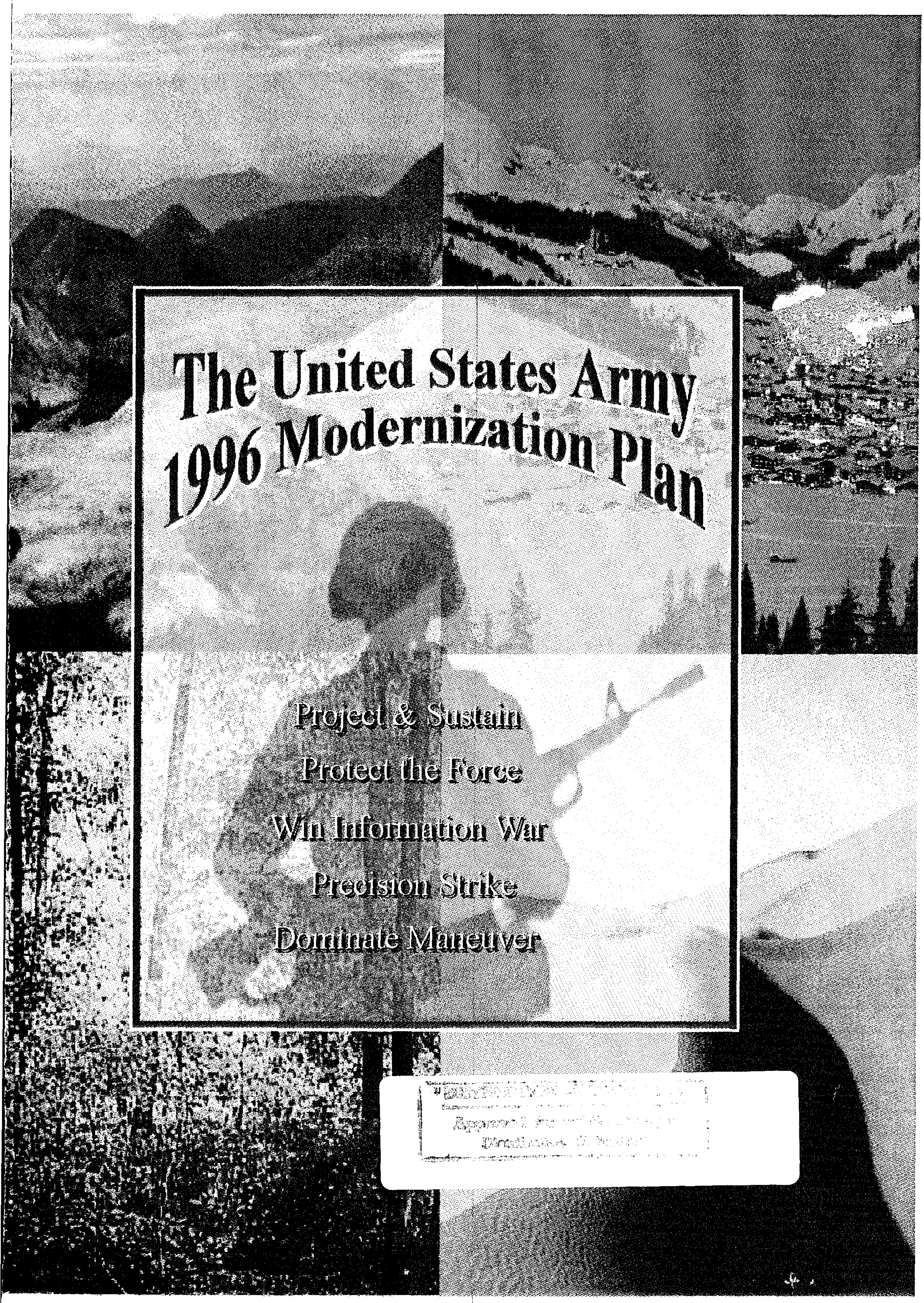

The United States Army 1996 Modernization Plan

Project & Sustain

Protect the Force

Win Information War

Precision Strike

Dominate Maneuver

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The Army Modernization Plan looks at the Army's modernization programs and assesses their abilities to meet the Army's five modernization objectives: Project and Sustain; Protect the Force; Win the Information War; Precision Strike; and Dominate Maneuver. The volume contains an Executive Summary, an Introduction, 14 Annexes, and a Glossary. Each annex consists of an Introduction, a Current Program Assessment, an RDA strategy, and a Conclusion. The entire Modernization Plan is contained in one unclassified volume. There is no classified version.

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DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR OPERATIONS AND PLANS
400 ARMY PENTAGON
WASHINGTON DC 20310-0400

REPLY TO
ATTENTION OF

DAMO-FDQ

8 March 1996

MEMORANDUM FOR DEFENSE TECHNICAL INFORMATION CENTER (DTIC), 8725 JOHN JAY KINGMAN RD., SUITE 0944, ATTN: ACQUISITIONS - OCP, FORT BELVOIR, VA 22060-6218

SUBJECT: 1996 Army Modernization Plan

1. Request the 1996 Army Modernization Plan be entered into the DTIC system and also be provided to the National Technical Information Service. Enclosed is a copy of the Modernization Plan with a SF 298 form.

2. The 1996 Modernization Plan supersedes all previous plans. Most users will want the current plan, but it is not inappropriate to provide previous plans for a historical perspective on Army modernization efforts. Request you advise customers that the updated plan is available.

3. POC this action is the undersigned, (703) 979-5036, Room 2C549, Pentagon.

William L. Conner

2 Encls

WILLIAM L. CONNER
COL, GS
ModPlan Integrator

DEPARTMENT OF THE ARMY
WASHINGTON, D.C. 20310-5200

December 22, 1995

SUBJECT: Army Modernization

As we rapidly approach the 21st Century, America's Army faces tremendous opportunities and significant challenges. Our modernization challenge is to leverage new technology to obtain the world's finest, most lethal weapons systems, thereby maximizing our greatest asset: the American soldier. Only by meeting this challenge will we see our vision, "...the world's best Army -- trained and ready for victory...changing to meet the challenges of today, tomorrow, and the 21st Century."

We will make this vision a reality through a process called Force XXI. To field the 21st Century Army we must employ digital technology at every level, while modernizing our equipment to provide the technological overmatch across the battlefield needed to obtain rapid, decisive victory. However, today's Army allocation of DoD modernization dollars is only 13 percent. We have the smallest piece of a small pie and are concerned about modernization shortfalls. Our proposed 1997 budget supports only the most critical programs, accepting the risk of deferring complete modernization until the beginning of the next century. Current production rates do not allow full modernization of first line fighting forces until 2015, at which time the technology will be 20 years older than it is now.

Our soldiers deserve the best equipment available, provided through adequate investments in science and technology as well as in our industrial base. The Army Modernization Plan explains in detail what we must accomplish for the soldier through the framework of five Modernization Objectives: Project and Sustain, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate Maneuver.

As an integral part of the joint team, the future Army will be, as it always has been, the nation's force of decision. With Force XXI we are changing today's Army into that future Army. Through modernization we can ensure our soldiers will be trained and ready for victory, now and in the 21st Century.

Dennis J. Reimer
General, United States Army
Chief of Staff

Togo D. West, Jr.
Secretary of the Army

THE 1996 UNITED STATES ARMY MODERNIZATION PLAN

TABLE OF CONTENTS

Prepared By:

HQDA
ATTN: DAMO-FDQ
THE PENTAGON
WASHINGTON, D.C. 20310-0400

EXECUTIVE SUMMARY

Changing to meet the challenges of today . . . tomorrow . . . and the 21st Century.

Why Modernize?

Modernization is essential to ensure that the Army is **able to respond successfully to our Nation's needs**. The uncertain world environment has fundamentally changed America's security imperatives, the National Military Strategy, and the missions given to the Services, especially the Army. The National Military Strategy of flexible and selective engagement requires the Army to maintain capabilities for missions involving peacetime engagement and conflict prevention, as well as to fight and win wars. The **dangers we face today are more diverse** than those of the former bipolar environment. Activities across the entire spectrum of military operations are more likely to occur, but are also less predictable. Today's - and Tomorrow's - Army must be a robust, force projection Army that can accomplish a variety of tasks.

The Vision: America's Army,... the world's best Army
-- An Army that is **Trained and Ready for Victory**.

Modernization funding relates directly to warfighting capability. The old paradigm claiming the Army equips men while other Services man equipment no longer holds true. This adage is based on two outmoded assumptions, the first being that Army equipment is easily manufactured. Only warships and planes take a long time to procure. Therefore Army modernization funds can be diverted to other needs until war breaks out, then we can quickly "raise an Army." The second assumption is that soldiers are expendable resources, readily replaceable in time of war from our large population base. Neither premise is valid in today's Army, nor will they be in the next century. Modern armies, all modern armies, man sophisticated and high tech equipment. **Soldiers are our most precious assets,** heavy losses will no longer be tolerated. Providing modern equipment for soldiers to man and protecting these soldiers from all forms of harm on the battlefield is both expensive and time consuming, but it is how modern armies stay both lethal and survivable.

One potential outcome of this paradigm shift is substitution of the strategic nuclear triad: submarine, bomber, missile system based, with a **strategic conventional triad: land, sea, air system based**. In such a triad land forces are key. People live on land. In the conduct of military operations if we choose not to destroy an adversary with nuclear weapons, then the only way we can achieve decisive victory is with troops on the ground. The decision to commit the Army is never the Army's, so we must always be ready for decisive commitment. Achieving and retaining such competence does not come without cost. Historically the Army receives an average 26% share of the defense budget. This number has not varied much in the last fifty years, except during war years. Recent Army allocations have been just below this traditional figure. If land force dominance is to remain the decisive tool of the nation's military strategy **it may be time to re-think the Army's percentage share of the defense budget.**

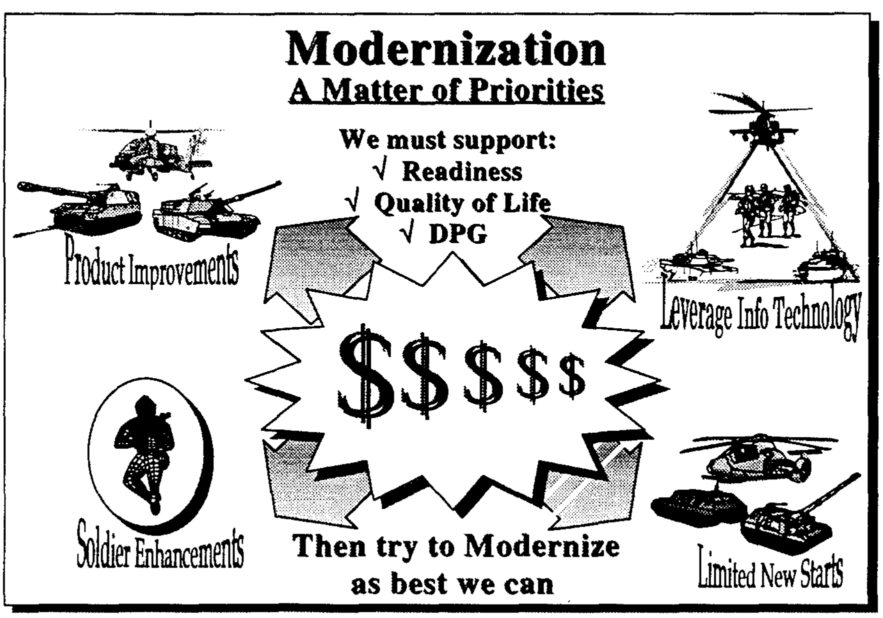
Through technological overmatch, Army modernization must provide a qualitative edge to ensure mission accomplishment. The Army Modernization Plan supports the National Military Strategy and prepares the Army for future challenges.

FORCE XXI

The 21st Century force will be called Force XXI. This force concept will encompass the reconceptualization and redesign of the force at all echelons. Force XXI is defined by five characteristics: doctrinal flexibility, strategic mobility, tailorability/modularity, connectivity, and versatility. To support the National Military Strategy the Force XXI Army must be rapidly tailorable, rapidly expansible, strategically deployable, and effectively employable as part of a joint and multinational team.

A Matter of Priorities

Army modernization is a matter of priorities. There are competing imperatives for the Army's Total Obligation Authority. To successfully meet all missions, the Army must have highly qualified and motivated people; **modern, well-maintained, and interoperable equipment**; realistic training; strategic mobility; sufficient support and sustainment capabilities; and **adequate investment in science and technology**. The Army's modernization objectives need to be met, but there are limited resources available to address these competing requirements.



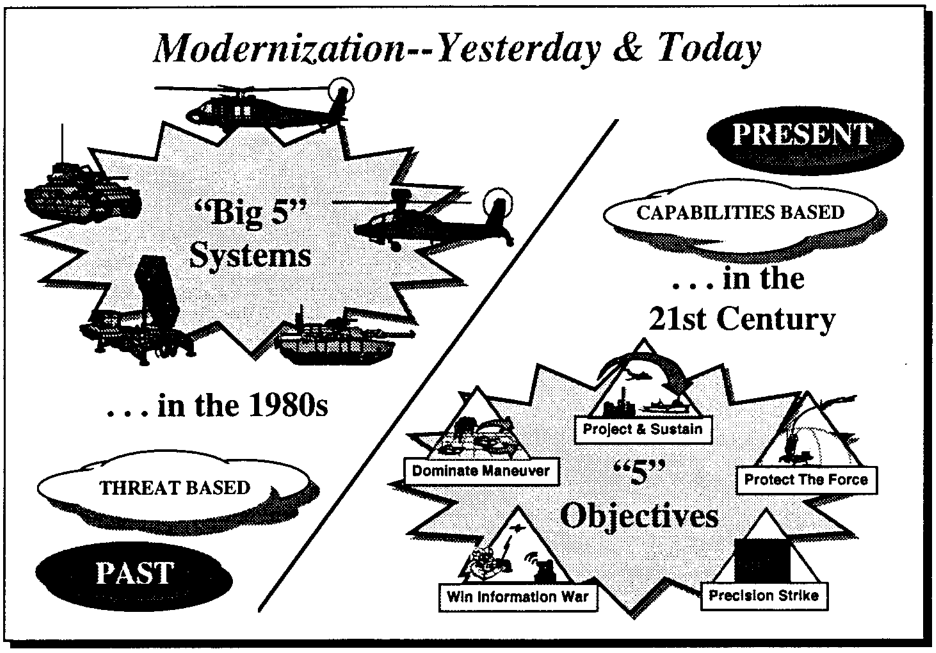
The Army has priorities that must be maintained, -- even at a cost to modernization. Readiness, Quality of Life, fulfilling strategic roles and meeting the mission requirements directed by the Department of Defense in its annual Defense

Planning Guidance are current required capabilities which must be maintained in the near term, even though long term goals may be put at risk.

Modernization, readiness and force structure are all part of a lethal and survivable Army. Our current modernization strategy is to balance capabilities to ensure a force capable of providing land force dominance.

Army Modernization Objectives

During the Cold War, the Army's requirements were "threat based" and reflected the bipolar nature of the geopolitical environment. Today, the Army has developed a series of Modernization Objectives (Project and Sustain, Protect the Force, Win the Information War, Conduct Precision Strike, Dominate Maneuver) which provide a capabilities based foundation for Army requirements to meet its many diverse missions.



Modernization Assessment

Capabilities, deficiencies and procurement shortfalls exist in each of the Army's Modernization Objective areas. The 1996 RDT&E (Research, Development, Testing, and Evaluation) and Procurement funding for the Army, in constant dollars, is the **lowest in 30 years**. The Army modernization process will continue to address fielding deficiencies and propose solutions. The proposed solutions will incorporate several enabling strategies, such as Horizontal Technology Integration and the leveraging of information technologies, to increase efficiency in the Army's operations and modernization process. Accepted solutions will be included in the Program Objective Memorandum (POM). But there are no solutions to chronic underfunding of desired programs.

This Modernization appraisal provides a subjective assessment--**RED, AMBER, GREEN**--of each modernization objective.

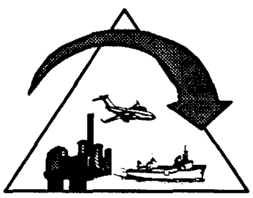
- **RED** means no capability to achieve the modernization objective exists, or is insufficient to defeat the threat or provide the required support.

- **AMBER** means a limited capability or quantity exists to achieve the modernization objective.

- **GREEN** means adequate capability and quantity exists to achieve the modernization objective.

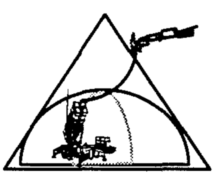
Ratings are based on the anticipated required 21st Century capabilities and the current status of key support programs necessary to meet modernization goals. Each modernization objective is rated in the **NEAR-TERM** (1996-98), **MID-TERM** (1999-01), AND **FAR-TERM** (2002-11).

Overall assessments are based on the cumulative assessments, made according to the same criteria, contained in each of the Mod Plan Annexes.


Project and Sustain

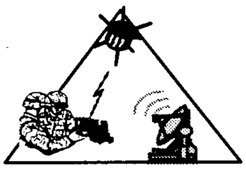
Today's environment and future environments demand the capabilities to project CONUS-based forces quickly, and to sustain those forces for extended periods of time.

Project and Sustain the Force is rated AMBER for the near-term, and RED for the mid- and far-terms. Improved airlift and sealift capabilities are still required. Strategic lift improvements will significantly enhance the Army's ability to Project and Sustain the Force in the near- and mid-terms. However, CSS programs frequently pay the bills for Army readiness and operational requirements. Trucks, ammunition, maintenance and materiel handling equipment, and generators have a difficult time competing for funds. The degraded medium and heavy helicopter lift capability, the lack of funding for medium and light tactical wheel vehicles and tactical generators, the concern for potential SATCOM shortfalls, and, in addition, the status of ammunition modernization keeps this objective area rated RED into the far-term.


Protect The Force

Military forces are most vulnerable during initial, forced entry into hostile areas. During the early stages of such operations, the systems required to protect forces are limited in availability. The potential for disruption of operations by theater ballistic and cruise missiles during this period is very high. The potential for fratricide still exists during any military operation.

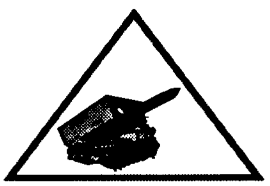
Protect the Force is rated AMBER for the near-term, and RED for the mid- and far-terms. This rating is a consequence of the lack of an effective combat identification system and low rates of fielding detection and survival capabilities. Although continuous improvements are taking place in this important modernization objective area, uncertainty in all missile defense funding, the shortfalls in protection of the maneuver forces against cruise and short range ballistic missiles, the far-term lack of aeromedevac capability, and Combat Health Service shortfalls keep the rating RED through the mid- and far-terms.



Win Information War

Information warfare capabilities harness advances in information technologies in order to collect, process, disseminate, and use information. The goal is to provide Force XXI the operational advantages of Information Dominance.

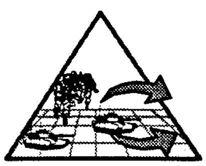
Win the Information War is rated AMBER for the near-, mid-, and far-terms. Horizontal/vertical seamless communication architectures which provide voice, data, graphics, imagery, and video information for all battlefield operating systems are not yet fielded for the warfighter. The efforts to digitize the battlefield and implement the Enterprise Strategy will take advantage of the rapid changes in technology to move toward a seamless architecture in an efficient and affordable manner. The objective remains AMBER through the far-term based on inadequate funding to procure the appropriate quantity of systems to meet Force Package 2, 3, and 4 requirements.



Precision Strike

To assist in the accomplishment of his mission, the Force XXI commander must have an organic capability to conduct deep attacks against the threat. To successfully attack targets with precision at extended ranges requires the capability to see deep then transmit that information/intelligence in near real time to firing units employing advanced weapons and munitions systems.

Conduct Precision Strike is rated AMBER through the near-, mid-, and far-terms. Improvements in sensors, information/intelligence distribution systems, and munitions will barely keep pace with increased demands for precision strike capabilities, particularly due to the delayed fielding of advanced munitions such as SADARM, Extended Range MLRS, and ATACMS BLK II (BAT). The limited fielding of MLRS and HIMARS systems also contributes to this AMBER rating.



Dominate Maneuver

The Army must be able to control and dominate the fight in order to achieve swift, decisive victory with minimum casualties. Modernization of the maneuver forces aims toward making them more deployable, tailorable, and lethal.

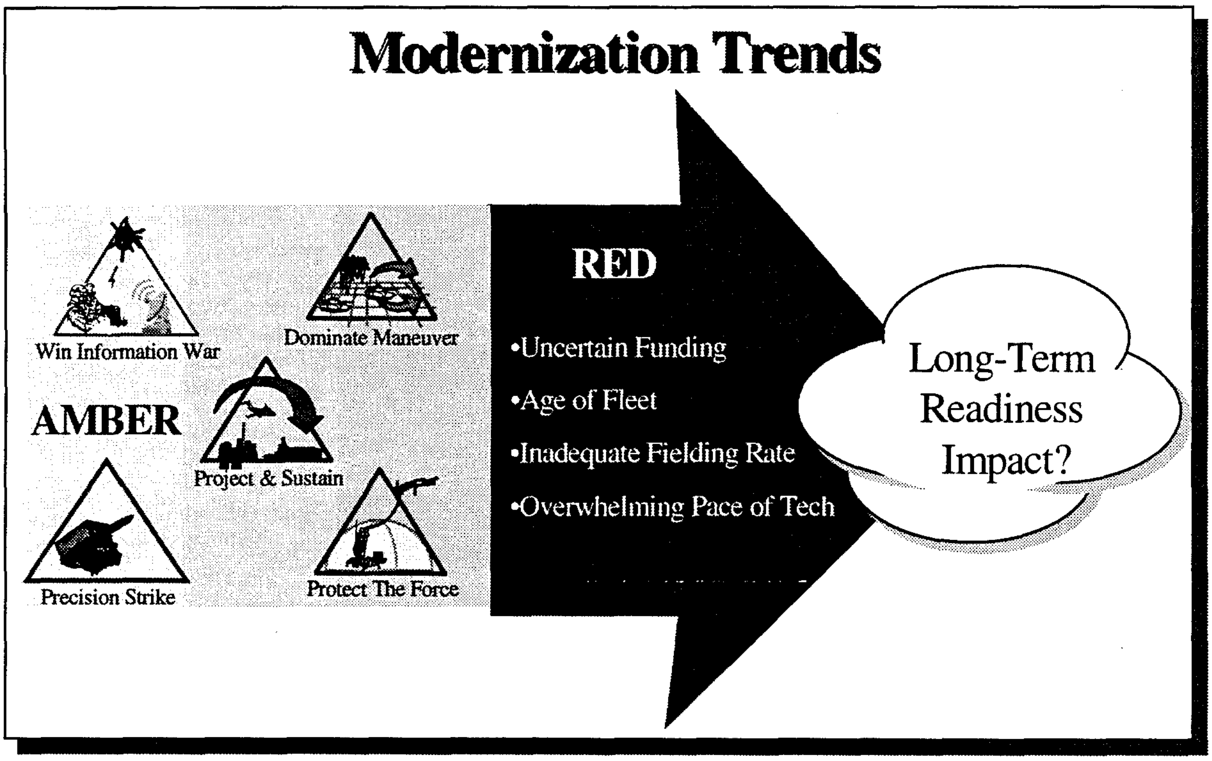
Dominate the Maneuver Battle is rated AMBER in the near-, mid-, and far-terms. The delayed fielding of key digital systems, such as the RAH-66

Comanche, the Long Range Advanced Scout Surveillance System, and the Crusader artillery system will limit the degree of integration achieved to dominate the maneuver battle. There is a modernization gap between maneuver weapons systems and counter obstacle capabilities. Inadequate funding exists for improvements to many light and heavy combat maneuver systems.

