
Impact: Installation of this system will increase situational awareness, especially in theaters where no intelligence gathering platforms are available. Aircrew and aircraft survivability will be enhanced with a countermeasure system. This system is critical for SOLL II operations and will ensure the C-17 has the same capability as the C-141 SOFI aircraft presently performing the special ops mission. The C-141 SOFI aircraft are modified with the ALR-69 Radar Warning Receiver (RWR).
Fix: Develop Advanced Situational Awareness/Countermeasures (ASACM) capabilities including Precision Location and Identification (PLAID) and future countermeasures on a portion of the C-17 fleet.
Status: (b)(5)

Heads-Up Missile Warning System (MWS). Missile warning system indications need to be presented in the field of view of both pilots.
Impact: This modification will increase safety of flight by preventing a "heads down" situation by both pilots while trying to determine the location of an incoming missile. Also, this will allow a quicker reaction to the indicated threat. The reaction time of the crew is critical to defeating an incoming missile. This system will also help during SOLL II operations.
Fix: Move current MWS indications from the throttle pedestal into the field of view.
Status: (b)(5)

compartment covert and NVIS-compatible lighting cut-in at P-127, fleet retrofit complete Dec 04. External combat lighting production cut-in at P-153.

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Fix: Move current MWS indications from the throttle pedestal into the field of view.
Status: (b)(5)

C-21 Program/Modifications

Program/Modification	(b)(5)
Service Bulletins	
Reduced Vertical Separation Minimums (RVSM)	
Fuel Imbalance	
Flight Data Recorder (FDR)	
TCAS II Version 7/Mode S Level 2 Elementary Surveillance	
Enhanced Mode S/Mode 5	
PACAF Oceanic Navigation	
USAFE SPECTRUM	
Secure Communications	
Simulator Upgrades	
Low Cost Modifications	

(b)(5)

Modification Explanations

Service Bulletins

The C-21 fleet requires funding to comply with contractor product improvements incorporating Learjet and other o e bulletins, identified as items recommended for USAF compliance. (b)(5)

Reduced Vertical Separation Minimums (RVSM)

This modification is required by the Air Force Navigation Safety (Nav Safety) Master Plan and Global Air Traffic Management (GATM) mandates, which are necessary for worldwide, unrestricted airspace access.

Fuel Imbalance

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

Flight Data Recorder (FDR)

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

TCAS II Version 7/Mode S Level 2 Elementary Surveillance

TCAS II Version 7 logic is an Aircraft Collision Avoidance System (ACAS) II compliant system as required by the European Civil Aviation Authorities (CAA) and other ICAO regions. ACAS II is the

C-21 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
Service Bulletins	X	X	X	X		
Reduced Vertical Separation Minimums (RVSM)						
Fuel Imbalance						
Flight Data Recorder (FDR)						
TCAS II Version 7/Mode S Level 2 Elementary Surveillance	X	X				
Enhanced Mode S/Mode 5						
PACAF Oceanic Navigation	X					
USAFE SPECTRUM	X					
Secure Communications	X	X				
Simulator Upgrades	X	X	X	X		
Low Cost Modifications	X	X	X	X		

(b)(5)

Modification Explanations

Service Bulletins

The C-21 fleet requires funding to comply with contractor product improvements incorporating Learjet and other o e bulletins, identified as items recommended for USAF compliance. (b)(5)

Reduced Vertical Separation Minimums (RVSM)

This modification is required by the Air Force Navigation Safety (Nav Safety) Master Plan and Global Air Traffic Management (GATM) mandates, which are necessary for worldwide, unrestricted airspace access.

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internationally recognized and accepted version of TCAS. Implementation is mandated by 2005 with military waivers until 2008.

Enhanced Mode S/Mode 5

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

PACAF Oceanic Navigation

Required in the Pacific in order to ensure aircraft meet FAA GPS remote/oceanic navigation requirements. This modification entails equipping the aircraft with dual independent navigation systems.