CONCLUSIONS

The United States owns the most technically sophisticated Army in the world. Current and programmed resource restraints, however, jeopardize the ability to maintain this technological edge against future adversaries. According to current fiscal guidance, the Army will receive insufficient funding to execute its modernization strategy in the out years.

In spite of an increasing number of missions and deployments, the Army has reduced force structure by one-third since 1989. Reduction of Army funding at a rate faster than the reduction in force structure, however, has resulted in deferring modernization to meet current readiness, quality of life, and mission requirements.



Funding for leap ahead new technology systems, such as Comanche and Crusader, is critical because it is so limited. This funding must, therefore, be protected. As funding for modernization is reduced, systems development, testing, and procurement are slowed, stretched, or stopped, resulting in the fielding of technologies many years removed from their initial maturation. Along with the rapid rate of evolving technology, anemic modernization enables potential adversaries to field equivalent technologies. The end result is the loss of benefits from previous Research and Development efforts and dollars, and more importantly the loss of the technological edge by which the nation expects the Army to "win swiftly with minimum casualties".

Continuously deferring the funding for modernization to the out years fails to produce the force required for the 21st Century. Reliance on out year funding always leaves the force behind the expectations.

Overall, the assessment of the Army Modernization Program's ability to maintain capabilities required by the Modernization Objectives is rated AMBER in the Near Term, and becomes RED by the year 2000.

Unless there is an infusion of new funds, the Army is clearly mortgaging its future technological edge, delaying fielding of key weapon systems well into the second decade of the twenty-first century, and placing its capability to fight at an unacceptably high risk. If the fiscal trends are not reversed, procurement of modern systems will be virtually non-existent during the current POM years.

Bottom Line

- We are AMBER , headed to **RED**
- We have done the best we can with the resources provided ... balancing near and future readiness
- Modernization continues to be **"anemic"**
  - Fielding of key weapons systems dragged well into second decade of the 21st Century
  - CINC's capability to fight an MRC degraded could result in unacceptably high risk
- We need a stable flow of **additional Army TOA** funds to increase modernization while maintaining force structure and readiness

INTRODUCTION

> *"If you are unwilling to put dollars into modernizing the force, what you end up doing is paying the price in blood."*
>
> *GEN Dennis J. Reimer*
> *Army Chief of Staff*

The Army Vision

The Army leadership's **vision** is to provide the world's best Army, an Army that is **trained and ready for victory**. Further, this Army must be a total force of quality soldiers (active and reserve) and civilians with the following characteristics:

- Equipped with the most modern weapons and equipment;
- An integral part of the joint team;
- A values based organization;
- Able to respond to our nation's needs; and
- Changing to meet the challenges of today...tomorrow...and the 21st Century.

Force XXI is the Army's process for realizing this vision. Through Force XXI the Army will manage institutional change, exploit new ideas and technologies, and find new and better ways to use our most precious asset: our soldiers.

Modernizing to support the Army vision and Force XXI is not an unconstrained process. First, **the Army must adapt to a force structure of 495,000 active duty soldiers, 575,000 guardsmen/reservists, and 233,000 civilians.** Second, the Army (like all Services) must learn to work with limited defense spending. These constraints tell us we must design the most capable force possible and equip that force through innovative and smarter modernization programs. And we must do this all without sacrificing readiness in the bargain.

A well-equipped and well-trained, power projection Army can support the National Military Strategy, a **strategy of flexible and selective engagement**. In conjunction with political and economic measures, Army capabilities must support a strategy that shapes the evolving international environment through deterrence (Promoting Stability) and, if necessary, closing with and destroying an adversary (Thwarting Aggression).

Being ready to fight and win remains our foremost responsibility and the prime consideration for Army modernization. The purpose of the 1996 Army Modernization Plan is to:

- Explain the modernization process;
- Provide an assessment of current modernization efforts;
- Establish a comprehensive and coherent summary of modernization programs; and
- Identify significant modernization funding shortfalls.

Modernization Strategy

The Army's 1996 modernization program makes the best use of available resources. However, with recent declines in Department of Defense Total Obligation Authority (TOA), these resources are inadequate to modernize the force at the necessary rate and to recapitalize equipment as it reaches the end of its service life. Our current **modernization strategy** is to balance capabilities to ensure a force capable of **land force dominance** in war, and in an uncertain world, we must also be able to deter future threats in support of the National Military Strategy.

As we continue to make the most of what we have for modernization, the Army is participating in a difficult **balancing act** with various new systems. Although in the near term this provides us with a limited capability to achieve our modernization objectives, **in the long term we may be in a position where our capabilities are insufficient to defeat the threat.** To preclude a return to the "hollow force" Army, an increase in total resources may be required.

The Army will publish a separate **modernization strategy,** a coordinated and coherent modernization effort essential to successfully compete in today's environment of tightened budgets and shrinking resources. Force development pundits sometimes question the Army's perceived inconsistent use of its prioritized list of unfunded systems (1-n list), and why some systems are fielded to the entire Army (active and reserve components) while other systems only go to a few units. Rather than address these questions on an individual basis, the Army will state its entire modernization case, linking force development programs to warfighting capabilities.

This **modernization strategy** will:

- Show that the Army has gotten the most out of its existing TOA by **identifying sacrifices and tradeoffs** already made;

- Define a **measure of success** by answering the question "What defines a modernized force?";

- Identify **battlefield deficiencies** in the warfighting force that should be fixed via modernization; and

- Send a **simple, crisp, and compelling** message for modernization.

The force for the 21st Century, called Force XXI, will be used as the model for modernization, with the five modernization objectives established as a basis for evaluation and definition of "fully modernized." Existing models, such as the Concepts Analysis Agency's **Value Added Analysis** and TRADOC's **Warfighting Lens Analysis** will be considered as an analytical basis for identifying deficiencies and modernization fixes. A working modernization strategy will then be the basis for an **Army Modernization Campaign Plan**, building toward Force XXI, and creating a compelling case for rebalancing DoD investment in POM 98-03 and beyond in favor of land forces.

Why Modernize?

Modernization is essential to ensure that the Army is **able to respond successfully to our Nation's needs,** both today and in the future. The Army must modernize in order to maintain the capability to support the National Military Strategy. *The Army Plan* defines modernization as "the continuous process of integrating new doctrine, training, organization, and equipment to develop and field warfighting capabilities for the Force Projection Army." In addition, a modernized force will permit the Army to meet future requirements with a smaller yet more flexible combined arms team. Maintaining and even improving on today's capability standards is a must for the future Army. As FM 100-3 states:

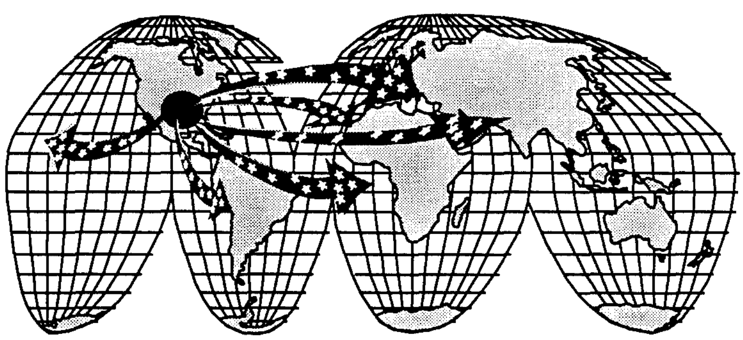
"Military power exists to **compel** an adversary to yield to our will as a result of our use of or threat to use destructive power. The mere existence of that power, and the evident ability to use it, allows us to **deter** others from acts inimical to our interests. An added benefit of having forces available is the ability simultaneously to **reassure** and **support**... friends and allies."

The Land Force component of military force remains an indispensable element of our nation's power. Our nation must maintain military forces sufficient to deter diverse threats, and **when necessary, to fight and win.**

The uncertain world environment has fundamentally changed the nation's security imperatives, the National Military Strategy, and the missions given to the Services, especially the Army. The **dangers we face today are more diverse** than those of the former bipolar environment. Today, activities across the entire spectrum of military operations are more likely to occur, but are also less predictable. We can also anticipate that it will be a long time before the strategic environment changes from these uncertainties.

A Different Kind Of Army

...A Power Projection Army



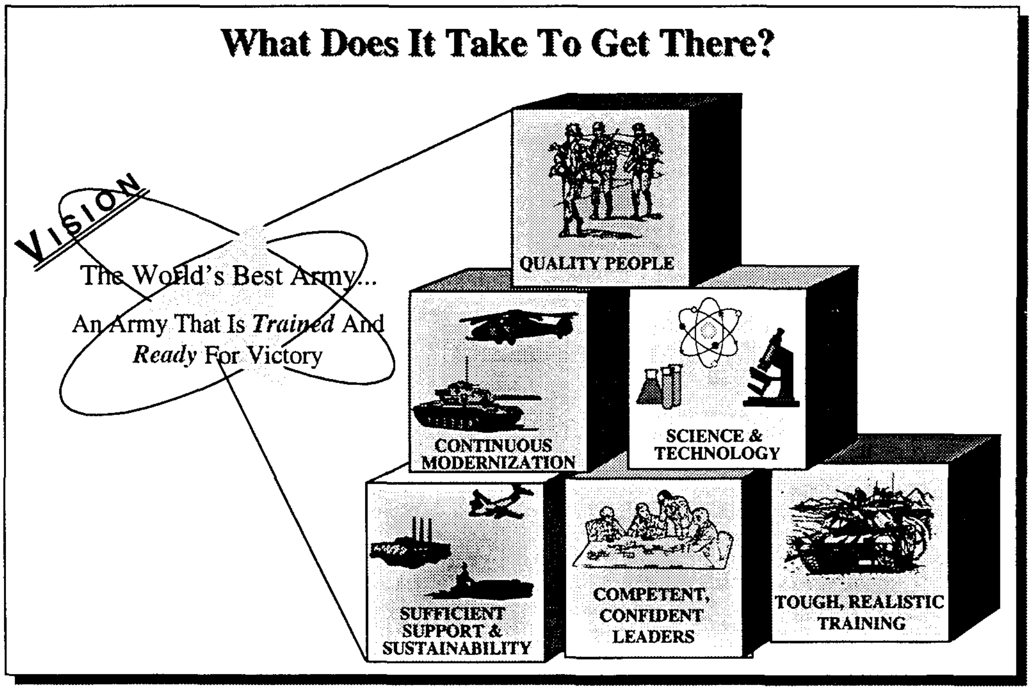
A Power Projection Army Capable Of Rapid Response To Crisis Anywhere Provides The Nation The Capabilities, During Peace And War, That Promote Deterrence And Stability

To protect and advance US interests in the face of Post-Cold War dangers and opportunities, **the US must possess the capability to deploy robust and flexible military forces** that can accomplish a variety of tasks:

- **Deter and Defeat Aggression in Major Regional Conflicts.** The Army must be able to deter and quickly defeat aggression, by projecting and sustaining power in more than one region, if necessary.

- **Provide a Credible Overseas Presence.** As part of the strategic component of Peacetime Engagement, Army forces must be forward deployed and permanently stationed in key overseas regions (like Europe and Korea) in peacetime to deter aggression and advance US strategic interests.
- **Counter Weapons of Mass Destruction.** In addition to improving our ability to deter and prevent use of such weapons, we must protect ourselves against their effects.
- **Contribute to Multilateral Peace Operations.** When national interests call for it, the Army must be ready to participate in peacekeeping, peace enforcement, and other operations in support of multilateral efforts to resolve regional conflicts and bolster democratic governments.
- **Support Counterterrorism Efforts and Other National Security Objectives.** The Army must maintain general purpose and specialized units to conduct counterterrorism and punitive attacks, noncombatant evacuation, counternarcotics operations, special forces assistance to nations and humanitarian and disaster relief operations.

To accomplish all of these missions successfully, the Army, as part of a joint and, probably, multinational force, must be capable of responding quickly and operating effectively. To do this, the Army must have highly qualified and motivated people; **modern, well-maintained, and interoperable equipment**; realistic training; strategic mobility; sufficient support and sustainment capabilities; and **adequate investment in science and technology**.



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Force XXI

The Army's environment is changing. The 21st Century Army will be smaller: 495,000 active duty soldiers, 575,000 National Guard and Army Reserve soldiers, and 233,000 Department of the Army Civilians. This is only two thirds of the FY89 Total Army. Meanwhile, our security environment grows more complex and uncertain while our defense budgets continue to shrink. Our mission is to design the most capable force possible within these constraints. Starting with our doctrine, the Army must find ways to reengineer itself, leveraging our strengths: quality people and advanced technology, to meet the challenges of the 21st Century.

Force XXI is the Army's corporate goal of what it must become to remain the lethal force of decision through the early decades of the 21st Century. It encompasses the reconceptualization and redesign of the Army at all echelons. As discussed in TRADOC Pamphlet 525-5, *Force XXI Operations*, America's future

Army must be prepared to face the full spectrum of operational environments: from Military Operations Other Than War (MOOTW), through armor-mech force battles, to battle between complex, adaptive forces. To meet this challenge the Force XXI Army must be rapidly tailorable, rapidly expansible, strategically deployable, and effectively employable as part of a joint and multinational team.

Significant capabilities of the Force XXI Army are defined by five characteristics:

- **Doctrinal Flexibility.** The ability to continually adapt tactics, techniques, procedures, and organizations to meet future requirements. Force XXI leaders will be required to apply the principles of war in ways as varied as scenarios presented.

- **Strategic Mobility.** The combination of anticipation, movement, and skillful pre-positioning in order to be "at the right place at the right time with the right capabilities." Force XXI units must be more deployable, yet able to reach deeper, while maintaining high levels of lethality and survivability. Additionally, the concepts of split-based operations, equipment pre-positioning, and increased strategic lift capability must be incorporated.

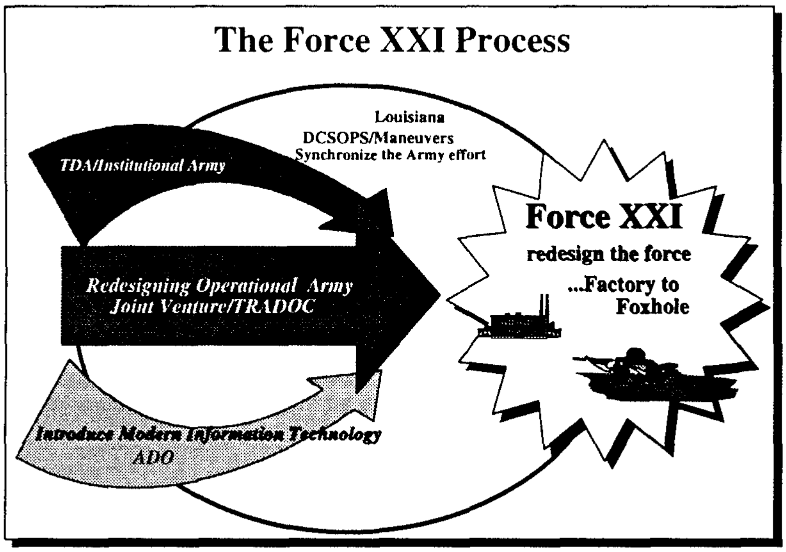
- **Tailorability and Modularity.** Limitations imposed by time, dwindling Army force structure, other Service capabilities, and situational factors will require Force XXI units that are modular to facilitate tailoring to meet each contingency.

- **Joint, Multinational, and Interagency Connectivity.** Execution of full-dimensional operations throughout the depth, height, width, and time of the future battle space requires unprecedented dependence on the talents of other Services, governments, and agencies. Political , economic, and military considerations require that most operations involve nongovernmental organizations (NGOs) and private voluntary organizations (PVOs) as well as the assets brought to the theater by other nations. The Force XXI Army must possess the ability to work with these players and exploit their capabilities without losing sight of its primary objective.

- **Versatility.** Well trained and disciplined units, provided with sufficient resources, can transition from combat to MOOTW missions and back again without losing their war winning capability.

As a result of the Army's modernization, Force XXI operations will possess these five characteristics early in the next century. The result will be an Army that can define the battle space, regulate the tempo, ensure the initiative, and conduct quick, decisive operations with the minimum force necessary.

The Force XXI Campaign Plan describes the process by which the Army will attain the Force XXI vision. The Campaign Plan consists of three axes. The main axis, called Joint Venture, addresses the operational force. The two supporting efforts are called the TDA/Institutional Army and the Army Digitization Office (ADO) axes, respectively.



On the Joint Venture axis, TRADOC is configuring the operational force by conducting a series of iterative and interactive Advanced Warfighting Experiments (AWEs) with a division-size experimental force (EXFOR). The initial component of the EXFOR will be a redesigned, digitized brigade-sized task force, called Task Force XXI. Task Force XXI, with a division command and control element, will conduct an AWE in early 1997. The goal of these experiments is to develop force design changes that improve lethality and survivability and allow commanders to control increased operational tempo. The results of this effort will provide a basis to make informed decisions regarding refinements in the areas of doctrine, organizational designs, training and leader development. In addition, insights gained from these experiments will aid decisions about research, development and acquisition of future technology.

Headquarters, Department of the Army, is synchronizing redesign of the TDA/Institutional Army on the second axis. This effort began Phase I in the fall of 1994 and is scheduled to be completed in the year 2000. The mission is to field a TDA Army, during the period Fiscal Year (FY) 02-07, that will meet the Title 10 needs of the Force XXI Army. The redesign effort is being done in harmony with the Joint Venture Campaign Plan (and vice versa). The Campaign Plan assigns key players and identifies objectives, management structure, methodology, and desired outcomes for each area. Additionally, the Campaign Plan assigns HQDA sponsors, MACOM proponents, and assessment responsibilities during the redesign for each Title 10 functional area. This axis will be synchronized with the Joint Venture and the ADO axes.

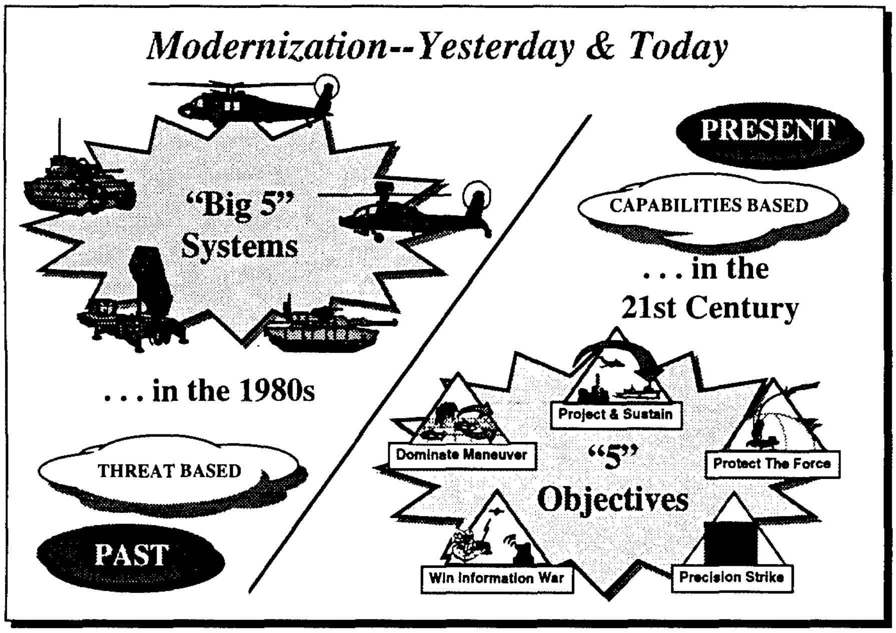
The third axis is the responsibility of the ADO, which provides programmatic support for acquisition and assimilation of information age Command, Control, Communications, Computers and Intelligence (C4I) capabilities into the force. The ADO oversees and coordinates the integration of Army battlefield digitization activities, and ensures the information age technology necessary for Force XXI is fielded horizontally across the force. The careful coordination of information technology insertion preserves a trained and ready Army as we transition to Force XXI.

Even the nation's industrial base must evolve significantly to build the needed advanced weaponry for Force XXI. Today, increasingly complex weapons combine firepower and maneuverability with sophisticated software and information management technology. In the future, weapons will be even more complex, with fully integrated digital communications, sensors, and advanced target acquisition systems, all enhanced by advanced satellite-based communication networks. To produce them, the Army will require an industrial base which is and will be responsive to the demands of Force XXI.

The Deputy Chief of Staff for Operations and Plans (DCSOPS), with the Louisiana Maneuvers (LAM) Task Force, synchronizes the work of the three axes and provides the focus on critical intellectual growth issues and policy decisions for senior Army leaders. Specifically this process articulates to decision-makers the intellectual basis for warfighting changes and force redesign; presents hypotheses for testing through experiments, simulation, and modeling; and guides the allocation of resources.

How the Army Modernizes

During the Cold War, the Army's requirements were "threat based" and reflected the bipolar nature of the geopolitical environment. Today, Army requirements are capabilities based to meet many diverse missions. The Army **Modernization Objectives** are a statement of the basic warfighting capabilities that the Army must retain to meet its expected missions and to maintain the capability to fight and win with minimum casualties as an integral part of a joint team. The five modernization objectives are: Project and Sustain the Force, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate Maneuver. Today's warfighter needs a flexible and responsive force prepared to execute a wide range of military operations against a diversity of threats.

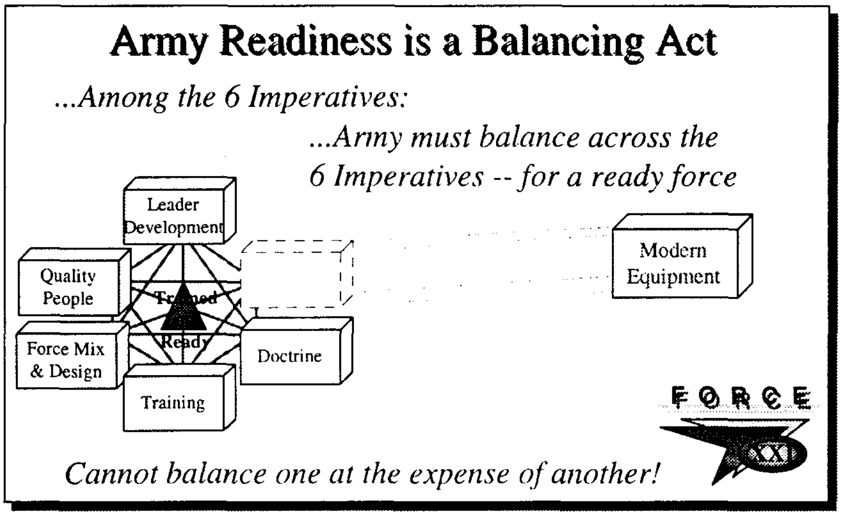


The Army's five modernization objectives describe primary warfighting requirements that keep today's modernization expenditures focused on the joint warfighter of the future. These modernization objectives provide a framework for the Operational Capability Requirements of Force XXI. These capabilities, which are summarized in TRADOC Pamphlet 525-66, are continually refined by the Army to provide the basis for future modernization. The Modernization Objectives also provide a framework for an assessment of Army modernization.