USAFE SPECTRUM

This modification is for four (maybe more) USAFE C-21s to be modified with the SPECTRUM patient transport module. USAFE C-21s are going to b ired to pull Bravo AE alert after the retirement of the C-9s in the USAFE theater beginning (b)(5)

Secure Communications

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

Simulator Upgrades

No additional information available.

Low Cost Modifications

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

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Secure Communications

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

Simulator Upgrades

No additional information available.

Low Cost Modifications

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

C-130 Program/Modifications

Program/Modification	(b)(5)
Electrical System Upgrade	
Autopilot/GCAS	
Enhanced TCAS	
C-130 Avionics Modernization Program (AMP)	
ALR-69	
C-130 Generator Disconnect	
Synchrophaser Wiring (BAR)	
Service Bulletins	
Low Cost Modifications	
Link-16, Joint Tactical Radio System (JTRS) [C-130 E/H/J]	
Global Air Traffic Management (GATM) [C-130 J]	

(b)(5)

Modification Explanations

Electrical System Upgrade

This flight safety modification incorporates C-130 Broad Area Review (BAR) recommendations to upgrade the C-130 electrical power system, which was designed in the 1950s. Modern avionics systems, however, are dependent on solid-state circuits and computer support that makes them more susceptible to disruptive electrical transients/spikes within the system. A low-voltage condition is suspected in the propeller synchrophaser malfunction, causing a loss of engine power in over 30 cases from 1987 to 1999. The C-130 will need "clean" electrical power for all new modifications to operate properly and reliably. A total of 394 aircraft will be modified.

Autopilot/GCAS

The current C-130 autopilot is unreliable, unmaintainable, and rapidly becoming unsupportable. Congress has mandated a GCAS system to provide warning of insufficient terrain clearance during low-level and terminal operations. This navigation safety (Nav Safety) modification replaces the obsolete E-4 and selected AP-105 autopilot systems and installs GCAS capability. A total of 618 aircraft will be modified.

Enhanced TCAS

This modification is required by the Air Force Navigation Safety (Nav Safety) Master Plan and Global Air Traffic Management (GATM) mandates, which are necessary for worldwide, unrestricted airspace access. The Secretary of Defense (SECDEF) directed installation of an airborne collision avoidance system, in response to the findings of the April 1996, CT-43 crash. This is an ongoing modification. To date, 378 C-130s have been either modified, or are on contract to be modified with the ETCAS system. The enhanced function is physically present, but is not functional, hence the C-130 will only use the TCAS II or normal mode. The remaining

C-130 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
Electrical System Upgrade	X					
Autopilot/GCAS	X	X				
Enhanced TCAS	X	X	X			
C-130 Avionics Modernization Program (AMP)	X	X	X	X		
ALR-69	X	X	X	X		
C-130 Generator Disconnect						
Synchrophaser Wiring (BAR)	X	X				
Service Bulletins	X	X	X	X		
Low Cost Modifications	X	X	X	X		
Link-16, Joint Tactical Radio System (JTRS) [C-130 E/H/J]						
Global Air Traffic Management (GATM) [C-130 J]	X	X	X	X		

(b)(5)

Modification Explanations

Electrical System Upgrade

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UH-1 Program/Modifications

Program/Modification	(b)(5)
Traffic Alert and Collision Avoidance System (TCAS) Low Cost Modifications	

(b)(5)

Modification Explanations

Traffic Alert and Collision Avoidance System (TCAS)

The UH-1s at Andrews fly within the heavily congested low-level environment surrounding the Washington D.C. area. The UH-1 has no traffic avoidance system that allows the 1st Helicopter Squadron (1 HS) to operate safely in the area. This proposal would modify 1 HS UH-1N helicopters with a TCAS IAW SAF/AQ and USAF/XO memo dated 9 Sep 96, subject: SECDEF - Directed Navigation and Safety Modifications.

Low Cost Modifications

Aircraft procurement (3010) funds set aside for small modifications where costs do not exceed $2M each year.