A Matter of Priorities

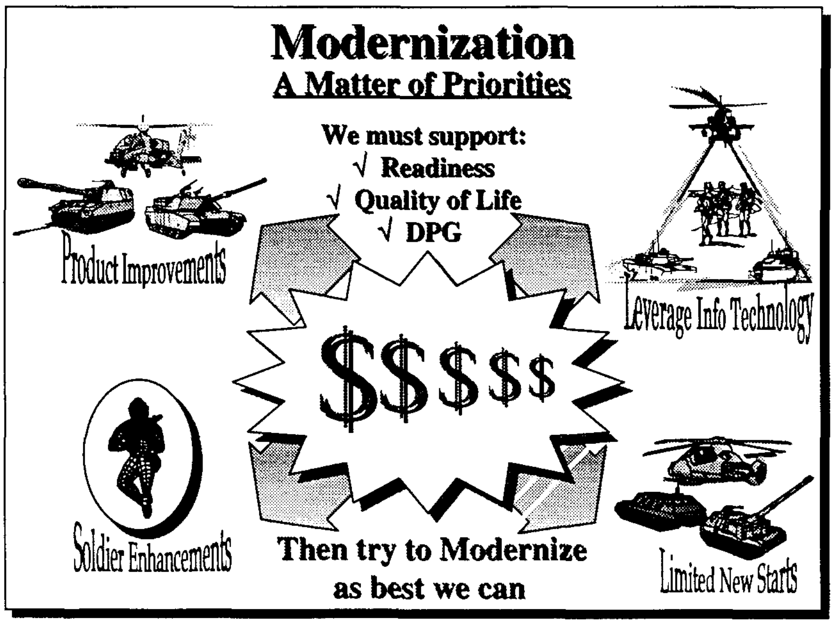
The Army's Title 10 **core competency** is to organize, train, equip, provide, and sustain the land component of the combatant commander's joint/multinational force. From this core competency four **core capabilities** emerge: develop the force; generate and project the force; sustain the force; and direct, acquire, and resource the force. Force modernization supports the core competency and is an integral part of two core capabilities, but it does not satisfy all the Army's needs. Modernization is simply one part of a healthy Army. Therefore, it is imperative for the Army to **simultaneously retain force structure, maintain readiness, and sustain modernization,** or risk losing its core competency.

Army modernization is a matter of priorities. There are competing imperatives for the Army's TOA. The Army's modernization objectives need to be met, while the Army must concurrently attract and maintain quality people that, through tough realistic training, learn to apply a doctrine that maximizes capabilities to accomplish the mission. The Army must retain the right force mix to accomplish varied missions. These forces must be trained and ready, and led by competent leaders. Limited resources must be balanced to address competing requirements.



The Army leadership has determined that there are priorities that must be maintained, even at a cost to modernization. Readiness, Quality of Life, fulfilling its strategic roles and meeting mission requirements directed by the Department of Defense in its annual Defense Planning Guidance are current required capabilities which must be maintained in the near term, even though long term goals may be put at risk. Current required capabilities include *peacetime engagement* and several *deterrence and conflict prevention* missions in addition to *fight and win* with a two major regional contingency focus.

Force XXI initiatives that develop doctrine, redesign the force, and provide tough realistic training in new capabilities add to the bill. These initiatives are necessary, however, to determine efficiencies that can be realized from modernization decisions.



After these requirements are funded, the Army modernizes as best as possible - while managing risk in the near term. Current technology advancements, many of which are also available to potential adversaries, demand that existing weapons systems and platforms continue to be updated. As a force multiplier, superior technology contributes to the Army's ability to serve as a credible deterrent and assures minimum casualties during combat. Since current fiscal constraints do not allow for complete recapitalization of the force's equipment, the Army's modernization strategy must be tailored to the available funding. Current Army funding allows for only:

- Product Improvements - Where systems are upgraded only when there is high payoff;
- Leveraging of Information Technologies - Digitization and situational awareness is being pursued as a combat multiplier;
- Limited New Starts - New Starts are begun only where true leap ahead technologies provide a unique capability; and
- Soldier Enhancements - A good investment in the Army's most valuable resource.

Two examples of this strategy are the **Comanche** armed reconnaissance helicopter and the **Crusader** field artillery system. Comanche will fix the Army's battlefield reconnaissance and security deficiencies. It takes 21st Century digital technology out of the laboratory and integrates it on a compact, low observable, survivable platform. Comanche will give the future force overmatching technology: an all weather, day-night armed reconnaissance capability. Crusader is the Army's revolutionary heavy force indirect fire cannon and artillery resupply system. Using advanced technology to improve accuracy, rate of fire, survivability, mobility, and ammunition speed, it will be the world's first totally automated howitzer. The Crusader and Comanche programs will produce high battlefield payoffs through maximum leveraging of technology.

The **Army Science and Technology Master Plan** (ASTMP) provides the outline of technology programs being pursued to meet specific requirements for new operational capabilities. The ASTMP is part of the Army's modernization strategy to deliver technologically superior future systems and cost-effective modifications to current systems that provide the capabilities most crucial for success in future operations. The ASTMP links the Army modernization strategy and the resources in the science and technology programs that support that strategy. TRADOC Pamphlet 525-66 describes the Operational Capability Requirements (OCRs) generated by the Army's Battle Labs, which serve as a capabilities baseline for Force XXI. Laboratory research is directly linked to technologies that will provide the capabilities required by the warfighter. The links between the scientists, the materiel developer, and the combat developer have never been closer. These innovative, productive, efficient, and resourceful linkages are being fostered and further enhanced by other enabling strategies to field a more capable force.

Army Equipping Policy (Force Packaging)

Prior to the application of continued severe funding constraints, Army modernization had an objective to recapitalize entire inventories of warfighting and support equipment. Wholesale replacements of fleets with more modern individually developed platforms was a way to maintain technological advantage. Today's modernization strategy is more flexible and takes greater advantage of the integration of emerging key technologies.

The Army's desired modernization end-state is to be a ready, fully modernized, deployable force. The interim goal is to equip Army units to prescribed readiness levels commensurate with their commitment to warfighting requirements. The intent is to maintain the highest level of readiness in forces most likely to deploy initially by providing them more modernized resources at higher levels of fill, while maintaining at least minimum acceptable levels for the Total Army. The requirements of the National Military Strategy, tempered by limitations of affordability and consideration of risk, determine the basis for the size and composition of America's Army. As such determinations are made, the Army is organized by Strategic Force Packages (FP), currently defined by "first to fight" priorities. Force Package composition is periodically reviewed and modified. System modernization programs are adjusted accordingly.

The force packaging methodology establishes priorities for issuing equipment in conjunction with the Army's tiered resourcing philosophy. The highest priority FP is normally resourced first. Total Army (Active Component, National Guard and Reserve) units receive new equipment in accordance with their designated Force Package.

In addition, the Army practices "cascading." Cascading is the redistribution of fielded materiel displaced by Total Package Fielding of new materiel. The goal is to optimize Total Force readiness levels by ensuring critical fielded items displaced by fielding of modernization items are redistributed to units based on relative "first to fight" priority and future new item fielding. This is accomplished by centralized control (at HQDA) of the items of equipment which have Total Force readiness and force modernization impact.

As a result of limited procurements of new systems and new capabilities, modernization is generally limited to fielding new systems to Force Package 1. For the remainder of the Army, this means a "modernization" program that cascades equipment being replaced in Force Package 1 to "upgrade" the older equipment that was being used by the later deploying units. This cascading may accomplish modernization overall, but since upgrades are limited to high payoff modifications and new starts are limited to "leap ahead" technologies, the gap between force packages widens and creates an Army of tiered capabilities. Slower replacement also results in an aging fleet which can require increased operations and maintenance funds. The costs of maintaining the older equipment may preclude modernizing a Force Package 2-4 unit, even with the equipment being replaced in a Force Package 1 unit.

Meeting the modernization objectives is a key goal for the Army Modernization Plan. It also provides a yardstick with which to measure the Army's success in implementation of the Modernization Plan. While this strategy of achieving modernization objectives capabilities may be consistent and integrated with doctrinal developments, funding constraints have meant that the strategy could not be fully implemented. The 1996 RDT&E (Research, Development, Testing, and Evaluation) and Procurement funding for the Army, in constant dollars, is the **lowest in 30 years.**

Enabling Strategies

As the Army modernizes to meet future capability objectives, innovative strategies must be employed to manage scarce modernization resources. Some of the **enabling strategies** the Army is using are: Horizontal Technology Integration (HTI), Joint Warfighter Focus, Information Dominance, and the Army Enterprise Strategy.

Horizontal Technology Integration

Fiscal constraints, the rate of technological advances, acquisition reforms and manufacturing improvements have significantly changed the Army's modernization strategy. The Army Modernization Plan now focuses on the Army's ability to field the capabilities needed to carry out joint warfighting requirements and the Information Based Operations of Force XXI. When a technology is identified as providing a significant capability improvement, it may be incorporated into dissimilar existing platforms that operate together. The **horizontal insertion of proven technologies** may be incorporated through new acquisitions, product improvements, or system component improvements. While this strategy accepts some risk, it greatly reduces the expense from a total recapitalization strategy and takes maximum advantage of expenditures for previously fielded systems.

HTI initiatives follow streamlined acquisition management procedures. The ASA (RDA) ensures technology insertion is synchronized through management oversight of the respective Program Executive Officers (PEOs) and Program Managers (PMs). PEOs and PMs manage HTI as a part of planned system improvements and milestone upgrades. They continue to ensure the systems acquisition strategies and acquisition plans are designed to incorporate a horizontal approach. HTI enabling strategies are resourced through individual Management Decision Packages (MDEPs). An MDEP will provide funding for both common, government furnished hardware, and for the actual insertion and integration of the common hardware onto the designated systems. PMs continue to be responsible for total system performance.

HTI is currently exploiting and applying technologies to three areas:

- **Second Generation Forward Looking Infrared (2nd Gen FLIR)** provides a wider field of view, greater range, and improved resolution to Infrared sights (Annex B).

- **Battlefield Combat Identification** technologies permit the warfighter to distinguish between friend and foe throughout the target engagement process (Annex B).

- **Digitization** provides the rapid exchange of information via high speed digital networks and data transfer systems to obtain seamless command and control capabilities (Annex C, D).

HTI has the potential to provide force improvements in order of magnitude beyond old ways of doing business. The HTI approach changes the environment and the process by which the Army modernizes. Successful implementation of HTI initiatives requires high priority, carefully documented, effective requirements documents and well developed acquisition strategies and plans. Technology outpaces the acquisition cycle. To succeed in the modernization process, the Army will use creative, flexible, and responsive ways to satisfy its needs while undertaking initiatives to streamline the acquisition process. The paramount focus of HTI is to maximize available resources and keep pace with rapid advances in technology.

Joint Warfighter Focus

The modernized Army must be able to fight as part of the joint team envisioned in Joint Publication 3-0, *Doctrine for Joint Operations.* This document provides guidelines for joint operations and US military involvement in multinational and interagency operations.

Military operations in the next century, more than ever before, will require the integration of all U.S. military capabilities to generate decisive combat power. This is the **joint underpinning** of the Army Modernization Plan. The Army will both leverage and support other Services, as well as national assets, through a robust network of Command, Control, Communications, and Computers (C4), including Intelligence and Electronic Warfare (IEW) systems. The Army Battle Command System (ABCS) architecture features a seamless, global grid of C4I systems designed to provide near real time digital information capabilities through the media of video, imagery, data, and voice. The goal is for all Services to have their IEW and C4 systems electronically connected, giving them the capability to talk to one another. Ultimately the condition of interoperability will be achieved, when information or services can be exchanged directly and satisfactorily between users.

Army IEW systems are integrated into joint, theater, and national architectures to enable all levels of the intelligence community to focus on warfighter requirements. The key to IEW success is connectivity among multi-media information and intelligence. Program Managers must address the technical specifications of how each Army system exchanges data and products with sister Service counterparts. Functional interoperability is a key aspect of IEW modernization. We must turn the necessities of **interoperability and connectivity** into virtues of Army modernization.

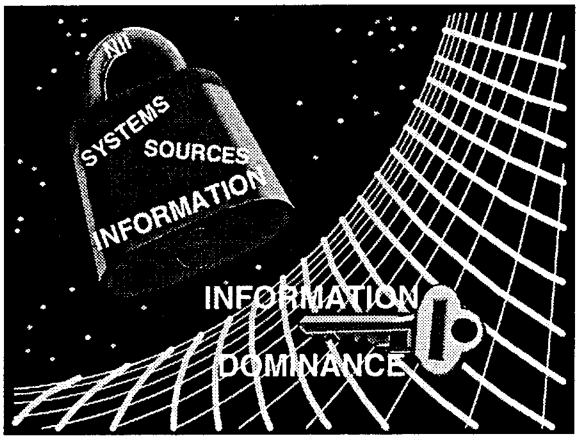
Joint doctrine provides Joint Forces Commanders (JFCs) a broad range of options to defeat an enemy or to conduct MOOTW. It recognizes the fundamental and beneficial effects of teamwork, unity of effort, and the synchronization of military operations in time, space, and purpose. Technological advances continue to increase the tempo, lethality, and depth of warfare. Joint doctrine allows JFCs the flexibility to accommodate these advances and use them to positive advantage.

While participating in joint operations the Army must be cognizant that it is also involved in unified actions, or operations, which are the synchronized application of all of the instruments of national and multinational power, including the actions of nonmilitary organizations as well as military forces.

JFCs must synchronize the actions of air, land, sea, space, and special operations forces to achieve strategic and operational objectives through integrated, joint campaigns and major operations. The goal is to increase the total effectiveness of the joint force, not to involve all forces equally in every campaign. For the JFC to accomplish this, the joint force and each component must have modernized open architecture command, control, communications, computers, and intelligence (C4I) systems that can interoperate and interface seamlessly, in near real time. These C4I systems will provide commanders a common view of the battlefield as they plan, coordinate, deconflict, and execute complementary and mutually supporting operations to accomplish the JFC's intent. As the Army fields elements of ABCS, it will comply with the Joint Global Command and Control System's (GCCS) standards and protocols, and adopt the DoD Common Operating Environment (COE).

Information Dominance

Information Dominance is the objective of the United States Army's modernization strategy for gaining an information advantage in order to win quickly and decisively. Information Dominance provides for the effective execution of all the actions contained in the goals of the five modernization objectives. FM 100-6 (Draft) defines Information Dominance as the degree of information superiority that allows the possessor to use information systems and capabilities to achieve an operational advantage in a conflict or to control the situation in MOOTW, while denying those capabilities to the adversary.



THE KEY TO THE FUTURE

Commanders must see a clear picture of the battlefield, and be able to use information effectively during all phases of any operation. Operational advantage is keyed to the use of modern communications capabilities linking systems associated with Command and Control (C2), intelligence, analysis, space, early warning, communications, and multispectral imagery, to commanders, planners and shooters (weapons systems).

The broad applications of Information Dominance dictate the approach to modern warfare. It is a conceptual framework which assists in the development of not just military plans and capabilities, but how all government agencies interact during crisis management and conflict resolution.

Army Enterprise Strategy

The Army Enterprise Strategy is the Army's comprehensive vision for all C4I activities. Synchronized and orchestrated efforts to harness information technologies are necessary if we are to achieve information dominance during a resource-constrained modernization period. The Enterprise Strategy provides focus for achieving the seamless information environment necessary to support the Army warfighters into the 21st Century. It is a holistic view of a force projection Army's information needs. The Enterprise Strategy integrates current doctrine and modernization plans for information systems and addresses the requirements to organize, train and equip the force. It also details the Army's role in the joint vision: *C4I for the Warrior.* Finally, it identifies the functional requirements for sustaining the force from both a tactical and a business perspective.

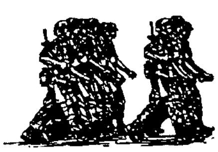
C4I architectures defined within the scope of the Enterprise Strategy guide future information technology exploitation with a sound, architecture-based foundation. The information infrastructure must facilitate and not inhibit the flow of information between force elements and must provide the flexibility to accommodate different missions and organizational structures. The absence of a common and enforced architecture has allowed most information and embedded systems to be developed with their own (sometimes unique and frequently closed) infrastructures. This is not conducive to seamlessness because it results in a variety of various message sets, information processing architectures, and information transport architectures. Interoperability is problematic and expensive, when accomplished through development and maintenance of unique interfaces. Adoption and enforcement of the Enterprise architectures, specifically the Technical Architecture, will foster interoperability between systems, as well as decrease development and maintenance costs through software reuse.

Warfighting Elements

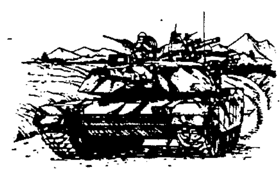
The future Army, like today's Army, will be **a combined arms force**. Each element, from aviation to wheels, supports and depends on the others. It is only in the combination of these elements that the Army achieves increased lethality from synergy, wherein the whole is far greater than the sum of its parts.

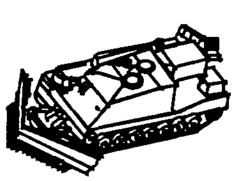
There have been changes to the content and structure of this year's Army Modernization Plan. In some cases previous Annexes were combined to reflect elements included in a particular Battlefield Operating System (BOS). The warfighting elements that were reflected in each Annex last year appear now only in this introduction. Special Operations Forces (SOF) modernization has been integrated into each of the Annexes that are providing equipment for SOF. The Training Annex reflects the overall Army training modernization, as opposed to reviewing training modernization status in each of the Annexes. The Annexes of this year's Modernization Plan are summarized here in the context of their warfighting elements.

Annex A summarizes the **structure of the force**. Force Structure is critical to the capabilities of the Army as it evolves to Force XXI.

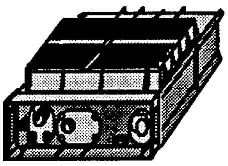


Mounted and dismounted forces (Heavy and Light units) (Annex B) provide the nation with the required options for future military operations. They are inherently tailorable, lethal, and versatile, and are the centerpiece of military action, providing decisive victory by dominating the battle space.

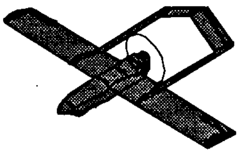




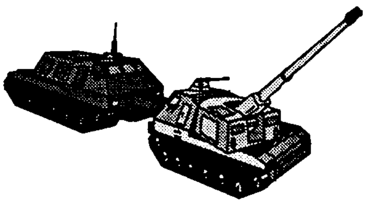
Army **engineer forces** (included in Annex B) support Force XXI operations across the entire spectrum of conflict and throughout the battle space. Engineer units maintain the mobility of the maneuver force with road and bridge equipment and through mine breaching operations. They impede the movement of enemy forces through countermobility missions. Topographic information and products, produced by Army engineers, provide accurate and timely terrain data as well as hard copy and electronic situational updates of unit locations and dispositions.



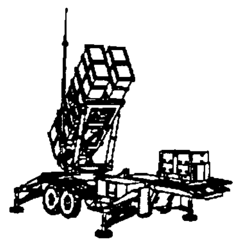
Modern armies coordinate their actions through an architecture of **Command, Control, Communications, and Computers (C4)** (Annex C). To support the Force XXI Army, the C4 community must provide the means to transport information between warfighters and supporters at all levels of warfare.



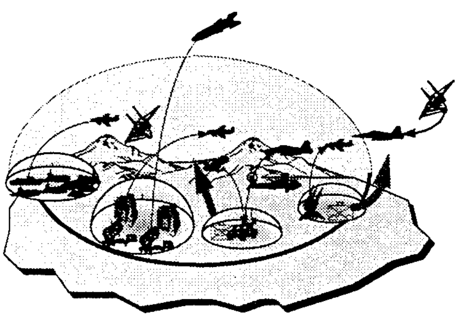
Intelligence and Electronic Warfare (IEW) systems (Annex D) are critical to winning the information war and disseminating intelligence in real time to tactical commanders. The gathering, processing, and dissemination of information must be synchronized with the operational concept and battle plan to ensure the commander's requirements are met.



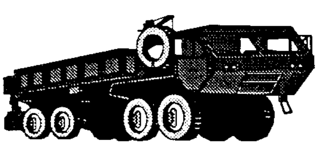
Field artillery forces occupy three major roles in the warfight under the heading of indirect **fire support** (Annex E). Together these three roles (close support, counterfire, and interdiction) provide maneuver forces the capability to employ decisive fires simultaneously throughout the battle space.



Air Defense (Annex F) supports the modern force by providing active defense against air and missile attack. Army air defense systems must work with air and maritime defenses, especially during the early stages of force projection, to provide continuous and seamless protection to the entire force. Together they ensure safe arrival of friendly forces in theater, provide a protective umbrella once they are in theater, allow freedom of maneuver on the battlefield, and provide the requisite protection to reconstitute forces.

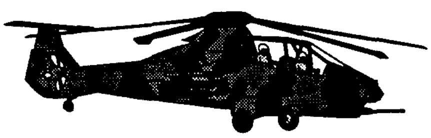


Complementing, but separate from air defense, is **missile defense** (Annex G). Approximately 26 countries now possess tactical ballistic missiles, with over 100 countries currently owning some form of ballistic missile, cruise missile, or Unmanned Aerial Vehicle (UAV). Missile Defense integrates the active defense of air defense forces with the elements of passive defense and attack operations.



Tactical wheeled vehicles (TWVs) (Annex H) support the warfight by providing ammunition and fuel, additional unit mobility, and sustainment supplies. Rapid force projection, extended communication lines, and the likelihood of operating without an existing logistical infrastructure, place unique demands on the Army's transportation capability.

The foundation of Army **logistics** (Annex I) modernization rests on projecting the force, sustaining the force, and providing core support to the force, at all operational levels. In addition to support of Army combat units, Army logistics assets support other Services, multi-national forces, and occasionally provide support directly to civilian populations.

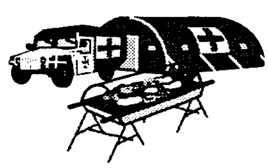


The inherent versatility of **Army aviation** (Annex J), a maneuver element in itself, enhances the efficiency and effectiveness of virtually all combat functions (maneuver, intelligence, fire support, battle command, mobility and survivability, air defense, and logistics). Through its capability as a maneuver force, Army aviation provides an extension of combat power throughout the battle space. Aviation forces bring to the fight: armed reconnaissance, security, real time battlefield intelligence, force protection, attack helicopter operations (including deep attack), air assaults, and combat support.