UH-1 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
Traffic Alert and Collision Avoidance System (TCAS) Low Cost Modifications	X	X	X	X		

(b)(5)

Modification Explanations

Traffic Alert and Collision Avoidance System (TCAS)

The UH-1s at Andrews fly within the heavily congested low-level environment surrounding the Washington D.C. area. The UH-1 has no traffic avoidance system that allows the 1st Helicopter Squadron (1 HS) to operate safely in the area. This proposal would modify 1 HS UH-1N helicopters with a TCAS IAW SAF/AQ and USAF/XO memo dated 9 Sep 96, subject: SECDEF - Directed Navigation and Safety Modifications.

Low Cost Modifications

Aircraft procurement (3010) funds set aside for small modifications where costs do not exceed $2M each year.

Special Air Mission Program/Modifications

Program/Modification	(b)(5)
C-20 Airworthiness Directives/Service Bulletins	
VC-25 GATM	
VC-25 Airworthiness Directives/Service Bulletins	
C-37 Airworthiness Directives/Service Bulletins	
C-32 Comm Update	
C-32 Airworthiness Directives/Service Bulletins	

(b)(5)

Modification Explanations

C-20 Airworthiness Directives/Service Bulletins

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

VC-25 GATM

This modification includes the installation of equipment to bring aircraft into full GATM compliance.

VC-25 Airworthiness Directives/Service Bulletins

The VC-25 is an Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

C-37 Airworthiness Directives/Service Bulletins

The C-37 is a Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

C-32 Comm Update

The communications upgrade consists of installing a communications management system and integration with the Communication System Operator (CSO) functions. The upgrade will allow management of secure and non-secure voice, data, and facsimile (transmit and receive) for 42 telephone stations within the aircraft. These aircraft support the President, Vice President, the Secretary of State, the Secretary of Defense, and other senior government officials, as well as their staffs, allowing them to conduct business while airborne, utilizing the on-board communications system. The C-32 is a Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

C-32 Airworthiness Directives/Service Bulletins

The C-32 is a Federal Aviation Administration (FAA)-certified aircraft and must comply with all FAA Airworthiness Directives.

Special Air Mission Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
C-20 Airworthiness Directives/Service Bulletins	X	X	X	X		
VC-25 GATM	X					
VC-25 Airworthiness Directives/Service Bulletins	X	X	X			
C-37 Airworthiness Directives/Service Bulletins	X	X	X	X		
C-32 Comm Update						
C-32 Airworthiness Directives/Service Bulletins	X	X	X	X		

(b)(5)

Modification Explanations

C-20 Airworthiness Directives/Service Bulletins

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(b)(5)

Related Roadmap Information

Other information related to the air refueling mission can be found on the KC-135 and KC-10 roadmaps.

KC-10 Program/Modifications

Program/Modification	(b)(5)
Flight Data Recorder/Cockpit Voice Recorder Replacement (AMP)	
Digital Weather Radar (AMP)	
KC-10 Global Air Traffic Management (GATM)	
Fuel Pressure Control Unit/Boom Control Unit (FPCU/BCU) Replacement	
Power Requirements and Upgrade with 110V AC Outlets (AMP)	
Cargo Barrier Replacement	
Center Instrument Panel Replacement (AMP)	
Cockpit Digital Instruments Conversion (AMP)	
Joint Chemical Agent Detector (JCAD)	
Joint Tactical Radio System (JTRS)	
Airborne Broadcast Intelligence (ABI)	
Thrust Reverser (TR) Modification	
KC-10 Aircraft Modernization Program (AMP)	
Inertial Navigation System (INS) Reliability and Supportability Upgrades (AMP)	
Defensive Systems and Protective Equipment (*AMP)	
Mode S Elementary (ELS)/Enhanced (EHS) Surveillance	
Mode 5 (AMP)	
Iridium Radio Antenna	
Real Time Information to the Cockpit (RTIC) [Airborne Network Intelligenc (ABI), Combat Track II, Link 16, UHF SATCOM antenna] (AMP)	
Fuel Tank Fire Suppression (*AMP)	
Precision Area Navigation (PRNAV)	
Airborne Network Integration (ANI)	
Night Vision Imaging System (NVIS) (*AMP)	
Maintenance Training System (MTS)(*AMP)	

(b)(5)

(* Under Consideration for AMP Program)