Special Operations Aviation (SOA) aircraft provide insertion/extraction, reconnaissance gathering, light attack, resupply, and other special operations support to the combined arms team. Modernization programs developed, funded, and managed by U.S. Special Operations Command (USSOCOM) will provide adverse weather and extended range capability for low visibility penetration and infiltration of enemy territory.

Arms control efforts alone cannot guarantee the absence of weapons of mass destruction (WMD) on the future battlefield. Protection of the force against WMD is addressed in Annex K: **Nuclear, Biological, and Chemical** (NBC) defense. The NBC mission area has three components: NBC defense, smoke and obscurants, and Flame/Incendiary and Nonlethal (FINL) munitions. The NBC modernization strategy focuses on developing multifunctional, multi-Service, easy to use and maintain, lightweight equipment to improve force survivability and to mitigate mission degradation caused by the very equipment that protects the force.

Combat Health Support (Annex L) is another capability required to Protect the Force and Sustain the Force. Medical support to the soldier provides the basis to conserve the fighting strength and thus assist the Army in achieving its warfighting goals.



In the past, the Army has relied on traditional, live field training exercises to provide the combat **training** (Annex M) needed for success in wartime. There is still a need for live fire training exercises, routine deployment exercises, and crew drills. However, the Army's vision for the future supports the capability to train in an affordable manner with technology moving toward a seamless synthetic environment consisting of live, virtual, and constructive simulations.

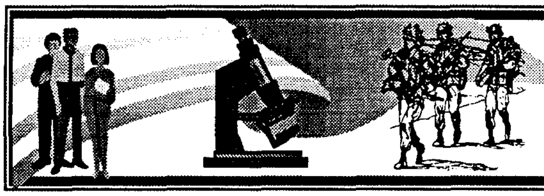
The Army's use of **space** (Annex N) is important to the conduct of all phases of land warfare. Force projection and maneuver are enhanced by the use of mapping products for areas where no up-to-date maps exist. Global positioning systems allow for navigation over unfamiliar or featureless terrain. Communications extend ground force capabilities to allow for efficient command, control, and sustainment of split-based and highly mobile forces. From disaster relief, humanitarian, and security assistance roles to combat operations, decisive victory depends on space capabilities and products. Future modernization of space systems will concentrate on ensuring Army access to space and providing the required space support directly to the warfighter. It is also important to develop the capability to deny space based information to the enemy.

In this era of regional focus, fewer forward based forces, decreasing resources, and growing uncertainty, **Special Operating Forces (SOF)** offer unique characteristics in support of U.S. military strategy. As a force multiplier, SOF complement conventional forces before, during and after a conflict. SOF expand the options of the National Command Authority, particularly in crises and contingencies such as terrorism, insurgency, subversion, and sabotage, that fall between diplomatic initiatives alone and the use of large, conventional forces. SOF provide a large range of capabilities, whether military, humanitarian, or peacekeeping.

Modernization of SOF equipment is unique. Attaining special operations objectives often means using specialized training and equipment to deliver people, equipment, and weapons with surgical precision; locate high-value, strategic, movable targets; and deliver firepower more accurately with less collateral damage and injury to civilian populations.

Modernization of SOF, however, also includes equipment common to other force elements of the Army. Throughout this Modernization Plan, discussion in the Annexes will point out where SOF capabilities are significantly impacted by Army equipment modernization.

Modernization Assessment



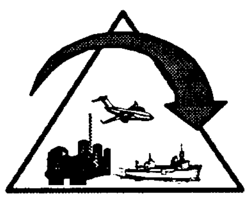
Redesign The Force...
Leverage both the power of people and the power of our technology.

In a resource constrained environment, the Army's modernization objectives (Project and Sustain, Protect the Force, Win the Information War, Precision Strike, Dominate Maneuver) provide focus to balance capabilities in Force XXI. Balanced technology insertion to achieve the modernization objectives is a key part of the Army's plan. At the same time, the modernization objectives attempt to ensure key support programs (trucks, generators, utility/cargo helicopters, and ammunition) retain proper priority to meet required resourcing goals. Modernization appraisals provide a subjective assessment--**RED, AMBER, GREEN**--of our ability to support the modernization objectives.

- **RED** means no capability to achieve the modernization objective exists, or capability is insufficient to defeat the threat or provide the required support.
- **AMBER** means a limited capability or quantity exists to achieve the modernization objective.
- **GREEN** means adequate capability and quantity exist to achieve the modernization objective.

These ratings are based on the anticipated required 21st Century capabilities and the current status of programs necessary to meet resourcing goals. Systems are rated in the **NEAR-TERM** (1996-98), **MID-TERM** (1999-01), and **FAR-TERM** (2002-11).

The following overall assessment is based on the cumulative assessments, made according to the same criteria, contained in each of the Annexes. Within each Annex, a review of that mission area's modernization programs is made, priorities are set among those programs, and the programs are integrated into the total Army force (active and reserve components). Each Annex is constrained to the available and programmed resources, and is responsive to the external factors of the changing threat, technology breakthroughs or delays, funding levels, and personnel/force structure assets. Capabilities are assessed and shortfalls are identified. In some cases these shortfalls are prioritized to indicate where additional modernization resources would be used should they become available through either additional TOA or through the reinvestment of resources saved by attaining efficiencies in other areas.



Project & Sustain

Project and Sustain the Force

The Army is primarily a Continental U.S.-based force. Today's environment and future environments demand the capabilities to project CONUS-based forces quickly, and to sustain those forces for extended periods of time. Refer to the Project and Sustain chart on the next page.

The Army requires rapid global force projection. Army strategic mobility improvements include prepositioned War Reserves, CONUS infrastructure improvements, and continued Army support for both the Air Force C-17 and the Navy Large, Medium Speed, Roll-on/Roll-off Lift Ship (LMSR) programs.

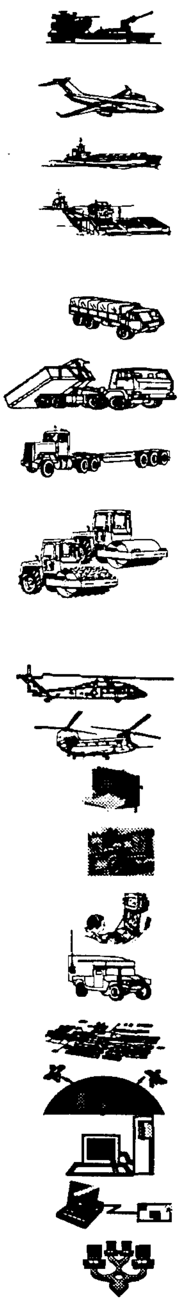
Nineteen LMSRs are being acquired: eight ships for afloat prepositioning of a heavy brigade combat team, and eleven ships for a heavy division's surge equipment from CONUS. By FY98 the Army will have eight prepositioned ships with combat unit equipment, and units capable of executing port and terminal operations, ground movement, and Logistics-Over-The-Shore (LOTS) operations. The remaining eleven LSMR ships will be delivered by FY01. **There is currently no on-hand capability, nor programmed procurement, for roll-on/roll-off discharge facilities. This results in longer offloading times.**

The Army continues to upgrade CONUS rail and air heads and to improve its information infrastructure at CONUS installations in order enhance power projection capabilities and to enable split-based operations. Improved information infrastructure permits implementation of Total Asset Visibility (TAV) and In Transit Visibility (ITV) to increase logistics efficiency, and the Total Distribution Program (TDP) to manage the distribution from factory to foxhole. These split-based operations capabilities are very dependent on maintaining Army requirements for and access to space based communication assets which have potential gaps in capacity and coverage, and are cause for concern. Any failure to procure programmed satellite systems will adversely affect the Army's capability to conduct split-based operations and, as a result, Force XXI logistics operations.

Achieving tactical mobility necessary to Project and Sustain the force continues to be a problem. Light and medium fleets have been hampered by procurement reductions and production stoppages, but the Family of Medium Tactical Vehicles Program (FMTV) has now received increased funding. The age of utility and cargo helicopters will become a sustainment problem in the far-term (when the CH-47 airframes will be more than 40 years old, and UH-1s will still be in the fleet because funds prevent buying adequate numbers of UH-60s).

The tactical electric power program provides tactical generators for command post, intelligence, communications, and logistics functions. Current funding for these programs is inadequate. The average age for the mid-term of these systems is 18 years.

PROJECT & SUSTAIN **PERCENT FIELDED AS OF FY03**

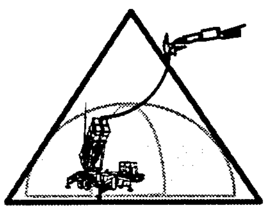


SYSTEM	$M FY97 Budget Request	Appropriation	FY97	FY98	FY99	FY00	FY01	FUE	FP1	FP2	FP3	FP4	ARMY
PROJECT													
Rail		RDTE											
	15.0	Proc						FLD	NA	NA	NA	NA	100%
C-17 (USAF Program)		RDTE											
	15,147.0	Proc						FLD	NA	NA	NA	NA	82%
LMSR (Navy Program)		RDTE						4Q					
	603.8	Proc						FY96	NA	NA	NA	NA	100%
LOTS (Logistics Over the Shore)		RDTE						2Q					
	22.0	Proc						FY98	NA	NA	NA	NA	35%
SUSTAIN													
FMTV		RDTE						1Q					
	240.0	Proc						FY96	100%	20%	0%	0%	20%
PLS (Trucks and Trailers)	0.0	RDTE											
	0.0	Proc						FLD	100%	100%	100%	100%	100%
FHTV (minus PLS)		RDTE											
	168.3	Proc						FLD	94%	95%	65%	66%	75%
Engineer Construction Equip		RDTE											
Vibratory Roller	0.0	Proc						FY97	39%	0%	0%	0%	14%
All Terrain Crane	6.4	Proc						FY97	41%	0%	0%	0%	13%
Hydraulic Excavator	6.5	Proc						FY98	65%	100%	0%	0%	31%
Dump Truck, 20T	0.0	Proc						FY00	99%	100%	0%	0%	34%
Truck, Bituminous	0.0	Proc						FY03	87%	0%	0%	0%	29%
Truck, Concrete	0.0	Proc						FY01	100%	29%	0%	0%	38%
Loader, 5CY	0.0	Proc						FY02	54%	0%	0%	0%	19%
UH-60L		RDTE											
	220.5	Proc						FLD	100%	100%	96%	41%	65%
CH-47D		RDT&E											
	8.3	Proc						FLD	100%	100%	100%	N/A	100%
TDS (Total Distribution Sys)		RDTE											
	21.6	Proc						FLD	100%	100%	0%	0%	50%
Tactical Quiet Generators		RDTE											
	17.7	Proc						NA	100%	10%	0%	0%	23%
CSSCS		RDTE						1Q					
	18.4	Proc						FY97	100%	100%	0%	0%	50%
HMMWV		RDTE											
	102.0	Proc						FLD	99%	99%	95%	89%	96%
Force Provider		RDTE											
	12.1	Proc						FLD	NA	NA	NA	NA	69%
PPC4I		RDTE						1Q					
	38.0	Proc						FY97	80%	27%	27%	27%	40%
RCAS (USAR and ARNG)		RDTE											
	75.5	Proc						FLD	NA	NA	NA	NA	90%
DMS		RDTE											
	41.8	Proc						FLD	NA	NA	NA	NA	80%
SBIS (all development funds)		RDTE						2Q					
	23.6	Proc						FY96	NA	NA	NA	NA	80%

RDTE
PROCUREMENT

Although Congress, OSD, and DA have improved ammunition posture, conventional ammunition has significant shortfalls. Training ammunition is not fully funded for FY 97-01. Industrial-based, stockpile management, and demilitarization functions are resourced to address critical requirements only. For ammunition modernization, there are 17 modern war reserve ammunition items. The Army will only procure 12 of these 17 munitions. Modernization of ammunition is not supported at current funding levels. In addition, only 76% of the ammunition production base is funded.

Project and Sustain the Force is rated AMBER for the near-term, and RED for the mid- and far-terms. Improved airlift and sealift capabilities are still required. Strategic lift improvements will significantly enhance the Army's ability to Project and Sustain the Force in the near- and mid-terms. However, CSS programs frequently pay the bills for Army readiness and operational requirements. Trucks, ammunition, maintenance and materiel handling equipment, and generators have a difficult time competing for funds. The degraded medium and heavy helicopter lift capability, the lack of funding for medium and light tactical wheel vehicles and tactical generators, the concern for potential SATCOM shortfalls, and, in addition, the status of ammunition modernization keeps this objective area rated RED into the far-term.



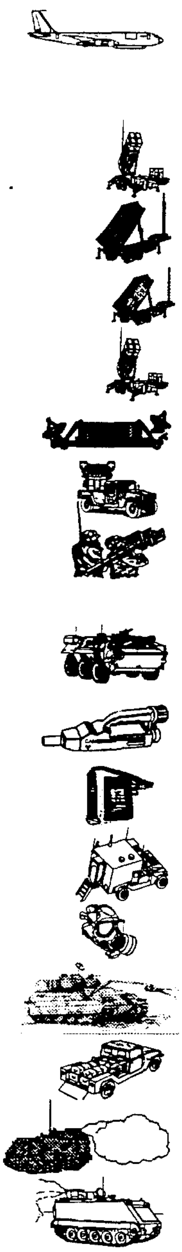
Protect The Force

<u>Protect The Force</u>

Military forces are most vulnerable during initial, forced entry into hostile areas. During the early stages of such operations, the systems required to protect forces are limited in availability. The potential for disruption of operations by theater ballistic and cruise missiles during this period is very high, and brings with it corresponding nuclear, biological, and chemical (NBC) employment threats. The potential for fratricide still exists during any military operation and requires accurate situational awareness. Refer to the Protect the Force chart on the next page.

Early entry/forced entry forces require far better protection from theater missiles and weapons of mass destruction. The fielding of PATRIOT Advanced Capability 3 (PAC-3), and Theater High Altitude Area Defense (THAAD), assisted by early warning alert from Joint Tactical Ground Stations (JTAGS) provides Force XXI the capability to respond to the growing ballistic and cruise missile threat. **Short range missiles remain a significant threat to maneuver forces.** Capabilities to defend against fixed wing manned aircraft exist, but **the evolving UAV/RPV threat and stand-off rotary wing threat still poses a lethal threat to maneuver forces.** Improvements to the Stinger missile and onboard launch capability from the Bradley Stinger Fighting Vehicle Enhanced (BSFV-E) are required to counter these threats. Missile defense against the very short range theater ballistic missiles (VSRTBMs), and cruise missiles is sufficiently improved only if Corps SAM is fielded. Corps SAM is currently competing for BMDO funding with other services' advanced capability TMD systems.

Fratricide reduction is enhanced most by accurate situational awareness. Measures to prevent fratricide such as: improved precision location and navigation, combat identification systems, and improved Identification, Friend or Foe (IFF) contribute to better situational awareness. These capabilities are enabled by advances in information technologies. The Army is actively focusing the use of such technologies to digitize the battlefield and implement the Enterprise Strategy to reduce fratricide. There is also continuing development of munitions insensitive to sympathetic detonation.



PROTECT THE FORCE — **PERCENT FIELDED AS OF FY03**

SYSTEM	$M FY97 Budget Request	Appropriation	FY97	FY98	FY99	FY00	FY01	FUE	FP1	FP2	FP3	FP4	ARMY
DETECT AND INTEGRATE													
JSTARS GSM/CGS		RDTE											
	93.2	Proc						FLD	100%	100%	100%	NA	100%
DEFEND													
PATRIOT PAC-3* (ERINT)		RDTE						3Q					
	569.5	Proc						FY98	100%	100%	10%	0%	60%
THAAD*		RDTE						2Q					
	738.4	Proc						FY02	25%	NA	NA	NA	25%
CORPS SAM*		RDTE						3Q					
	47.7	Proc						FY05	0%	0%	0%	0%	0%
PATRIOT		RDTE											
	37.9	Proc						FLD	100%	100%	100%	NA	100%
JTAGS***		RDTE						2Q					
	2.2	Proc						FY97	100%	N/A	N/A	N/A	100%
AVENGER		RDTE											
	6.7	Proc						FLD	100%	100%	25%	NA	65%
STINGER RMP		RDTE											
	13.8	Proc						FLD	100%	50%	0%	0%	39%
SURVIVE													
NBCRECON (FOX M93A1)**		RDTE						4Q					
	55.5	Proc						FY99	84%	0%	0%	0%	32%
CHEMDET (ACADA)**		RDTE						1Q					
	10.2	Proc						FY97	60%	0%	0%	0%	11%
NUCDET (POCKET RADIAC)**		RDTE						1Q					
	0.0	Proc						FY97	0%	0%	0%	0%	0%
BIODET (BIDS)**		RDTE						4Q					
	42.7	Proc						FY96	100%	100%	0%	0%	93%
Soldier Mask (M40)**		RDTE											
	49.6	Proc						FLD	100%	100%	100%	81%	94%
Collective Protection (CBPS)**		RDTE						2Q					
	12.6	Proc						FY97	89%	0%	0%	0%	21%
Modular DECON**		RDTE						4Q					
	3.9	Proc						FY99	85%	0%	0%	0%	24%
Smoke (Multiple Systems)		RDTE											
M56 Wheeled	25.0	Proc						4Q	61%	0%	0%	0%	24%
M58 Tracked		Proc						FY97	83%	0%	0%	0%	28%
Ground Vehicle Combat ID		RDTE											
	17.3	Proc						NA	0%	0%	0%	0%	0%

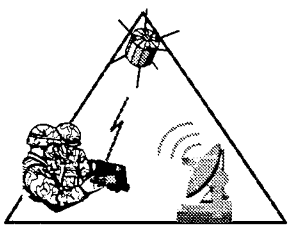
*BMDO Funded
**Joint Programs - Army Exec Agent
***FY 97 and Beyond JTAGS P3I

RDTE
PROCUREMENT

Survivability enhancements through the POM period include development of a biological detection capability, an NBC stand-off detection capability, and a multiagent chemical detection capability. Some shortfalls in the area of individual and integrated collective protection are expected to be overcome by the far-term with the fielding of new capabilities beginning in the mid-term, but developments in chemical and biological protection are required. Technology to develop and procure a receptor targeted immunization for biological agents will be a far-term goal. Technology is also the limiting factor in the area of decontamination. **A technology solution that will achieve waterless decontamination is required.**

Combat casualty care for soldiers has shortfalls in advanced medical communications which enhance patient location, diagnostics, and treatment. This is further aggravated by the far-term inadequacy of the air and ground medevac fleets. The POM terminates UH-60 production after FY96, 135 aircraft short of medevac requirements. Further, the current aero-medevac fleet must remain a composite force of UH-60s and UH-1Vs well into the next century due to shortage of modernization funds. In addition to patient evacuation shortfalls, combat health support shortfalls also exist in NBC collective protection for all medical units, and in development of biological agent protective measures.

Protect the Force is rated AMBER for the near-term, and RED for the mid- and far-terms. This rating is a consequence of the lack of an effective combat identification system and low rates of fielding detection and survival capabilities. Although continuous improvements are taking place in this important modernization objective area, uncertainty in all missile defense funding, the shortfalls in protection of the maneuver forces against cruise and short range ballistic missiles, the far-term lack of aeromedevac capability, and Combat Health Service shortfalls keep the rating RED through the mid- and far-terms.



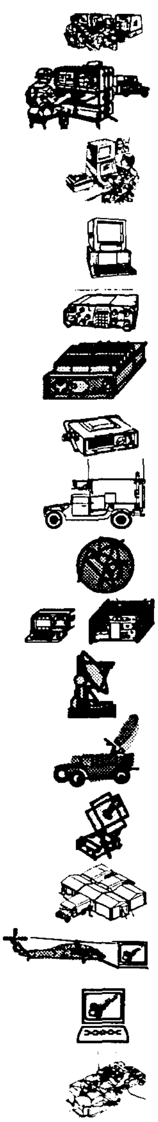
Win Information War

Win the Information War

Information warfare capabilities harness advances in information technologies in order to collect, process, disseminate, and use information. The goal is to provide Force XXI the operational advantages of Information Dominance. Rapidly advancing technology provides new opportunities for efficiently executing command and control responsibilities. At the same time, potential adversaries also have access to advanced technology to enhance their own command and control. Targeting and incapacitating the information systems of adversaries, while protecting our own, will allow deep and simultaneous attacks and lead to overmatching force and decisive victory. Refer to the Win the Information War charts on the next two pages.

The Army is fielding a robust sensor capability for Force Package 1 units and some Force Package 2 units. UAVs and other airborne capabilities will enable commanders at brigade level and above to control their fight by providing targeting, force protection, and situation development. Additional capabilities include the Joint Surveillance Target Attack Radar System (JSTARS) real time moving target acquisition through the Common Ground Station (CGS), the Ground Based Common Sensor (GBCS), Ground Based Sensor (GBS), air surveillance and tracking for Forward Area Air Defense System Command, Control and Intelligence (FAADSC2I). Shortfalls in the track mounted GBCS for mounted forces adversely effect their on-the-move collection capability.

WIN THE INFORMATION WAR — PERCENT FIELDED AS OF FY03

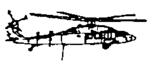


SYSTEM	$M FY97 Budget Request	Appropriation	FY97	FY98	FY99	FY00	FY01	FUE	FP1	FP2	FP3	FP4	ARMY
C4I SYSTEMS													
MCS		RDTE						2Q					
	49.7	Proc						FY98	100%	100%	100%	NA	100%
ASAS		RDTE						2Q					
	52.3	Proc						FY00	100%	82%	17%	NA	50%
Blk I at 100% in FY03; Blk II figures shown													
FAAD C2I		RDTE											
	60.6	Proc						FLD	100%	100%	25%	0%	65%
AFATDS		RDTE											
	76.1	Proc						FLD	100%	80%	0%	0%	47%
SINCGARS		RDTE											
	309.4	Proc						FLD	100%	100%	100%	70%	90%
Data Radio		RDTE						2Q					
	41.0	Proc						FY95	100%	25%	0%	0%	30%
GPS		RDTE											
	24.5	Proc						FLD	100%	100%	100%	100%	100%
MSE		RDTE											
	16.9	Proc						FLD	100%	100%	100%	100%	100%
AGCCS		RDTE						1Q					
	41.6	Proc						FY96	100%	100%	100%	100%	100%
CTT/JTT (3 Channel)		RDTE											
CBS-M	14.6	Proc						FLD	73%	73%	73%	NA	73%
TROJAN SPIRIT		RDTE											
	7.0	Proc						FLD	77%	60%	50%	NA	67%
Includes TROJAN Classic funding													
SMART-T		RDTE						2Q					
	64.7	Proc						FY98	100%	100%	100%	0%	48%
SCAMP		RDTE						4Q					
	33.3	Proc						FY98	100%	100%	100%	100%	100%
SICPS		RDTE											
	32.6	Proc						FLD	100%	70%	30%	10%	50%
A2C2S		RDTE						4Q					
	15.5	Proc						FY98	60%	0%	0%	0%	25%
INFOSEC (Multiple Systems)		RDTE											
	14.6	Proc						FLD	NA	NA	NA	NA	NA
IMETS		RDTE											
	3.3	Proc						FLD	74%	76%	90%	NA	76%

RDTE
PROCUREMENT

WIN THE INFORMATION WAR

PERCENT FIELDED AS OF FY03

SYSTEM	$M FY97 Budget Request	Appropriation	FY97	FY98	FY99	FY00	FY01	FUE	FP1	FP2	FP3	FP4	ARMY
SENSORS AND EW SYSTEMS													
 TENCAP		RDTE						FY99					
	45.0	Proc						(TES)	100%	100%	0%	NA	83%
		Note: Funds also maintain current systems until TES fielding											
 GRCS		RDTE											
	17.4	Proc						FLD	100%	100%	100%	NA	100%
 GBCS		RDTE						2Q					
	49.0	Proc						FY97	100%	27%	0%	NA	50%
 TACTICAL UAV (funded in DARP)		RDTE						1Q					
	7.8	Proc						FY99	100%	100%	100%	100%	100%
 AQF		RDTE						3Q					
	14.5	Proc						FY98	100%	11%	0%	NA	45%
 ARL		RDTE											
	25.8	Proc						FLD	NA	NA	NA	NA	67%
 GBS		RDTE						1Q					
	56.3	Proc						FY98	100%	100%	25%	0%	65%
 RAH-66		RDTE						4Q					
	298.6	Proc						FY06	0%	0%	0%	0%	0%

RDTE
PROCUREMENT

Continuous improvements to the Army Tactical Exploitation of National Capabilities (TENCAP) program provide intelligence from national to tactical levels. The All Source Analysis System (ASAS) fuses information from multiple systems. The information is then distributed through a communications architecture that will continue to improve with digitization and the implementation of the Enterprise Strategy.