KC-10 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
Flight Data Recorder/Cockpit Voice Recorder Replacement (AMP)			X	X		
Digital Weather Radar (AMP)			X	X		
KC-10 Global Air Traffic Management (GATM)	X					
Fuel Pressure Control Unit/Boom Control Unit (FPCU/BCU) Replacement						
Power Requirements and Upgrade with 110V AC Outlets (AMP)			X	X		
Cargo Barrier Replacement						
Center Instrument Panel Replacement (AMP)			X	X		
Cockpit Digital Instruments Conversion (AMP)			X	X		
Joint Chemical Agent Detector (JCAD)						
Joint Tactical Radio System (JTRS)						
Airborne Broadcast Intelligence (ABI)	X					
Thrust Reverser (TR) Modification	X	X	X	X		
KC-10 Aircraft Modernization Program (AMP)			X	X		
Inertial Navigation System (INS) Reliability and Supportability Upgrades (AMP)			X	X		
Defensive Systems and Protective Equipment (*AMP)						
Mode S Elementary (ELS)/Enhanced (EHS) Surveillance	X	X				
Mode 5 (AMP)			X	X		
Iridium Radio Antenna						
Real Time Information to the Cockpit (RTIC) [Airborne Network Intelligenc (ABI), Combat Track II, Link 16, UHF SATCOM antenna] (AMP)			X	X		
Fuel Tank Fire Suppression (*AMP)						
Precision Area Navigation (PRNAV)	X	X	X	X		
Airborne Network Integration (ANI)						
Night Vision Imaging System (NVIS) (*AMP)						
Maintenance Training System (MTS)(*AMP)						

(b)(5)

(* Under Consideration for AMP Program)

the remainder of useful life of the airframe. DC/KC-10 type analog instruments are becoming increasingly expensive to procure and/or maintain and will require replacement in the near term. As the commercial aircraft continue to digitize and automate their systems, the KC-10 will soon become a sole-user of this older technology and its continued use will become cost-prohibitive for the 59 AMC KC-10s. This program serves AMC and the Air Force with significant cost-savings in procurement and overall operations costs.

Joint Chemical Agent Detector (JCAD)

This program will provide a capability/system installed on the aircraft to detect, identify, quantify, and warn personnel of the presence of vapor chemical warfare (CW) agents. The platform owner is responsible for mounting the JCAD(s) onto their platform and responsible for installation costs.

Joint Tactical Radio System (JTRS)

JTRS is a joint aircraft communication system. OSD has issued a mandate that no more aircraft radios can be purchased that are not JTRS or JTRS co
develop a migration schedule to JTRS for all platforms. (b)(5)

Airborne Broadcast Intelligence (ABI)

This small program procures and sustains a carry-on device that provides crews with an intelligence feed while in flight. ABI receives ground, air, and water threat updates. ABI can be used on a KC-10 equipped with an UHF SATCOM antenna. ABI CONOPS projects four sets at McGuire AFB and four sets at Travis AFB to support the KC-10.

Thrust Reverser (TR) Modification

The TR modification is required by the FAA to prevent unwanted deployment of TRs. Modification consists of three separate FAA Service Bulletins. The first SB repositions indication light to the pilot station and is completed. The remaining two SBs (wiring and installation of an additional locking system) must be completed by Oct 06 (b)(5)

KC-10 Aircraft Modernization Program (AMP)

HQ AMC and KC-10 SPO conducted a Business Case Analysis (BCA). The BCA recommended approach is a competitive acquisition strategy that will improve the fleet's ability to meet future enhancements. This acquisition approach requires development of an Initial Capabilities Document, a Capabilities Development Document, refinement of cost estimates, a new, competitive acquisition strategy, and AMC and AF support in the FY 06 POM. The competition could benefit the AF by further reducing costs and could produce new technology solutions (e.g. open architecture, color MCDUs, digital local area network).