Communications capability for split-based operations is provided through military and commercial satellite sources. Space systems also provide surveillance capability from national assets; up-to-date weather and environmental effects information through the Integrated Meteorological System terminals; terrain and mapping data for use in systems like the Aviation Mission Planning System (AMPS); and precise position location using small Global Positioning System (GPS) receivers. GPS capabilities are also being integrated into all Army weapons platforms in compliance with congressional mandate.

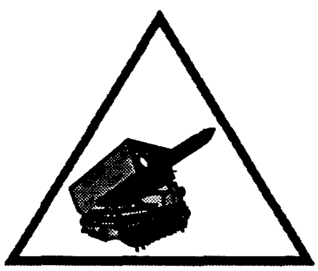
Information capabilities are also enhanced by wideband capabilities of terrestrial systems such as the Army Data Distribution System (ADDS), which passes increased quantities of data. The fielding of Have Quick radios and the Improved Data Modem will provide target handover and digital message capability for Army aviation.

Advanced technology allows incorporation of electronic warfare protection features. For example, the Secure, Mobile, Anti-jam, Reliable, Tactical Terminal (SMART-T) multi-channel satellite terminal for Military Strategic Tactical Relay (MILSTAR) satellites will provide range extension capabilities for Mobile Subscriber Equipment (MSE). It will also incorporate Low Probability of Intercept (LPI) and Low Probability of Detection (LPD) features. SCAMP is a Single Channel Anti-jam, Manportable MILSTAR terminal that will be employed at corps and below tactical units. SCAMP provides required voice and data range extension for command and control.

Information security systems (INFOSEC) assure multilevel security from CONUS to and within the operational theater. Current funding levels for these programs are severely limited.

Denying the use of space-based information is a critical capability envisioned for the 21st Century warfighter. Capabilities in this area are limited, but must be developed consistent with national policy.

Win the Information War is rated AMBER for the near-, mid-, and far-terms. Horizontal/vertical seamless communication architectures which provide voice, data, graphics, imagery, and video information for all battlefield operating systems are not yet fielded for the warfighter. The efforts to digitize the battlefield and implement the Enterprise Strategy will take advantage of the rapid changes in technology to move toward a seamless architecture in an efficient and affordable manner. The objective remains AMBER through the far-term based on inadequate funding to procure the appropriate quantity of systems to meet Force Package 2, 3, and 4 requirements.



Precision Strike

Conduct Precision Strike

To assist in the accomplishment of his mission, the Force XXI commander must have rapidly deployable capability to conduct deep attacks against the threat. To successfully attack targets with precision at extended ranges requires the capability to see deep, to find designated high-payoff targets, and then transmit that information/intelligence in near real time to firing units employing advanced weapons and munitions systems to destroy those targets. Refer to the Conduct Precision Strike chart on the next page.

To enable the Force XXI Army to see deep, a family of capable sensors is being fielded. UAVs designed for close, short, and extended ranges would provide the warfighter with unprecedented real time situational awareness. The capabilities of UAVs, in concert with airborne sensor platforms such as Joint Surveillance and Target Attack Radar System (JSTARS) and Guardrail Common Sensor (GRCS), and the armed reconnaissance Comanche helicopter, as well as national assets downlinked through TENCAP and fused by the All Source Analysis System (ASAS) and the Advanced Field Artillery Tactical Data System (AFATDS), would provide the warfighter with the information needed to attack deep targets quickly and efficiently. Delays in fielding some of these capabilities will defer the warfighters capability to adequately conduct precision strike.

Precision Strike munition improvements in the mid- and far-terms will enable Force XXI to take advantage of sensor and targeting architecture advances to deliver deep fires with precision. The longer range Global Positioning System (GPS) guided ATACMS Block IA will be fielded in Fiscal Year 1998. It is programmed to be followed in Fiscal Year 2001 by ATACMS Block II carrying Brilliant Anti-Armor submunitions. The extended range ATACMS Block IIA carrying the P3I BAT is programmed to be fielded in Fiscal Year 2003.

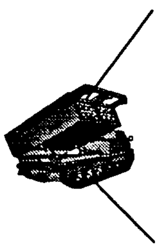
Conduct Precision Strike is rated AMBER through the near-, mid-, and far-terms. Improvements in sensors, information/intelligence distribution systems, and munitions will barely keep pace with increased demands for precision strike capabilities, particularly due to the delayed fielding of advanced munitions such as SADARM, Extended Range MLRS, and ATACMS BLK II (BAT). The limited fielding of MLRS and HIMARS systems also contributes to this **AMBER** rating.

CONDUCT PRECISION STRIKE

PERCENT FIELDED AS OF FY03

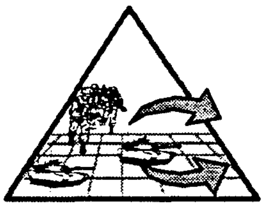






SYSTEM	$M FY97 Budget Request	Appropriation	FY97	FY98	FY99	FY00	FY01	FUE	FP1	FP2	FP3	FP4	ARMY
SHOOTERS													
SADARM	67.7	RDTE						4Q					
		Proc						FY99	NA	NA	NA	NA	7%
ATACMS BLK I	0.0	RDTE											
		Proc						FLD	NA	NA	NA	NA	100%
ATACMS BLK IA	100.7	RDTE						2Q					
		Proc						FY98	NA	NA	NA	NA	100%
ATACMS BLK II (BAT)	151.3	RDTE						3Q					
		Proc						FY01	NA	NA	NA	NA	33%
ER-MLRS (Extended Range)	36.6	RDTE						4Q					
		Proc						FY99	NA	NA	NA	NA	15%
MLRS LAUNCHER	39.5	RDTE											
		Proc						FLD	100%	100%	24%	0%	65%
MLRS Imp Launcher Mechanical System	27.8	RDTE						3Q					
		Proc						FY00	100%	56%	0%	0%	38%
MLRS Improved Fire Control System	27.0	RDTE						3Q					
		Proc						FY00	100%	56%	0%	0%	38%

RDTE
PROCUREMENT



Dominate Maneuver

Dominate the Maneuver Battle

The Army must be able to control and dominate the fight in order to achieve swift, decisive victory with minimum casualties. Modernization of the maneuver forces aims toward making them more deployable, tailorable, and lethal. Maneuver forces must be able to get to the area of operations, and once there, they must have the versatility to function in both war and MOOTW. Refer to the Dominate Maneuver charts on the next two pages.

Maneuver force improvements in range and lethality are achieved with the fielding of Javelin and Improved Target Acquisition System (ITAS) in the mid-term. Far-term fielding of the Advanced Tank Armament System (ATAS) will provide more improvements. ATAS is funded through the Advanced Technology Demonstration (ATD) phase, only.

The range extension of fire support for mounted forces is limited to Paladin and extended range MLRS rocket improvements. Crusader and the associated resupply vehicle are far-term programs.

Mounted force (M1 Abrams and M2/3 Bradley) improvements continue in the near- and mid-terms through digitization programs and Second Generation Forward Looking Infrared (FLIR) technologies to enhance situation awareness and to improve day/night and all-weather fighting capabilities.

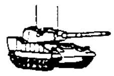
Mounted force command and control and C2-on-the-move will be enhanced by the Command and Control Vehicle (C2V). The current maneuver control system, as a component of the Army Battle Command System (ABCS), will be fielded to additional forces. The Improved Data Modem for aviation will enhance situational awareness and flexibility. GPS integration into platforms will enhance all maneuver force capabilities.

Airborne, air assault, light and SOF critical combat equipment, such as night vision and small arms systems, often have difficulty competing for funds against larger systems. Approximately 60% of these forces in the active component lack some of the equipment necessary to dominate the light/dismounted maneuver battle.

There is a modernization gap between maneuver weapons systems and counter obstacle capabilities. There will be improvement with the fielding of the M1 Breacher (Grizzly), the Heavy Assault Bridge ((Wolverine), and the Airborne Stand-off Minefield Detection System (ASTAMIDS) but the numbers are too limited to adequately support mounted force maneuvers. Countermobility improves with the fielding of Volcano and Wide Area Munition (WAM), but WAM numbers are again insufficient for even the contingency forces.

DOMINATE THE MANEUVER BATTLE

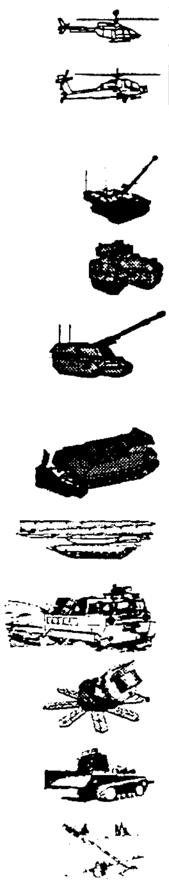
PERCENT FIELDED AS OF FY03

SYSTEM	SM FY97 Budget Request	Appropriation	FY97	FY98	FY99	FY00	FY01	FUE	FP1	FP2	FP3	FP4	ARMY
MANEUVER													
 M1A2 (Abrams) (includes M1A2 2nd GEN FLIR)	532.7	RDTE PROC						FLD	94%	0%	0%	0%	12%
 AGS (includes AGS 2nd GEN FLIR)	216.1	RDTE PROC						2Q FY99	100%	NA	64%	NA	83%
 LRAS3	8.0	RDTE Proc						3Q FY01	44%	0%	0%	0%	17%
 M2A2 and M3A2 (Bradley)	7.8	RDTE Proc						FLD	NA	70%	91%	0%	52%
 M2A2 ODS and M3A2 ODS (Bradley)	86.8	RDTE Proc						FLD	53%	30%	0%	0%	73%
 M2A3 and M3A3 (includes 2nd GEN FLIR)	231.7	RDTE PROC						4Q FY00	47%	0%	0%	0%	32%
 AMS-H	5.8	RDTE Proc						2Q FY06	0%	0%	0%	0%	0%
 ITAS	32.1	RDTE Proc						4Q FY97	84%	0%	0%	0%	
 JAVELIN	168.2	RDTE Proc						FLD	100%	50%	0%	0%	37%
 LOSAT (Tech Base)	18.7	RDTE Proc						NA	NA	NA	NA	NA	NA
 EFOG-M (Tech Base)	58.6	RDTE Proc						NA	NA	NA	NA	NA	NA
 C2V	57.9	RDTE Proc						3Q FY99	80%	0%	0%	0%	21%
 Thermal Weapon Sight	26.4	RDTE Proc						FLD	25%	0%	0%	0%	10%
 Enhanced Land Warrior	39.6	RDTE Proc						4Q FY00	52%	0%	0%	0%	11%
 120mm Mortar	7.1	RDTE Proc						FLD	100%	100%	100%	85%	96%
 M113A3 Family of Vehicles	25.5	RDTE Proc						FLD	100%	60%	30%	10%	50%
 Night Vision Goggles (includes AN/PVS-7B)	40.8	RDTE Proc						FLD	100%	100%	70%	0%	57%
 Multipurpose Individual Munition (MPIM)	14.6	RDTE Proc						4Q FY01	31%	0%	0%	0%	4%

RDTE
PROCUREMENT

DOMINATE THE MANEUVER BATTLE

PERCENT FIELDED AS OF FY03



SYSTEM	SM FY97 Budget Request	Appropriation	FY97	FY98	FY99	FY00	FY01	FUE	FP1	FP2	FP3	FP4	ARMY
AVIATION													
OH58D (Kiowa Warrior)		RDTE											
	12.4	Proc						FLD	90%	83%	73%	22%	72%
AH-64D (Longbow Apache)		RDTE											
	413.5	Proc						1Q97	40%	0%	0%	0%	16%
FIRE POWER													
M109A6 (Paladin)		RDTE											
	47.8	Proc						FLD	100%	100%	0%	0%	38%
Bradley FIST Vehicle		RDTE						1Q					
	20.9	Proc						FY00	74%	0%	0%	0%	23%
Crusader		RDTE						4Q					
	267.8	Proc						FY05	0%	0%	0%	0%	0%
MOBILITY/COUNTERMOBILITY													
Grizzly (M1 Breacher)		RDTE						4Q					
	34.5	Proc						FY01	22%	0%	0%	0%	5%
Wolverine (Heavy Aslt Bridge)		RDTE						1Q					
	58.2	Proc						FY00	54%	0%	0%	0%	10%
VOLCANO		RDTE											
	1.0	Proc						FLD	100%	100%	100%	75%	95%
Hornet (WAM)		RDTE						2Q					
	46.0	Proc						FY98	NA	NA	NA	NA	6%
Deployable Universal Combat Earthmover (DEUCE)		RDTE						4Q					
	8.0	Proc						FY98	94%	0%	0%	0%	40%
Heavy Dry Support Bridge		RDTE						1Q					
	0.0	Proc						FY03	17%	0%	0%	0%	3%

RDTE
PROCUREMENT

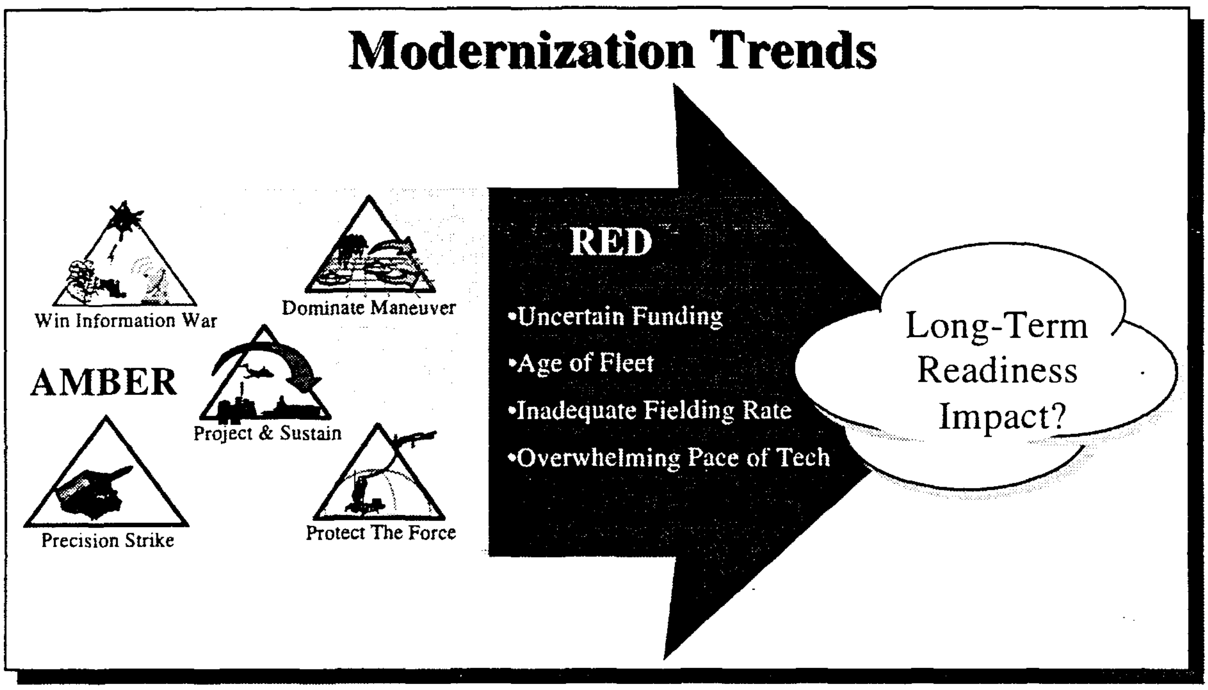
Dominate the Maneuver Battle is rated AMBER in the near-, mid-, and far-terms. An automated threat location capability is key to Force XXI maneuver force requirements. As a result of the Army's digitization efforts, fusion of data from increasing and improving battlefield sensor suites will make the common picture of the battlefield available to maneuver force commanders. Digitization also enables massing fires without massing forces, thus increasing survivability. The delayed fielding of key digital systems, such as the RAH-66 Comanche, the Long Range Advanced Scout Surveillance System, and the Crusader artillery system will limit the degree of integration achieved to dominate the maneuver battle.

Conclusion

Most readers of this Army Modernization Plan realize that there are many factors affecting modernization and the Army's ability to carry out the plan. The plan must be reviewed and revised regularly because of these factors. Uncertain and inconsistent funding is certainly one of these factors. Perhaps as acquisition reforms and efficiencies are implemented, our method of funding will also improve. Accurate funding expectations enable a greater degree of efficiency and planning in modernization program management. Decrements from anticipated or planning amounts necessitates expensive changes to contracts, increased item costs, and less efficient production methods.

Army procurement runs into the billions of dollars every year. This is matched by an equally large research and development program. We are good stewards of the taxpayers' dollars, but defense spending cuts have forced us into the quandary of making inefficient business decisions. The preferred ratio of procurement spending to research spending is 3:1. Budget cutbacks have lowered this ratio to almost 1:1. As a result Army modernization has become anemic.

Delays in fielding, and fielding to only part of the total force, also result in an older average age for equipment fleets than anticipated. Older equipment, in addition to lacking the operational capability of modernized fleets, can be more expensive to maintain. This requires allocation of more money for operations and maintenance of the fleets and thus makes even fewer resources available for modernization; further compounding the problem.



Today's modernization is tomorrow's readiness, but readiness is a balancing act. Anemic research, development, and acquisition (RDA) funding today puts us on the razor's edge of tomorrow's readiness. Too many negative factors are hindering the Army's modernization program. Funding remains uncertain. **We cannot raid force structure or readiness to pay for modernization**, nor can we buy what we need with existing POM dollars. Over the next five years (FY 97-01) the Army requires **additional RDA funding**, while retaining sufficient TOA to maintain force structure and readiness. But this doesn't tell the entire story. **Existing procurement lines are already so stretched out that, even fully funded, they put the future modernized force at risk.**

When we say the Crusader program is "fully funded" (Annex E), we measure that funding against a ten year procurement cycle that only fields the active force. When we say the Comanche provides us a "GREEN" Reconnaissance and Security rating (Annex J), we mean it in the context of the Contingency Force only, a fraction of the Total Army. If it takes twenty years to field the M1 tank family at current fielding rates, how modern is our tank force in that twentieth year?

We have done the best we can with the resources provided, trying to balance current and future readiness. The Army will redouble its efforts to streamline the procurement process, and plow generated savings into more procurement. Still, **our overall modernization assessment is AMBER, headed to RED.** Beside the need for additional RDA funding over the POM years, we also require **funding stability** from one budget year to the next to manage our investments with confidence, and to achieve efficiencies of scale in our procurements. Otherwise, **Army modernization will continue to be anemic**: fielding of key weapons systems will be dragged well into the second decade of the 21st Century, thereby degrading the ability of our warfighting CINC's to fight a single MRC. We risk sending our soldiers into the next war without the technological overmatch required to obtain decisive victory with minimum casualties. Army modernization is the cornerstone of the new strategic conventional triad. Sea and air power provide important deployment and operational support, but only the Army can achieve ***land force dominance***, the key to military decision.

Bottom Line

- We are AMBER , headed to **RED**
- We have done the best we can with the resources provided ... balancing near and future readiness
- Modernization continues to be **"anemic"**
  - Fielding of key weapons systems dragged well into second decade of the 21st Century
  - CINC's capability to fight an MRC degraded could result in unacceptably high risk
- We need a stable flow of **additional Army TOA** funds to increase modernization while maintaining force structure and readiness

ANNEX A

FORCE STRUCTURE

SECTION 1

INTRODUCTION

> "Changing to meet the challenges of today...tomorrow...and the 21st Century." GEN Dennis J. Reimer, Chief of Staff, Army

Force Structure Overview

Global security in today's environment remains complex and full of unknowns. No longer are we confronted with "a clear and present danger." Instead, the Army faces a spectrum of perhaps less dangerous but more unpredictable threats.

Today's Army continues to undergo its most significant change since the end of World War II. It has been transformed from a forward deployed Cold War Army-- to a power projection Army. It has limited forward deployments and is stationed mainly in the continental United States.

The Army's primary mission remains to fight and win the Nation's wars. As outlined in the National Military Strategy, the most demanding of the Army's potential missions is fighting two near-simultaneous major regional contingencies. However, the Army is also confronted with new and dangerous challenges, such as regional conflicts involving the use of advanced conventional weapons, ballistic missiles, and chemical and biological weapons. Simultaneously, the Army will conduct peace keeping, peace enforcement, and military operations other than war.

The Active Army has been directed to reach an objective end strength of 495,000 by the end of FY 96. That number will provide a force structure of four corps and ten divisions (6 heavy, 2 light, 1 airborne, and 1 air assault). The divisions will be complemented by the Ranger Regiment, a Special Operations Aviation Regiment, 5 Special Forces Groups, a PSYOP group, a Civil Affairs Battalion, one Special Operations Signal Battalion, and one Special Operations Support Battalion. In addition to the combat force, the Active Army will also consist of the institutional part of the Army which is responsible for training, generating, and sustaining the force in both peace and war. Active Component forces are backed by combat, combat support, and combat service support units in the Reserve Component (RC). Those forces are also being reduced and will be at a 575,000 end strength by end of FY98.

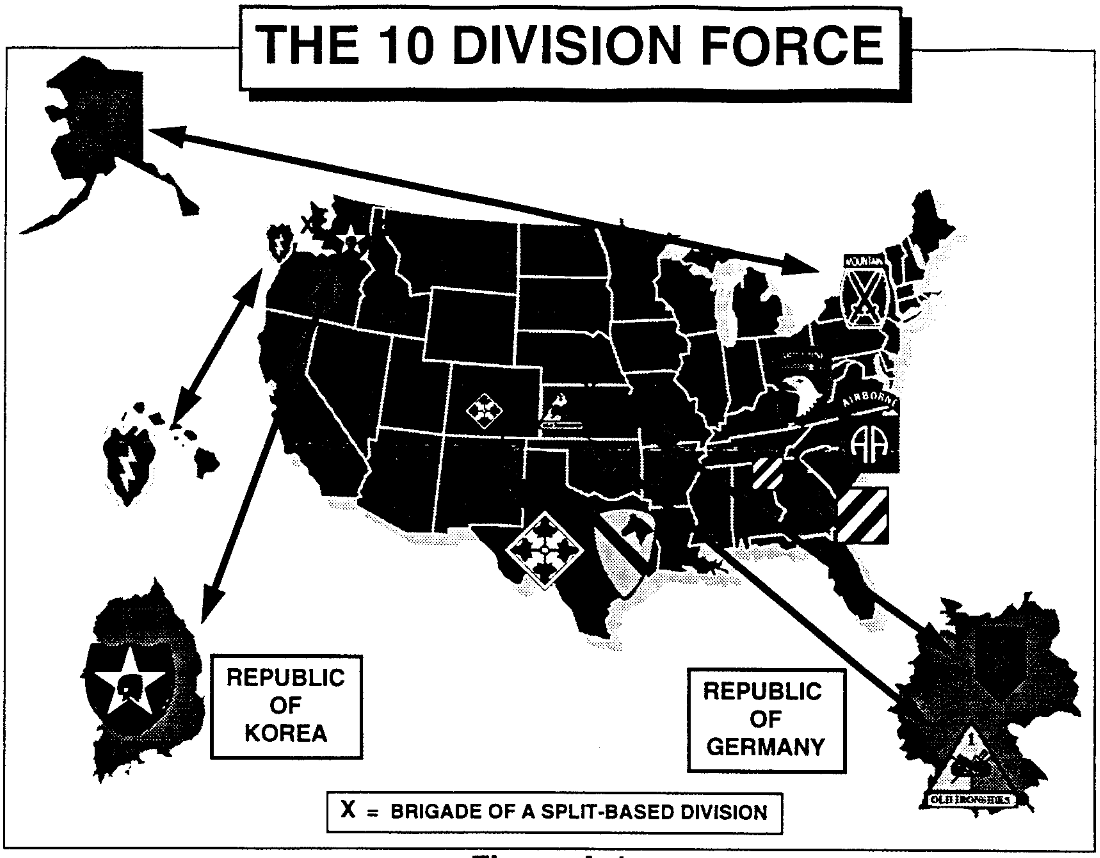


Figure A-1

We must work hard at our reengineering efforts to help fund future modernization needs while maintaining core competencies. The changes we make in peacetime must transition to war. They must serve us on the battlefield.

Structure and the Force XXI Campaign Plan

> "I want to make sure that as we continue to live in this changing world, a world of constrained resources, that we apply them as effectively as we possibly can."
> GEN Reimer

The 1996 force provides the point of departure for Force XXI which will set the azimuth for modernization of the Army into the early 21st Century. The Army's senior leadership is convinced that Force XXI is the right course of action to meet the Army's needs for the future. Force XXI recognizes that warfare will change and that America's Army must stay ahead of that change. Force XXI is the manifestation of our process for managing institutional change and exploiting the revolution in information technology to reengineer our future operating forces.

The Army of the 21st Century will be more lethal, mobile, and survivable. It will be knowledge-based, modular, and tailorable, enabling it to respond efficiently and effectively to the challenges of the post-Cold War security environment. The enhanced capabilities emanating from the application of information and digital technology will influence and change the doctrine and the design of the future force.

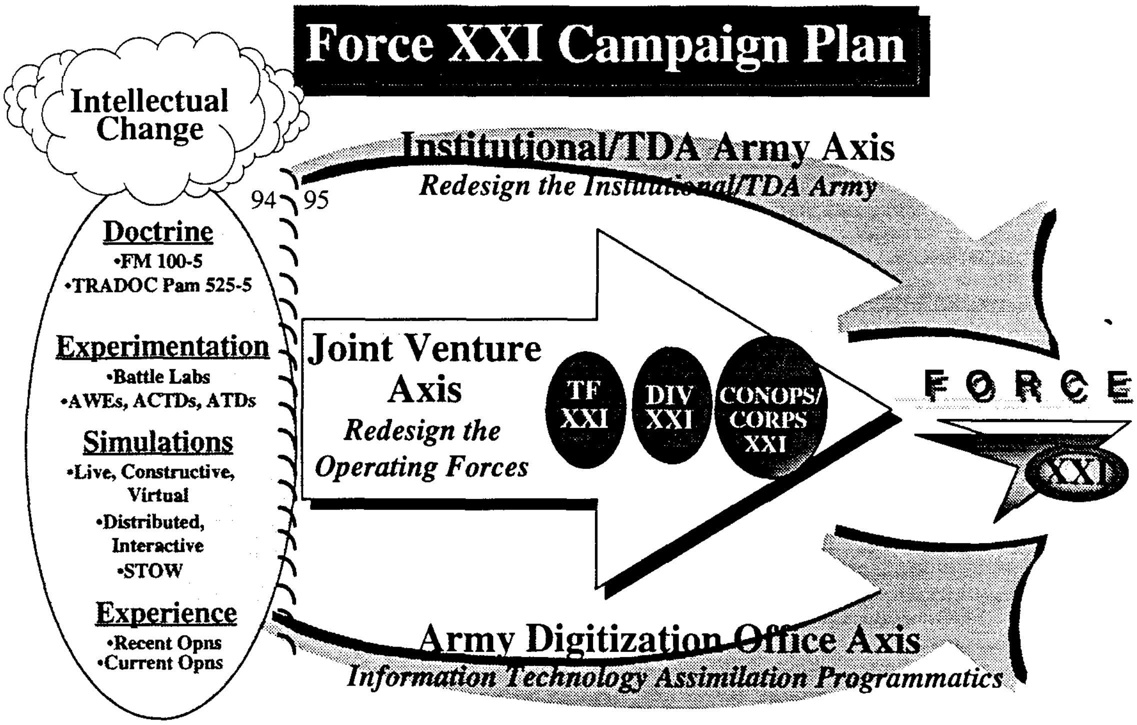


Figure A-2

Force XXI will enhance our capability to task organize forces by mutually interfacing command and control, communications, and intelligence means. Units will be both modular and more adaptable. The Army will provide digital connectivity between the appropriate Active and Reserve Component units ensuring the balance of combat, combat support, and combat service support units required to support joint and multinational operations.

The Army of the 21st Century must also accommodate the constraints imposed by decreasing budgets and reductions in manpower. More importantly, Force XXI must harness current and emerging technologies which offer quantum advances in the operational capabilities for the land force. Those technologies will enable the Army to generate greater combat power with the same or lesser end strength. Projecting power from the United States, the Army will provide land forces to the Joint Forces with the appropriate lethality, organizational capability, and versatility to respond to an increasingly broad range of missions.

To be prepared for the future, we have already begun planning and preparation. The Army's redesign effort to find efficiencies in all areas, particularly training and logistical support, is well on its way and can be found in the three axes of Force XXI.

The main effort of the Force XXI Campaign Plan is the Joint Venture Axis. That axis is focused on the redesign of the Army's operational forces. The Joint Venture effort is a partnership among all the major commands and the Army Staff. The Commander, United States Army Training and Doctrine Command, has the responsibility for overseeing and coordinating this effort. The initial focus of Joint Venture is the redesign of the division.

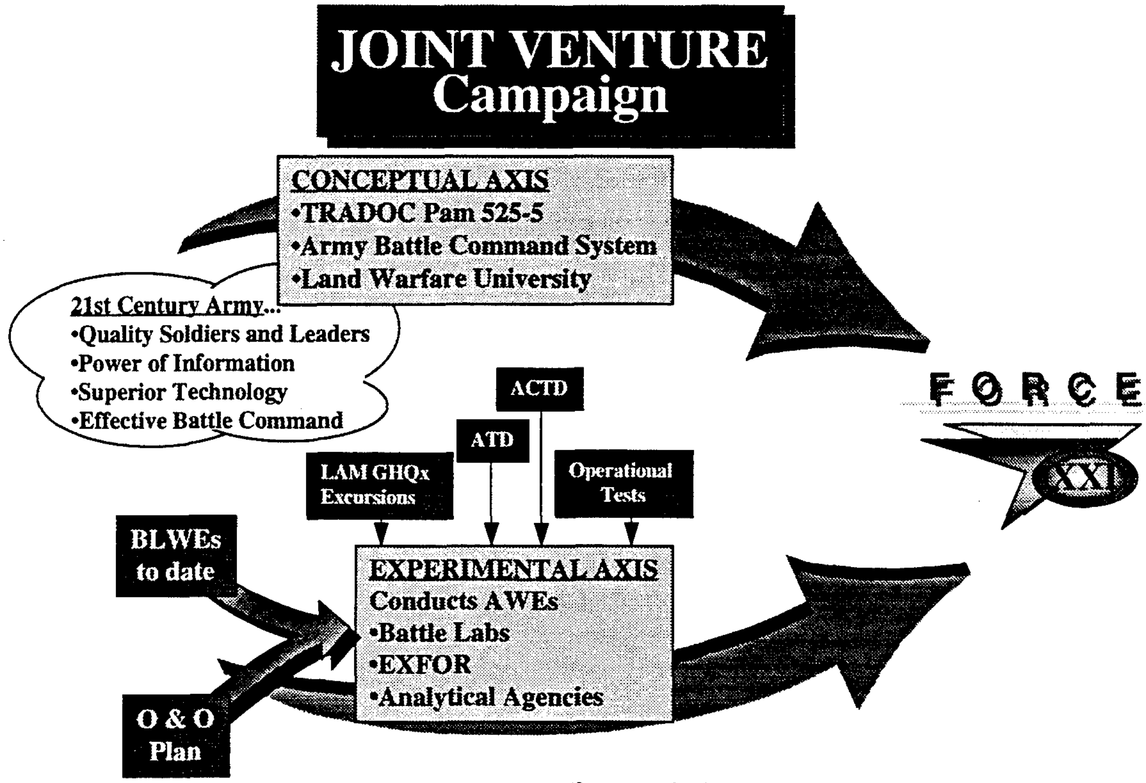


Figure A-3

The design effort uses an interactive and linked series of Advanced Warfighting Experiments (AWE), Advanced Technology Demonstrations (ATD), and Advanced Concept Technology Demonstrations (ACTD) to provide insights into the critical decisions the Army must make about future organizations, equipment, training, and doctrine. These experiments will prompt interim and final design decisions, and help design future experiments.

The second axis is led by the Army's Vice Chief of Staff to reengineer the Institutional/TDA Army from the factory to the schoolhouse. This is the part of the Army responsible for generating and sustaining the operational forces. It will divest unnecessary force structure while retaining the ability to perform the Army's Title 10 functions.

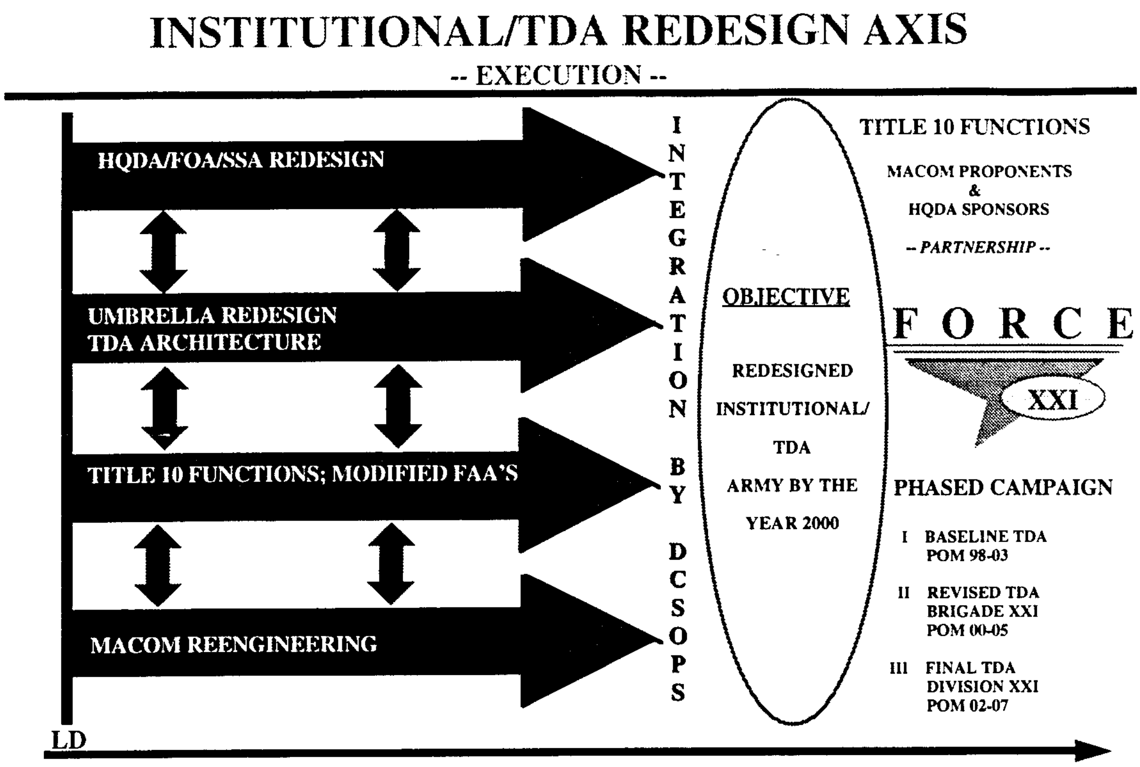


Figure A-4

The reengineering of the Institutional/TDA Army, a vital part of the top-to- bottom, front-to-rear redefinition, will be conducted in three phases in concert with the POM cycles beginning with POM 98-03. This reengineering effort involves four simultaneous and interrelated efforts:

- Redesign of Headquarters, Department of the Army (HQDA). This effort also includes its Field Operating Agencies (FOAs) and Staff Support Activities (SSA) which will be part of the initial redesign phase.

- Umbrella Redesign. An effort to integrate the results of the various FAAs and interface with the overall redesign and digitization of the warfighting Army.

- The Functional Area Assessment (FAA) Process. A complementary forum to develop and process redesign issues for Service Title 10 functions.

- MACOM Reengineering. The internal reengineering efforts of the major commands (MACOMS, i.e., TRADOC, FORSCOM, AMC, etc.) is already in progress.

The four capabilities of the Institutional/ TDA Axis redesign are:

1. Developing the force--recruiting, training, equipping;

2. Generating the force--mixing, projecting, supporting;

3. Sustaining the force--supplying, servicing, maintaining; and

4. Directing, acquiring and resourcing the force--organizing, balancing, planning.

When completed, this axis will produce a seamless, connectivity between the institutional and operational forces.

The third and final axis is the Army Digitization Office (ADO). It provides the management structure to ensure the acquisition process develops a digitized force capable of exploiting the value of the information age. Future architectures will be based upon a robust, versatile concept of information based battle command. This is an extremely challenging requirement due to the technical complexity of attempting to integrate fielded platforms and systems, which use older technology and software languages, with new and future systems, which will use software that may not be written yet. The ADO has the authority to coordinate actions of the acquisition officials integrating user requirements. To do this, ADO must be able to react quickly, invest smartly, and maintain flexibility to accept change and grow.

Reserve Components (RC)

> "The United States Army cannot really go to war without the Reserve Component. We are truly America's Army. We have to be a seamless blend." GEN Reimer

Since 1991, the Army has been restructuring to meet the changing needs of a post Cold War world. The aim has been to minimize risk and costs while simultaneously maximizing the respective capabilities of the Army Reserve and the Army National Guard. The decision was made to do so by adapting the functions and structures of both reserve components and assigning missions which leveraged their traditional strengths. The AC/RC Senior Leaders' Offsite Agreement focused the combat mission within the National Guard and the combat service support mission with the Army Reserve.

The National Guard will benefit from the overall agreement by becoming a smaller, more balanced force. That force will give the National Guard both the ability to support the warfight and to respond to domestic emergencies. They gain high priority, high profile, combat service support units that directly support two nearly simultaneous major regional conflict scenarios.

The Army Reserve will also benefit from the overall agreement by gaining 58 Contingency Force Pool units from the ARNG. The Army Reserve will transfer the requirement for approximately 4,600 utility rotary wing aviation force structure spaces, and most of their remaining combat units to the National Guard. The Army Reserve will keep two modernized AH-64 battalions, three CH-47 companies and all of their current fixed wing assets.

In addition, increasing the level of Full Time Support (FTS) for reserve component units is a high priority. The shortage of adequate FTS authorizations is a primary factor inhibiting higher readiness levels. The Army is complying with directed guidance to increase the level of FTS as a percentage of RC end strength. FTS is currently projected to be 10.4% for the USAR and 13.1% for the ARNG.

SHAPING THE ARMY

(INCLUDING POM 97-01 END STRENGTH DATA)

ACTUAL DATA (FY89–FY94) | PROGRAM DATA (FY95 onward)

FY89	FY90	FY91	FY92	FY93	FY94	FY95
770K AC	732K AC	710K AC	611K AC	572K AC	541K AC	510K AC
776K RC	743K RC	745K RC	729K RC	686K RC	657K RC	629K RC
ARNG- 457	ARNG- 444	ARNG- 446	ARNG- 426	ARNG- 410	ARNG- 397	ARNG- 387
USAR- 319	USAR- 299	USAR- 299	USAR- 303	USAR- 276	USAR- 260	USAR- 242
5 CORPS	5 CORPS	5 CORPS	4 CORPS	4 CORPS	4 CORPS	4 CORPS
18 AC DIV	18 AC DIV	18 AC DIV	14 AC DIV	14 AC DIV	12 AC DIV	12 AC DIV
10 RC DIV	10 RC DIV	10 RC DIV	10 RC DIV	8 RC DIV	8 RC DIV	8 RC DIV
403K CIVs	380K CIVs	365K CIVs	334K CIVs	294K CIVs	280K CIVs	271K CIVs
			INACTIVATED: VII CORPS 3 AD, 8 ID, 9 ID, 2 AD		INACTIVATED: 6 ID 7 ID	

FY96	FY97	FY98	FY99	FY00	FY01	FY 89-01
495K AC	495K AC	*495K AC	*495K AC	*495K AC	*495K AC	CUMULATIVE REDUCTIONS
603K RC	582K RC	*575K RC	*575K RC	*575K RC	*575K RC	AC : -275K (-36%)
ARNG- 373	ARNG- 367	ARNG- 367 ARNG FSA - 405	ARNG- 367 ARNG FSA - 405	ARNG- 367 ARNG FSA - 405	ARNG- 367 ARNG FSA - 405	RC : -201K (-26%)
USAR- 230	USAR- 215	USAR- 208	USAR- 208	USAR- 208	USAR- 208	-1 CORPS
4 CORPS	4 CORPS	4 CORPS	4 CORPS	4 CORPS	4 CORPS	-8 AC DIV
10 AC DIV	10 AC DIV	10 AC DIV	10 AC DIV	10 AC DIV	10 AC DIV	-2 RC DIV
8 RC DIV	8 RC DIV	8 RC DIV	8 RC DIV	8 RC DIV	8 RC DIV	
259K CIVs	250K CIVs	245K CIVs	240K CIVs	236K CIVs	233K CIVs	CIVs : -170K (-42%)
INACTIVATED: 2 AD 24 ID						

* Under Review

Figure A-5

Civilian Personnel

Department of the Army Civilians (DAC) are major contributors to the Army's mission. Civilians comprise approximately 20% of the overall work force (AC and RC) and fill vital positions in support of operations. Most importantly, they provide stability and institutional knowledge, regardless of what organizational level they are assigned, from senior management to administrative support. This is particularly true in that portion of the work force which supports depot maintenance, supply, acquisition, training, medical care, research and development, and facilities operations.

The Army's civilian strength level will be further reduced throughout this decade by over 170,000 personnel. This reduction reflects reduced funding, new force structure designs, efficiencies through consolidations, realignments, functional transfers, mission support requirements, FTE limitation, and results of the base closure program. The DAC strength levels are a dependent variable related to the following factors: force structure changes, force management, funded workload, and Congressional ceilings and floors.

In view of the force structure reductions in both the AC and RC, it is logical to assume that the civilian force structure will also be reduced accordingly. However, it is important to understand that in a CONUS-based, Force Projection Army, the overall infrastructure support base is primarily manned and operated by civilian personnel. This is of particular importance given that the overall tempo of Army operational deployments have been increasing, not decreasing, since the end of the Cold War. Further civilian strength reductions need to be measured on changes in roles and missions and the National Military Strategy. The trends of the overall force structure are displayed in Figure A-6 and reflect the Department of the Army plan to meet policy guidance and directions.

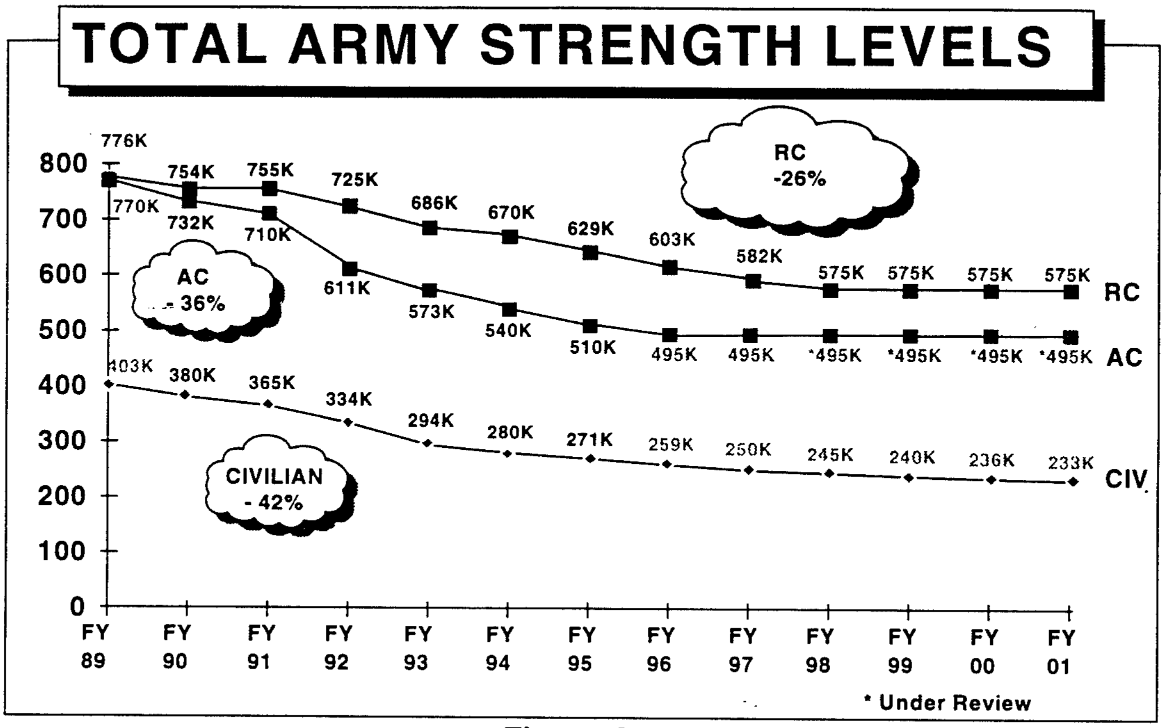


Figure A-6

SECTION 2

CONCLUSION

> "We must find the best ways to organize, train, and equip our forces to exploit our competitive advantages - quality people and advanced technology." GEN Reimer

Future U.S. Army force structure is being designed to support the National Military Strategy. That force structure must be designed to accomplish the missions, and adopt the new weapons - technology - techniques to support the requirements and new dangers of our changing times. To meet these future requirements, the Army is developing both the means and the process for achieving success and ensuring its fundamental mission of winning the Nation's wars, quickly, decisively, and with minimum casualties. The procurement of overmatching technology, embedded in modernized systems is critical to future successes on tomorrow's battlefields. Force XXI is a recognition that warfare will change and that America's Army must stay ahead of that change. We will be equipped with the most modern weapons and equipment the country can provide. We will be trained and ready - equipped to defend the Nation's interests and win its wars in the 21st Century.