KC-10 AMP supports four main requirements areas in addition to CNS/ATM:

-Airspace access capabilities (mandated National Airspace System and International Airspace Requirements)
-Safety capabilities (FAA mandated safety requirements)
-Military capabilities (C4I, ABI, Multi-mission payload, and aircraft survivability)
-Reliability/maintainability/supportability capabilities (to counter excessive failure rates, non-maintainable and obsolescence issues)

Inertial Navigation System (INS) Reliability and Supportability Upgrades (AMP)

INS will become unsupportable in the FY08-09 timeframe due to limited parts availability. Plan is to include an INS upgrade as part of the AMP.

Defensive Systems and Protective Equipment (*AMP)

Install a system such as LAIRCM to protect KC-10 from IR and RF threats to reduce vulnerability from hostile systems. Plan is to incorporate into AMP as a separate priced option.

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KC-135 Program/Modifications

Program/Modification	(b)(5)
Airline Style Passenger Seats	
Control Column Actuated Stabilizer Trim Brake	
Global Air Traffic Management (GATM) Modification	
Reduced Pressure Autobrake Actuator	
Control Column Potted Yoke Switches	
Large Aircraft Infrared Countermeasures (LAIRCM)	
Mode S (Elementary and Enhanced) Mode 5	
Airborne Network Integration (ANI)	
Roll-On Beyond-Line-of-Sight Enhancement (ROBE)	

(b)(5)

Modification Explanations

Airline Style Passenger Seats

The current airline-style passenger seats are no longer manufactured, since they do not meet FAA standards for crashworthiness. Consequently, parts are increasingly scarce and no more spare seats are available, making the seats unsupportable. The new seats meets all FAA requirements.

Control Column Actuated Stabilizer Trim Brake

Addressed pitch trim runaway prevention and control by adding a brake similar to commercial 707 installation. Proposed solution requires redesign of floor structure to mount brake, design control.

(b)(5)

(b)(5)

Global Air Traffic Management (GATM) Modification

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

KC-135 Program/Modifications

Program/Modification	Past	Exe-cution	Programmed		Funding	Estimated Completion
	FY04	FY05	FY06	FY07	(b)(5)	
Airline Style Passenger Seats						
Control Column Actuated Stabilizer Trim Brake	X	X	X	X		
Global Air Traffic Management (GATM) Modification	X	X	X	X		
Reduced Pressure Autobrake Actuator						
Control Column Potted Yoke Switches						
Large Aircraft Infrared Countermeasures (LAIRCM)						
Mode S (Elementary and Enhanced) Mode 5	X	X				
Airborne Network Integration (ANI)						
Roll-On Beyond-Line-of-Sight Enhancement (ROBE)	X	X				

(b)(5)

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Reduced Pressure Autobrake Actuator

The pressure of the installed autobrake actuator is higher than the OEM now recommends. The higher the pressure actuator can and does induce a pitch of the main landing gear (MLG) truck resulting in the MLG contacting the MLG oleo. This contact can induce a stress riser, which can result in a cracked MLG truck.

Large Aircraft Infrared Countermeasures (LAIRCM)

Provides a highly effective defensive capability for transport and tanker aircraft against infrared (IR) surface-to-air missiles (SAM). System consists of a missile warning system and directed laser countermeasures. Current plans call for equipping 22 KC-135s with LAIRCM to support two ies (SSC). (b)(5)

(b)(5)

Control Column Potted Yoke Switches

Addresses design of existing stabilizer trim switch installation in the control wheel, which has maintainability problems, and can induce short circuits. Two design approaches provided: switches potted with individual wire splices, or switches potted with integral wire disconnect block. Installation is complete on one prototype aircraft. (b)(5)

(b)(5)

Mode S (Elementary and Enhanced) Mode 5

The current KC-135 APX-100 Mode S transponder does not meet Eurocontrol requirements for elementary surveillance established by ICAO Standards and Recommended Practices (SARPs), Annex 10, Amendment 73. This requirement is currently scheduled to be implemented in Mar 05. To meet elementary surveillance requirements, a software upgrade to the currently installed APX100 is required. This is a “late-to-need” requirement. Air Staff provided funding in FY04/05 to upgrade the APX-100 to meet the Elementary Mode S requirement. However, the KC-135 APX-100 Mode S analog transponder does not meet anticipated Eurocontrol requirements for enhanced surveillance (anticipated for FY08), nor the DOD requirement (per AF/XO message 15 May 02) to upgrade Mode 4 (to Mode 5) military identification friend or foe (IFF) systems.