ANNEX B

COMBAT MANEUVER

SECTION 1

INTRODUCTION

> *'I went into Kuwait with 39 tanks. After 37 days of bombing, I still had 32. After 20 minutes against the Second Armored Cavalry Regiment, I had none.'*
> *Iraqi Battalion Commander, 1991*

Scope. This Annex addresses the Army's planned modernization of its combat maneuver forces to meet the objectives of Force XXI. As used in this annex, combat maneuver forces include Mounted; Close Combat - Light; Engineer and Mine Warfare; Soldier Systems; and Aviation (see Annex J for discussion of Aviation systems). Discussion of each will address the combat maneuver roles and requirements in the Army's modernization objectives: Project and Sustain the Force, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate Maneuver.

Mounted Force. Designed to ensure decisive victory quickly with minimum loss of life and materiel, the mounted force is being modernized to enhance its capabilities to be operationally/strategically deployable, early entry capable, agile, tailorable and survivable as part of any joint or multinational force in any military operation.

Close Combat - Light. These forces include Light Forces that participate in and support non-mechanized operations, including Rangers and Special Forces. Designed to be the principal quick reaction, early entry and lead force in almost any forced entry operation, especially in close terrain and during periods of limited visibility. The light force is being modernized to enhance its capabilities to be lethal, versatile, responsive, deployable, and survivable.

Engineer & Mine Warfare. Engineer Forces include combat, construction and topographic units that support both mounted and light forces across the entire operational continuum. Designed to be a primary combat multiplier, the engineer force is being modernized to enhance its capabilities to support Army modernization objectives. Topographic engineering development in the future will be closely tied to terrain data digitization which, in turn, will affect future battlefield visualization command and control systems.

Soldier System. The Soldier System is an integrated system of systems built around the individual soldier and everything that he wears, consumes or carries for individual use in a tactical environment. Modernizing soldier equipment is a continuous, evolutionary process designed to integrate, package, and provide synergy to the individual soldier's lethality, command and control, mobility, survivability, and sustainment capabilities on the 21st Century digitized battlefield.

Modernization Strategy. The combat maneuver modernization strategy consists of five tenets:

- Modernize "first to fight" units with the most capable equipment;
- Cascade equipment to the rest of the force;
- Modernize prepositioned sets concurrent with contingency forces;
- Ensure soldiers of the entire force have quality equipment; and
- Synchronize modernization over time and across the entire force.

Warfighting Concept

Mounted Forces: Dominate the Maneuver Battle. To achieve quick, decisive victory, mounted forces must be capable of controlling and dominating the battle. They must be able to get to the fight quickly and once there, maneuver and inflict lethal results in high tempo operations throughout the depth of the battlefield, physically and psychologically destroying the enemy. Mounted Force synchronization is not limited to M1A2 Abrams tanks and M2A3 Bradley Infantry Fighting vehicles, but also includes other integral components such as Paladin, Apache, Long Range Advanced Scout Surveillance System, the Grizzly, the Wolverine, and future systems such as Comanche and Crusader. To ensure our Mounted Forces maintain the decisive edge in combat superiority, we must leverage technology in five critical areas:

Increase target acquisition. Increase all weather, day/night target acquisition and Probability of Kill capabilities, while optimizing synchronization of supporting fires.

Digitize the battlefield. Provide commanders with the capabilities to acquire and analyze critical information and apply this understanding, and to integrate, synchronize, and focus all warfighting and battlefield operating systems to their maximum potential.

Increase lethality. Facilitate situational awareness and target hand-off within the combined arms task force to maximize combat power, kill more targets, and reduce potential for fratricide.

Increase survivability. Optimize survivability via: use of new materials, safety enhancements, leadership training, and improved countermeasures.

Improve force structure. Develop and implement the optimum force design for mounted forces of the future.

Close Combat - Light Forces: Provide maximum flexibility anywhere in the world, across the entire operational spectrum. When deterrence fails, Light Forces are capable of conducting forced entry operations by their strategic response capability, considerable tactical versatility, and firepower; thereby dominating battle space by high-tempo, around-the-clock, all-weather air-ground operations. Light Forces establish the requisite conditions for victory by follow-on heavier forces or terminate conflicts before heavy forces are needed. Light Forces are the "option of choice" for Peacetime Engagement and Conflict Prevention. To ensure our Close Combat - Light Forces maintain an overmatch against potential enemies, we must leverage technology in five key areas:

Integrate digitization. Digitizing Light Forces permits information transfer between deciders, shooters, and supporters -- both ground and air platforms -- permitting independent actions because all have situational awareness and a common view of what needs to be done to seize the initiative from the enemy.

Provide smaller, lighter, precision firepower. Light Force firepower, including direct and indirect precision fires, must overmatch enemy capabilities in range, target acquisition, accuracy, and lethality. Light Forces need smaller, lighter weapons and a reduced variety of munitions to ease logistical demands. They need munitions which can be used against a wide array of targets. These capabilities give Light Forces the ability to operate against a wider spectrum of hostile forces.

Facilitate mobility and maneuver. Light Forces must possess equipment made from strong lightweight materials and cargo vehicles able to load, transport, and off-load materials faster. This increases the tempo of light operations, and enhances their all weather, all terrain capability.

Maximize leadership and training. Light Forces use advanced distributed simulations, microprocessors, and information technology for timely unit and leader training, mission planning, and rehearsals. Light Forces at diverse locations train together through virtual, constructive, and live simulations.

Increase protection. Light Forces use unmanned aerial and ground vehicles for surveillance, advanced night vision equipment, and combat identification technologies to reduce friendly casualties by reducing the duration of operations.

Engineers & Mine Warfare: Provide mobility, countermobility, survivability, sustainment and topographic engineer support. Engineers contribute to operations by protecting and supporting early deploying forces, by supporting forces to gain dominance of extended battle space, and through production of digital terrain analysis and topographic products for maneuver units. Digital terrain databases will provide the foundation of future 3D battlefield visualization technology for command and control. Engineer missions range from peacetime engagement to conflict prevention, to war. Engineers must leverage technology in four key areas:

Peacetime engagement. Increase capabilities to perform engineer missions in nation-assistance, infrastructure development, facilities management, and disaster relief operations.

Conflict prevention. Increase capabilities to engage in countermine, demolition, survivability support, barrier construction, and other build-up missions to demonstrate the resolve and will of U.S. forces.

Combat support. Increase capabilities to perform in war. Engineers maintain the mobility of the maneuver force throughout the depth of the battlefield with the Grizzly (the mounted breacher), Wolverine (heavy assault bridge), the Heavy Dry Support Bridge, the Improved Ribbon Bridge, and standoff mine detection and breaching systems. Engineers apply countermobility throughout the depth of the battle through the use of scatterable mine systems such as VOLCANO, the Modular Pack Mine System, and the Wide Area Munition. During early entry operations engineers construct/repair seaports and airfields, support logistics-over-the-shore operations, construct/repair/rehabilitate strategic and operational airfields, construct/repair/maintain roads, and construct infrastructure facilities -- all to allow joint forces to perform continuous operations after deploying rapidly.

Topographic support. Increase topographic support across the operational spectrum. Engineers support Force Projection/early entry operations by performing terrain reconnaissance and analysis through observation, presentation of digital terrain data, and exploitation of multispectral imagery. They also provide terrain information products for maneuver units.

Soldier System: Improve the combat effectiveness and survivability of the individual soldier. 21st Century soldiers must prepare for and execute missions in a variety of multi-dimensional operations. The Soldier System is the overarching umbrella that enhances all capabilities within every system of combat maneuver (Land Warrior, Mounted Warrior, and Air Warrior). There are five significant capabilities needed by every soldier to ensure that we overmatch enemy capabilities in:

Lethality. Increase the soldier's capability to detect, acquire, identify, locate, engage, and defeat threat soldiers and their equipment at greater ranges, with greater accuracy, in all weather and visibility conditions.

Command and control. Increase the leader's ability to direct, coordinate, and control personnel, weapons, equipment, and information. Focus procedures necessary to assimilate and disseminate through digitization of battlefield systems to win the information war.

Survivability. Increase the soldier's capability for self-protection against threat weapon effects and environmental conditions through improved situational awareness, reduced signatures, and improved protection.

Sustainment. Better capability to sustain soldiers in a tactical environment. Sustaining a soldier means supplying with those items fundamental to survival and critical to overall effectiveness, performance, and mission accomplishment.

Mobility. Deploy and move the soldier about the battlefield to better fulfill assigned missions. Provide soldiers with improved situational awareness, navigation/location support, improved night vision, better load carrying capability, and reduced/limited weight.

SECTION 2

CURRENT PROGRAM ASSESSMENT

Introduction

Development and procurement of modern combat maneuver systems are generally proceeding as programmed. Infantry and Armor fighting vehicles continue to receive support. Modernization of equipment used by light forces, as well as all soldiers, continues with the soldier modernization programs. Engineer systems, however, have not received the high priority required to maintain parallel modernization. Overall, the development and procurement of modern combat systems are able to keep the Army within a tiered modernization program.

A key objective is to better synchronize the modernization of our systems and capabilities. That is to field Infantry, Armor, and Engineer equipment as modernization "packages" within a more limited, specified period of time. The result would be totally modernized battalions, brigades, and divisions in shorter periods of time to better leverage each system's supporting capabilities.

Mounted Forces

While Mounted Force modernization continues to improve throughout the near- and far-terms, several important systems have been postponed, stretched out and/or reduced in quantity due to reductions in funding. This means an unequally modernized Contingency Corps, *and the cascading of their equipment to modernize the rest of Force Packages 2 and 3.* The result: **major** differences in levels of modernization among the various Force Packages. The introduction of M1A2 and M2/3A3 will improve survivability, lethality, and situational awareness through faster access to intelligence, enhanced decision making, and improved dissemination of orders and graphics. Fielding of these systems will extend for a number of years, creating unequal capabilities within our "first to fight" units, and exacerbating the problematic issues associated with creating a seamless digitized architecture for warfighting.

A significant shortfall in Mounted Force modernization is in the area of scouts. The Up-Armored HMMWV is an interim solution that will, in the short term, meet the scout's minimum requirements, but will have a shorter life cycle than the objective system. The Long Range Scout Surveillance System (LRAS3) provides 2nd Generation Forward Looking Infrared Radar (FLIR) capabilities and is the critical near-term improvement that will make the scout Up-Armored HMMWV an effective interim solution. Without these improvements, our current scout vehicle is inadequate and will remain so until the Future Scout Vehicle is fielded. This shortcoming impacts significantly on the maneuver commander's ability to see the battlefield, validate and confirm intelligence information quickly, and create the tempo needed to rapidly execute the mounted battle.

MOUNTED FORCES PROGRAM ASSESSMENT				
MISSION/CAPABILITY	SYSTEMS	NEAR-TERM FY 96-98	MID-TERM FY 99-01	FAR-TERM FY 02-11
MOUNTED FORCES	ABRAMS M1A2	AMBER	AMBER	AMBER
	ABRAMS SYSTEMS ENHANCEMENT PROGRAM	AMBER	AMBER	AMBER
	ABRAMS M1A3	RED	RED	RED
	BRADLEY ODS	AMBER	AMBER	AMBER
	BRADLEY A3	AMBER	AMBER	AMBER
	M113 FAMILY OF VEHICLES	AMBER	AMBER	AMBER
CAVALRY FORCES	ARMORED GUN SYSTEM	AMBER	AMBER	GREEN
	SCOUT HMMWV	AMBER	AMBER	GREEN
	LONG RANGE SCOUT SURVEILLANCE SYSTEM	RED	RED	RED
	FUTURE SCOUT VEHICLE	RED	RED	RED
LETHALITY / FIREPOWER / SURVIVABILITY	ADVANCED TANK ARMAMENT SYSTEM	AMBER	AMBER	AMBER
	ARMAMENT ENHANCEMENT INITIATIVE	AMBER	AMBER	AMBER
	IMPROVED MORTAR BALLISTIC COMPUTER	AMBER	AMBER	AMBER
	M1064 MORTAR CARRIER	AMBER	AMBER	AMBER
	SUITE OF SURVIVABILITY ENHANCEMENT SENSORS	RED	RED	RED
MOBILITY	IMPROVED RECOVERY VEHICLE	RED	RED	RED
	GRIZZLY	RED	AMBER	AMBER
	WOLVERINE	RED	AMBER	AMBER
HTI	GATEWAYS	AMBER	GREEN	GREEN
	DIGITIZED MORTAR FIRE CONTROL SYSTEM	AMBER	AMBER	GREEN

Figure B-1

Mounted Maneuver Forces. Mounted maneuver forces are heavy units equipped with tanks, infantry fighting vehicles, and supporting arms (air defense, artillery, and engineers) that have like mobility.

Abrams Main Battle Tank (M1A2). The M1A2 is an integral component of the Army's strategy to digitize the battlefield, own the night and increase effectiveness through horizontal technology insertion. Improvements over M1A1 include Commander's Independent Thermal Viewer (CITV), Position Navigation System (POS/NAV), Improved Armor, Improved Commander's Weapon Station, 2nd Generation FLIR, and Intervehicular Information System (IVIS). The M1A2 Abrams is the Army's first digitized ground combat maneuver system, and is positioned for significant capability improvements commensurate with Army progress towards total battlefield digitization. The Abrams upgrade program consists of two phases:

- Phase I (FY91-FY95) procures 4 pilot vehicles and 206 upgrades and partially fields one division of the CONUS Contingency Force (CCF).

- Phase II (FY96-completion) provides 792 tanks which completes the CONUS Contingency Force and a portion of the Forward Deployed Divisions by FY07. AMBER through the far-term.

Abrams Systems Enhancement Program (SEP). The Abrams SEP will integrate the Abrams tank into the common operating environment of the future digitized battlefield, enabling the tank to upgrade its digitization command and control software and hardware concurrent with Army efforts. SEP will make the M1A2 a better tank, integrating 2nd Generation FLIR, thermal management (environmental cooling / thermal touch reduction), power management (Under Armor Auxiliary Power Unit), and a more robust processing system. The M1A2SE will retain the ability to overmatch any tank it encounters and integrate it more fully into the Force XXI digitization environment. Retrofit of existing M1A2s with the SEP package will provide all armor units equipped with M1A2s the sustained ability to maintain dominance. M1A2SE will field to FP1 units beginning in FY00, with completion in FY05. Concurrently, the M1A2SE retrofit fielding will begin in FY02, completing fielding to select forward deployed units in FY06. The SEP program is **AMBER** through the far-term due to the length of time required to complete fielding, with the associated risk to power projection.

Abrams Upgrade, M1A3. The next upgrade of the Abrams Tank, the M1A3, will sustain lethality overmatch while increasing its survivability on a more lethal battlefield. The M1A3 will incorporate the most advanced fire control of any tank, combined with the punch needed to defeat any tank it would encounter. The M1A3 will be the last upgrade of the Abrams line, allowing the Army to retain maneuver dominance on the battlefield in the near future, while positioning tank development for the Future Main Battle Tank (FMBT), a leap ahead in technology. RDTE for the M1A3 will begin in FY02, with procurement tentatively programmed for FY05. M1A3 will be fielded to FP1 units beginning in FY07 and will complete fielding to forward deployed units in FY15. **RED** through the far-term due to length of time to fielding.

Bradley Fighting Vehicle Upgrade (M2/3A2 ODS). The M2/3 ODS (Operation Desert Storm) Bradley upgrade incorporates several important technological advances that present an objective balance between near-and far-term modernization of the Bradley Fleet. Improvements in the ODS include an Appliquéd Digitization capability, Eyesafe Laser Range Finder (ELRF), Global Positioning System (GPS) Navigation System, Driver's Viewer Enhancer (DVE), Restowage, and Missile Countermeasure Device (MCD). The Battlefield Combat Identification System (BCIS) may additionally be incorporated, based on results of a Task Force XXI Army Warfighting Experiment to be conducted in February 96. ODS Bradley will go to Force Package 1 commencing FY96 and will complete Force Package 3 active component units in FY03. There will be a total of 1,423 ODS Bradley upgrades; **AMBER** through the far-term.

Bradley Fighting Vehicle Upgrade (M2/3A3). The M2/3A3 Bradley upgrade will maintain task force compatibility with the M1A2 Abrams and achieve technology overmatch on the digitized battlefield. (See Annex F for a discussion of the Bradley Stinger Fighting Vehicle.) In addition to all improvements listed under the ODS Bradley, the A3 will gain significant lethality through a 2nd Generation FLIR, a commander's independent FLIR, and a ballistic fire control system. The First Unit Equipped will be in FY00. The total program procures 1,602 A3 Bradley upgrades for the CONUS Contingency Corps, Korea, selected prepositioned sets, and the training base; **AMBER** through the far-term.

M113 Family of Vehicles (FOV) Upgrade Program. The Reliability Improvement Selected Equipment (RISE) Program was designed to improve the mobility and survivability of the M113A2 Armored Personnel carrier. Improvements include: a 275 horsepower engine and an upgraded transmission, externally mounted fuel tanks and an improved steering system. The Army intends to apply a RISE power upgrade to the remaining vehicles in Force Package 1 and 2. The total Army requirement for M113A3 in all force packages is 19,213; **AMBER.**

Cavalry Forces

Armored Gun System (AGS) (M8). The AGS will be employed in Light Armor Battalions and the Light Armored Cavalry Regiment, providing the Army with a dimension of mounted forces capable of early entry in any theater, under all conditions. Capable of Low Velocity Air Drop (LVAD), the AGS can be air dropped into a theater of operations, providing a capability to conduct mounted operations in support of the airhead. The AGS will give early entry forces sufficient combat power to paralyze any opponent through the depth of operations. AGS will be fielded to FP1 units in FY99 (First Unit Equipped), and will complete fielding in FY05. **AMBER** through the mid-term, based on the lack of a fielded system to the CCF until the mid- to far-term. CCF units will continue to operate with less capable systems until AGS fielding, increasing the degree of risk to mission and soldiers.

Scout Up-Armored HMMWV (M1114A1). Up-Armored HMMWV increases scout survivability by upgrading protection levels throughout the vehicle. It provides the crew with 360 degree 7.62 AP protection and up to 12 lb. underbody mine protection while maintaining the same mobility of the current scout HMMWV (M1025/M1026). Production is scheduled to begin in FY96 with First Unit Equipped in FY96. Current funding procures 695 vehicles, which is short by 130 to complete all active component requirements. To meet RC enhanced brigade requirements, an additional 210 M1114A1 are required. **AMBER** through the mid-term.

Long-Range Advanced Scout Surveillance System. LRAS3 is a mounted and man portable, day/night, adverse weather observation and target acquisition device. It will allow scouts to acquire and identify enemy equipment and positions while remaining outside of small and large caliber direct fire acquisition and engagement ranges. LRAS3 will have a 50 to 70 percent better target acquisition enhancement capability over current/modified systems. LRAS3 is the solution for both mechanized infantry and armor battalion High Mobility Multipurpose Wheeled Vehicles (HMMWV) scout platoons target acquisition/surveillance deficiencies. Procurement is set to begin in FY99 with a First Unit Equipped in FY01. Procurement of LRAS3 is not synchronized with other 2nd Gen FLIR / digitized maneuver systems, perpetuating a shortfall in ground reconnaissance capability on the digitized battlefield until FY04. The Army will procure 650 systems which will fill all Force Package 1 mounted battalion scout platoons and the light armored cavalry regiment. **RED** through the far-term.

Future Scout Vehicle (FSV). Future Scout Vehicle will use the technologies from CAV, combined with HTI integration of leap ahead sensor technology to develop the first optimized scout/reconnaissance vehicle. This vehicle will provide the maneuver commander with the ability to gain and maintain contact through the entire sensor spectrum. Designed to complement other sensor systems, such as UAV, Comanche, and Longbow, the FSV will provide commanders a real time validation of intelligence and reconnaissance information that enables him to adjust his force for maximum effect. This will enhance the tempo of operations and provide maximum security to maneuver forces; the result: more violent execution of the maneuver battle under conditions set and controlled by our commanders. The FSV tech demo is scheduled for FY99. FSV is funded for development beginning in FY02, with projected fielding to FP1 units beginning in FY09. In the interim period, scouts will continue to operate on platforms that are not optimized for reconnaissance, reducing their effectiveness to the maneuver commander. **RED** through the far-term.

Lethality and Firepower

Armament Enhancement Initiative (AEI). AEI is a comprehensive program to accelerate fielding of tank ammunition and ensure the continued lethality of the U.S. tank fleet despite rapid and worldwide development of armored vehicle protection technology. AEI is the Army's only kinetic energy lethality program and is critical to development of future tank upgrades and the ability to continue to overmatch any threat on the battlefield. **AMBER** through the far-term.

Improved Mortar Ballistic Computer (IMBC). IMBC replaces the current M23 Mortar Ballistic Computer. The IMBC provides digital message capability and mortar firing data computation compatible and integrated with modern automated field artillery fire control systems. GPS is embedded in the IMBC. Procurement begins in FY96 but there is insufficient funding to procure more than 489 of the required 1350 systems. **AMBER.**

M1064 Carrier with 120mm Mortar System. The M121 is a smooth bore, muzzle loaded mortar system. The M121 Carrier mounted mortar replaces the 4.2" mortar on a one for one basis in mechanized infantry and armor battalions and cavalry squadrons. The maximum/minimum ranges of the 120mm mortar is 7,200/200 meters (compared to 6,800/800 meters of the 4.2" mortar). The M121 is mounted in the M1064/1064A3 carrier, a modified 4.2" mortar carrier. Fielding of the M121 carrier mounted mortar began in Jul 95 and will continue through FY98. Force Packages 1 and 2 will receive the RISE upgraded M1064A3 carriers. The total Army requirement for all force packages is 1,260 systems. **AMBER** through the far-term.

Mobility. Mounted maneuver forces must maintain the freedom to maneuver.

Grizzly Breaching Vehicle. The Grizzly will provide an in-stride, under-armor breaching capability for heavy divisions. The Grizzly is based on the M1 chassis and power unit and will have the same cross-country mobility as the M1 and M2/M3 force it will support. The current AAO is more than 900. FUE will be in FY00, hence **RED** through the mid-term. As nearly 400 systems are procured through FY11, the system is rated **AMBER** through the far-term, primarily due to low rates of fielding through FP2 and selected prepositioned unit sets.