(b)(5)

Recommended solution is to procure a new transponder such as the APX-119.

Airborne Network Integration (ANI)

AMC has a global secure and non-secure communications requirement to meet AMC missions in support of the USAF CONOPS. ANI upgrade will provide integrated access to the Global Information Grid (GIG) to support C2 voice and data requirements, transfer aircraft status and position information to secure Tactical Data Link (TDL), and provide aircraft IP addressability within the GIG for sharing of operational data. AMC’s plan is to use Joint Tactical Radio System (JTRS) Program radios to provide required capabilities not provided by Global Air Traffic Management modifications or Avionics Modernization Programs (e.g. Airborne Networking, wide-band applications, etc). ANI will satisfy requirements in Real Time Information to the Cockpit (RTIC) AMC MNS 002-93, Global Mobility CONOPS (Sec 5.3), JTRS ORD Version 3.2, JROCM 087-03, 9 April 2003, and Advanced Situational Awareness and Countermeasures (ASACMS) CDD (Draft in AFROC coordination). ANI development is contingent upon availability of JTRS low rate initial production projected in late (b)(5)

Roll-On Beyond-Line-of-Sight Enhancement (ROBE)

SECAF/CSAF directed development of a roll-on/off communication system to be used on tanker aircraft, enabling range extension and translation of tactical data links as a near-term, data relay gateway capability. The primary objective is to connect battle directors in the Air and Space Operations Center (AOC) 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. Forty KC-135 ROBE Spiral 1.0 aircraft modifications (A Kits) are complete and 20

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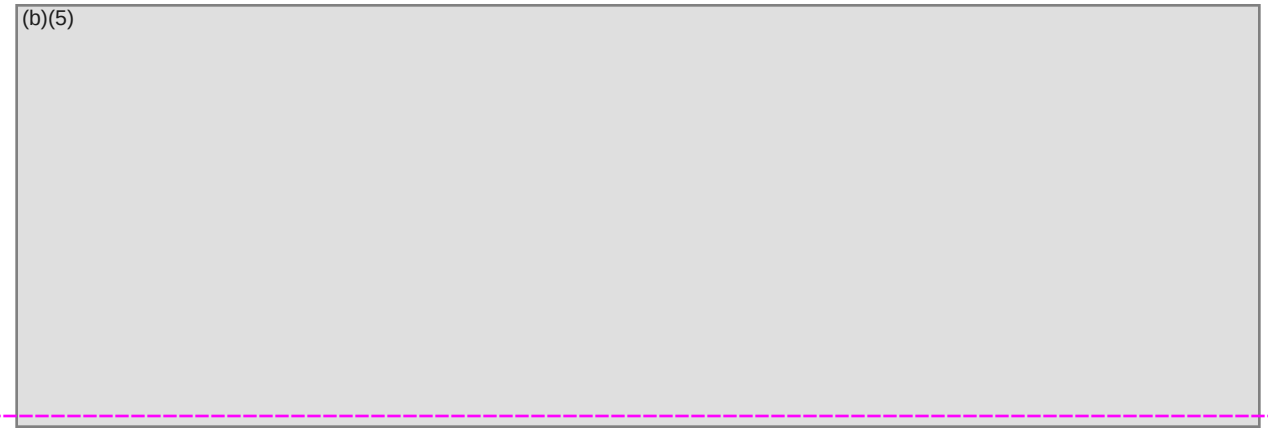
Long-Term (FY20-26)



Long-Term (FY20-26)

(b)(5)

Deficiencies Needing Solutions

Numerous deficiencies, with potential technological solutions, are explained in detail on various other mission area and weapon system roadmaps. There are potential technological solutions for most deficiencies, and they should be explored as necessary. A technology time line, detailed explanations for the KC-X, AMC-X, CX, and the relationship between air mobility and space follow in this roadmap. More detailed discussion on using space as a medium for mobility operations can be found on the spacelift roadmap.