Wolverine - Heavy Assault Bridge. The Wolverine will provide a Class 70 assault crossing capability over 24 meter gaps. This system will replace the Armored Vehicle Launched Bridge (AVLB), a Class 60, 20 meter assault gap crossing system. The current AAO is over 900. FUE will be in late FY99, hence **RED** through the mid-term; as nearly 400 systems are fielded through FY11, the system is rated **AMBER** through the far-term, primarily due to low rates of fielding through FP2 and selected prepositioned unit sets.

Improved Recovery Vehicle (M88A1E1). The IRV is a 70 ton vehicle capable of recovering an Abrams Series Tank. IRV also has the capability to lift 35 Tons. Replacement of current M88 Recovery Vehicles will provide significant battlefield flexibility, eliminating the need to utilize two M88s to safely tow an Abrams tank. The current AAO of 346 vehicles fills Force Packages 1 and 2 and the training base. First Unit Equipped is scheduled for 1Q FY97. **RED** through the mid-term.

Horizontal Technology Integration. The digitized battlefield is the cornerstone of the Army's Horizontal Technology Integration (HTI) initiative and characteristic of the future battlefield environment. The significance of digitization among mounted maneuver forces is that it will allow our leaders to integrate information laterally and vertically among combat systems, crews, and combat vehicles, creating a real time simultaneous common picture of the battlefield.

Digitized Mortar Fire Control System (DMFCS). The DMFCS integrates mortar platoons, sections, and gun squads with the Army's digital battlefield. Additionally, DMFCS allows mortars to widely disperse and operate in a semiautonomous manner, which greatly increases their survivability. Key components of DMFCS include a computer with embedded GPS, a direction determining device with a collimator and a dedicated SINCGARS. Mortar units with DMFCS can deliver more accurate fires at twice the rate of present-day units. Although current technology exists to develop and field DMFCS by FY98, funding is not available until FY02. **RED** through the far-term.

Protection. Emphasis is being placed on reducing the susceptibility and vulnerability of personnel and armored vehicles. Through the use of new sensor, countermeasure, and light weight composite armor technologies, we can reduce the likelihood of Mounted Force casualties while increasing operational effectiveness.

Close Combat - Light

Maneuver and Mobility

Night Vision Goggles (AN/PVS-7B/7D). The AN/PVS-7B/7D permits soldiers to effectively fight and move at night. This head/helmet-mounted night vision goggle uses one 3rd generation image intensification helmet mounted tube, allowing detection and targeting (along with the AN/PAQ-4 Aiming Light), under minimal starlight, of man-sized targets to 150-180 meters. This equipment provides a critical edge in combat for Light, Airborne, Air Assault, Ranger, and Special Forces units. The Army is only funded to resource Force Packages 1 through 3. AMBER.

Driver's Vision Enhancer (AN/VAS-5). Provides second generation thermal driving capability for combat and tactical wheeled vehicles to include the BFV, Abrams tank, HMMWV, PLS, and HEMTT. First Unit Equipped is during 4th Qtr FY96. The Army is only funded to resource Force Package 1. **AMBER.**

Monocular Night Vision Device (MNVD). A Soldier Enhancement Program (SEP) initiative, the MNVD permits combat leaders to have one multipurpose night vision device in lieu of several other systems (substitutes for both NVGs and the weapons night vision scope). It also functions as a night vision accessory to the Close Combat Optic. The Army is funded to resource procurement for SF, RGR, LT, ABN, AASLT and mechanized dismounts in AC units in Force Packages 1 through 3. **AMBER.**

Special Forces Mobility Enhancement. This program augments the mobility and firepower of selected Special Forces units for desert operations. Each A Team is mounted in four modified HMMWVs. First unit equipped during 2Q FY96. **GREEN.**

MISSION/CAPABILITY OR MOD OBJECTIVE	SYSTEMS	NEAR-TERM FY 96-98	MID-TERM FY 99-01	FAR-TERM FY 02-11
LIGHT FORCE PROGRAM ASSESSMENT				
MOBILITY & MANEUVER	NIGHT VISION GOGGLES	AMBER	RED	RED
	MONOCULAR NVD	AMBER	RED	RED
	DRIVER'S VISION ENHANCER	AMBER	RED	RED
FIREPOWER & LETHALITY	IMPROVED TARGET ACQUISITION SYS	AMBER	RED	RED
	M16A2 RIFLE	AMBER	AMBER	AMBER
	M4 CARBINE	AMBER	AMBER	AMBER
	M249 SAW	AMBER	AMBER	AMBER
	MK-19 40 MM GMG	AMBER	AMBER	AMBER
	MED MG UPGRADE	RED	RED	RED
	JAVELIN	AMBER	GREEN	GREEN
	MPIM/SRAW	RED	AMBER	AMBER
	ADVANCED MISSILE SYS-HVY	RED	RED	RED
	LIGHTWEIGHT MORTAR SYS	RED	RED	RED
	THERMAL WEAPON SIGHT	AMBER	AMBER	AMBER
	MELIOS	AMBER	AMBER	AMBER
	LTWT LASER DESIGN/RNGFNDR	RED	RED	RED
	AN/PVS-4 PIP	AMBER	RED	RED
	SNIPER DAY/NIGHT SIGHT	AMBER	AMBER	AMBER
DIGITIZATION	IMPROVED MORTAR BALLISTIC COMPUTER	AMBER	AMBER	AMBER
	LIGHTWEIGHT DIGITAL TOC	RED	RED	RED

Figure B-2

Firepower and Lethality

Improved Target Acquisition System (ITAS). The ITAS upgrades the TOW heavy antitank weapon system now in Light Force units. ITAS improves target detection, acquisition, fire control, and recognition range, and has 2nd Generation FLIR, direct view optics, laser range finder, autoboresight, autotrack, BIT/BITE, and embedded training. Currently in Research and Development, ITAS begins fielding in 4th Qtr, FY97. ITAS is only funded for Light Forces in a portion of Force Package 1. **AMBER.**

M16A2 Rifle. The M16A2 rifle is a 5.56mm, lightweight, air-cooled, gas-operated, magazine-fed, selective-rate, low impulse rifle capable of delivering accurate, lethal fire at ranges up to 550m. An improved version of the M16A1 it replaces, the M16A2 incorporates improvements to the receiver, barrel, trigger group, stock, and grip that increase overall effectiveness. Improved accuracy is achieved by using heavier NATO standard ammunition and incorporating an improved muzzle compensator, three-round burst control, and heavier barrel. Through FY95 the Army has procured 68% of its requirement, including some conversions of A1 models to the A2 configuration. The Army is considering additional procurements in FY96 and beyond. **AMBER.**

M4 Carbine. The M4 carbine is a more compact version of the M16A2 rifle with a collapsible stock. It provides the individual soldier operating in close quarters the capability to engage targets at extended range with accurate, lethal fire. The M4 shares approximately 85% of its parts with the M16A2 rifle. It will replace all .45 caliber sub-machine guns (M3), and partially replaces .45 caliber pistols, 9mm pistols, M16A1 and A2 rifles carried by unit leaders, crew-served gunners, vehicle crewmen, and radio operators. Through FY95 the Army has procured 57% of its requirement. The Army is considering additional procurements in FY96 and beyond. **AMBER.**

M249 Squad Automatic Weapon (SAW). The M249 is a 5.56mm, lightweight, air-cooled, gas-operated, belt-fed, one-man portable automatic weapon capable of delivering a large volume of effective fire at ranges up to 800 meters. The basis of issue is one per soldier designated to fire in the automatic rifle role in all types of units. It is scheduled to replace the M60 7.62mm medium machine gun in certain units. Through FY95 the Army has procured 71% of its requirement. The Army is considering additional procurements in FY96 and beyond. **AMBER.**

MK19-3 40mm Grenade Machine Gun (GMG). A 40mm, self-powered, air-cooled, belt-fed, blowback operated weapon, the MK19-3 is designed to deliver accurate, intense, and decisive firepower against point targets at ranges out to 1,600 m and area targets at ranges out to 2,200 m. It is scheduled to replace selected M2 .50 caliber heavy machine guns in selected units and will be the primary suppressive weapon for combat support and combat service support units. Through FY95 the Army has procured 54% of its requirement. The Army is considering additional procurements in FY96 and beyond. **AMBER.**

Medium Machine Gun Upgrade Kit. This effort is intended to provide a near-term solution to reduced performance of the aging M60 7.62mm medium machine gun fleet in Force Package 1 and 2 infantry units by improving the current M60 or M240 7.62mm medium machine gun. In addition to achieving improvements in reliability, the weapon will be modified to accept modular accessories such as a day optic, night vision sight, laser aiming light, flashlight, and training device. Technical and Operational Testing is scheduled for completion in 4QFY95. Procurement is currently unfunded. **RED.**

Javelin. The Javelin is a joint Army/USMC program; a man portable medium antitank weapon that replaces the obsolete Dragon (although not on a 1-for-1 basis). The Javelin has an integrated day/Second Generation Forward Looking Infrared (FLIR) sight; a range exceeding 2,000 meters; a lock-on before launch, fire and forget capability that can be selected for direct or top attack; and can be fired from enclosures. The Javelin is the number one antitank priority for Light Forces. The Javelin is to be fielded in 3rd Qtr, FY96, but is funded to fully field Active Component forces only. **AMBER.**

Multipurpose Individual Munition (MPIM) / Short Range Anti-tank Weapon (SRAW). The MPIM/SRAW, a Joint Army/USMC program, is a light, disposable, multi-purpose weapon that replaces the AT4 and is capable of defeating personnel in bunkers, behind masonry and brick walls, and in light armored vehicles. The MPIM/SRAW has an effective range of 500 meters except against bunkers. It is safely fired from enclosures and does not require a dedicated gunner. This is a joint program that uses a launch & flight module developed in the USMC SRAW program and uses the Army-developed MPIM warhead module. Research and Development occurs FY96-99 with the First Unit Equipped in FY01. **RED** in the near-term; **AMBER** in mid- and far-terms.

Advanced Missile System-Heavy (AMS-H). The AMS-H is the next generation heavy antitank missile system. It will replace the TOW in both heavy and light forces. Proposed system design will make the AMS-H compatible with ITAS/IBAS and the current family of launchers. The AMS-H will have a modular design to enhance shelf-life extensions and allow the missile to counter future threats. The program is scheduled to start in FY96 with a **goal** of First Unit Equipped by FY06. **RED.**

Lightweight Mortar System (LMS). The LMS is a proposed program that would replace Light Force 81mm mortars with 120mm mortars. Currently in the concept phase, the system would use composite materials and an enhanced energy absorbing recoil device could reduce the weight of the 120mm heavy mortar by over 60%. The 120mm mortar has significantly greater range and lethality. Further, replacing the 81mm mortar with the 120mm mortar would standardize the battalion-level mortars throughout both Light and Mounted Forces. The LMS is not funded for development or procurement. **RED.**

Thermal Weapon Sight (TWS)/(AN/PAS-13). The TWS is a family of lightweight, compact, battery operated, second generation, thermal imaging devices that begins full production in FY95 after operational testing is completed. The TWS will mount on the M16 rifle, M4 Carbine, M249 Squad Machine Gun, M60 Medium Machine Gun, the .50 caliber Heavy Machine Gun and the MK-19 40mm Machine Gun. First Unit Equipped will occur in 3rd Qtr, FY96. The planned procurement extends out to FY08, but will only fill Force Package 1 requirements. **AMBER.**

Mini Eyesafe Laser Infrared Observation Set (MELIOS). The MELIOS, a lightweight, eyesafe, handheld, battery powered laser range finder, accurately measures ranges to 10,000 meters (+/- 5 meters). The Army has funded 8,355 MELIOS, a quantity which fields MELIOS to Force Packages 1, 2 and the active forces only in Force Package 3. **AMBER.**

Lightweight Laser Designator Range Finder (LLDR). The LLDR provides Light Force fire support teams plus combat observation and lasing teams a lightweight (total 30 pound), day/night laser designator that has range-to-target, azimuth and vertical angle, and target marking for precision or laser-guided munitions. LLDR is not funded for development or procurement. **RED.**

AN/PVS-4 Product Improvement Program. Provides soldiers with small arms not equipped with TWS with a third generation Image Intensification tube. Funding will resource only a portion of the 82nd Abn Div. **AMBER.**

Sniper Day/Night Sight (SNS). The SNS provides the sniper the capability to fire the M21 Sniper Weapon accurately to a range of 600m at night and 800m during the day. The Army is funded for 50% of requirements and will field SNS to Force Packages 1 and 2. **AMBER.**

Digitization

Improved Mortar Ballistic Computer (IMBC). The IMBC replaces the present M23 Mortar Ballistic Computer which now has obsolete components, cannot be expanded, and will be unsupportable after FY96. The IMBC provides digital message capability and mortar firing data computations which are both compatible and integrated with modern automated field artillery fire control systems. The IMBC has an embedded GPS. Procurement begins in FY96, but current funding will only procure 489 of the required 1350 systems. **AMBER.**

Lightweight Digital Tactical Operations Center (LDTOC). The LDTOC, a man portable system, provides digital information interface to Light Forces: digital transmission and receipt of orders, situational awareness, and other data as outlined in Force XXI Battle Command - Brigade and Below. The LDTOC is a new program; it is undergoing experimentation at the Rapid Force Projection Initiative (RFPI)-C4 ATD at the JRTC, and could progress into development in FY96. Currently, the LDTOC is not funded for development or procurement. **RED.**

Engineer and Mine Warfare

Mobility

Countermine / Counter Obstacle - Detection

Airborne Standoff Minefield Detection System (ASTAMIDS). Provides a new capability for future maneuver warfare: the means to detect mined areas well forward of friendly troops, thereby supporting planning and execution of deep maneuver. Will be fielded to Intelligence units at division and corps levels. The AAO is currently planned at 97 systems. Procurement begins in FY00, resulting **RED** in the near-term and **AMBER** through the far-term due to low procurement rates.

Ground Standoff Mine Detection System (GTAMIDS) / Interim Vehicle Mounted Mine Detector (IVMMD). GSTAMIDS will provide a new capability to detect metallic and non-metallic mines along routes from a variety of vehicles; IVMMD will detect on-route mines only. Although the final basis of issue is to be determined, the interim system

(IVMMD) will be fielded to selected engineer units of FP1 in FY99-01 (**RED** in the near-term, **AMBER** mid-term). Procurement of the objective GSTAMIDS will begin in FY02, improving the assessment to **GREEN** by FY11.

Handheld Standoff Mine Detection System (HSTAMIDS). Provides dismounted soldiers a multi-spectral means to detect mines. This system will rely on a combination of technologies, possibly including infrared/thermal imaging, synthetic pulse, and ground-penetrating radar, or others to detect metallic and non-metallic mines on and below ground surface. HSTAMIDS will replace the AN/PSS-12 mine detectors. AAO is over 16,000 sets. Procurement will begin in FY99; this causes our non-metallic detection assessment to be **RED** through the near-term, rising to **AMBER** through the mid-term and to **GREEN** by the close of the far-term.

Countermine / Counter Obstacle - Breaching. **RED** in the near-term. Breaching capability for mounted forces will steadily improve through FY11, raising the assessment to **AMBER** through the far-term.

Grizzly. See page B-11 (Mobility), Mounted Forces, above in this section.

Standoff Minefield Breacher (SMB). This explosive-based system will be the follow-on to the Mine Clearing Line Charge (MICLIC). The SMB will be either a mounted or towed system used to detonate or destroy on and off-route mines during deliberate or hasty breaching operations. Procurement begins in FY01, continuing an **AMBER** assessment through the far-term.

Anti-Personnel Obstacle Breaching System (APOBS). Provides dismounted forces the capability for a two man breach of a one meter wide gap through wire and anti-personnel mines. Current system is the Bangalore Torpedo, dating from pre-World War II. The Marine Corps has adopted APOBS and is procuring it now. No funding causes our dismounted breaching ability to be **RED** through the far-term.

Countermine / Counter Obstacle - Marking. The current hand-emplaced system is slow and does not support high tempo operations. No anticipated funding for an assault breach marking system. **RED** through the far-term.

Countermine / Counter Obstacle - Clearing. Clearing of large areas of tactical significance (assembly areas, routes, etc.) can only be achieved by labor intensive hand held systems. No research and development/procurement is planned to develop systems that can rapidly clear large areas for tactical use. **AMBER** through the far-term.

Gap Crossing. The ability of future Army forces to cross gaps throughout the depth of battle space is at risk. Current lines of communication (LOC) bridging is limited to the Medium Girder Bridge (MGB), a Class 60 system approaching the end of its design life, and the Bailey Bridge, a labor intensive bridge used during World War II. Although adequate numbers of these bridges are on hand to fill TOE bridge unit requirements, the Army can fill only 63% and 11% respectively, of Bailey and MGB minimal war plans requirements for installed bridging. **RED** in the near-term, slight improvement but still **AMBER** through the mid- to far-terms.

Wolverine - Assault Bridge. See page B-11 (Mobility), Mounted Forces, above in this section.

Armored Vehicle Launched Bridge - 70. A modification to Class 60 AVLBs allows the bridge to carry Class 70 tracked vehicles. About 50 bridges are being modified using FY94 funds. No additional funding anticipated, resulting in **RED** through the far-term due to units in force packages 3 and 4 not having an assault gap crossing capability to support their M1 tanks.

Heavy Dry Support Bridge (HDSB) - Forward Tactical Area LOC Bridge. The HDSB will provide the maneuver force a forward area LOC bridge capable of crossing Class 96 wheeled traffic (Heavy Equipment Transporter with an M1A2 tank) over 40 meter gaps. This bridge can be installed in less than 90 minutes by less than 14 men. FUE for this bridge will be in 1st Qtr, FY02, causing our gap crossing capability to be **RED** through the mid-term and improving to **AMBER** through the far-term due to limited procurement of HDSB sets.

Improved Ribbon Bridge (IRB) - Float Bridge. The IRB will replace the current Ribbon Bridge found in engineer Assault Float Bridge companies. This bridge provides a greater degree of flotation, allowing crossings in faster water as well as increased survivability against small arms fire and small artillery fragments; it also has stronger ramp sections which support access/egress across higher river banks. Current systems are **AMBER** due to limitations on crossing ability. This will improve to **GREEN** by the end of the far-term as Force Package 1 and 2 units are equipped.

Improved Common Bridge Transporter (ICBT). The ICBT will be a bridge carrier common to all bridge units. It will replace the 5 ton dump trucks presently in fixed bridge companies (MGB and Bailey) and 8 ton bridge trucks in assault float bridge companies. It is built on a HEMTT chassis and will allow palletized loading/unloading of bridging equipment, thereby providing greater reliability and flexibility to engineer bridge companies. FUE is FY98. **AMBER** in the near- to mid-term, **GREEN** through the far-term.

ENGINEER & MINE WARFARE PROGRAM ASSESSMENT				
MISSION/CAPABILITY	SYSTEMS	NEAR-TERM FY 96-98	MID-TERM FY 99-01	FAR-TERM FY 02-11
MOBILITY	MANEUVER: Grizzly / Wolverine / AVLB-70	RED	RED	AMBER
	COUNTERMINE-DETECT: ASTAMIDS / GSTAMIDS IVMMD / HSTAMIDS	RED	AMBER	AMBER
	COUNTERMINE-BREACH: SMB / APOBS / Grizzly	RED	AMBER	AMBER
	COUNTERMINE - MARKING	RED	RED	RED
	COUNTERMINE - CLEAR	AMBER	AMBER	AMBER
	GAP CROSSING - HDSB / IRB / Wolverine / AVLB-70	RED	AMBER	AMBER
COUNTER-MOBILITY	MINE WARFARE: Hornet (WAM) SLAM VOLCANO MPOMS	AMBER	AMBER	AMBER
	EXPLOSIVES	RED	RED	RED
SURVIVABILITY	FORTIFICATIONS: Construction Equipment M9 ACE DUECE	AMBER	AMBER	AMBER
	CAMOUFLAGE	AMBER	AMBER	GREEN
SUSTAINMENT	Construction Equipment	RED	RED	RED
TOPOGRAPHY	Combat Terrain Information Systems	AMBER	AMBER	GREEN
	TSS - High Volume Carto Printing	AMBER	AMBER	GREEN

Figure B-3

Countermobility

Scatterable Mines. **AMBER** through the far-term due to limited Class V procurement.

VOLCANO. This is the state of the art tactical mine system for Army forces today, providing scatterable, rapidly emplaced minefields. Ground VOLCANO dispensers will be fielded through all FP4 units by FY99; **GREEN** in the mid- and far-terms. Air VOLCANO dispensers (employed on UH-60 helicopters) will begin fielding in FY96 and will be complete through FP3 by FY98; **GREEN** in the mid- through far-terms. Shortfalls exist in reload capabilities due to reduced procurement of Class V, increasing risk during early entry/force projection and extended operations. VOLCANO Class V rated **AMBER** (procuring only 56% of the total requirement).

Modular Pack Mine System (MOPMS). This system provides a tactical unit a capability for close-in protective mining. It has been fielded but in limited quantities to Force Packages 1 and 2 and selected Force Package 3 units. **AMBER** through the far-term.

Smart Mines. **RED** in the near-term, **AMBER** through the mid- and far-terms.

Hornet. Formerly known as the Wide Area Munition (WAM), the Hornet is the precursor of future obstacle warfare. The initial Hand Emplaced Hornet has a standoff detection and engagement capability by attacking targets out to 100 meters with a top attack munition. Due to its 100 meter range, it can cover the same frontage as 150-200 conventional antitank mines. Hornet will be the base Dynamic Obstacle System technology, reached through the Hornet product improvement program (with a turn-on, turn-off capability) and Deep Attack Hornet deliverable by rocket, missile, or fixed wing aircraft. **RED** in the near-term due to limited procurement of Hand Emplaced Hornet commencing in FY97. **AMBER** through the far-term due to a 28% fill of the AAO of nearly 40,000.

Explosives. **RED** in the near- and mid-terms due to obsolescence of current stocks and labor-intensive requirements for current demolition techniques. The introduction of new explosives systems through the mid-term, (the Bridge and Road Munition (BRM), the Penetration Augmentation Munition (PAM), and the Modernized Demolition Initiator (MDI)), will improve the ability of engineers and Special Operations forces to conduct demolition operations. Because of limited procurement of these new items, and the continuing aging of existing stocks, this area will remain **RED** in the far-term.

Survivability

Fortifications. M9 Armored Combat Earthmover (ACE). The ACE is the primary earthmover in mechanized combat engineer battalions. Currently there are 448 systems on hand, filling 26% of the total Army requirement, with FPs 1 and 2 being 52% and 65%, respectively. Rated **AMBER** in the near-term. No major procurement for an improved ACE is planned until FY07; this added to the existing ACE numbers, will buy only 43% through FY11. Considering aging equipment among original ACEs, the assessment continues as **AMBER** through the far-term.

Camouflage. **AMBER** in the near- through mid-terms with current Lightweight Screen Systems fielded throughout the Army, this system does not provide protection against some of the modern sensors available today. Continued development and procurement of the Multi-Spectral Camouflage System (MSCS) and the Ultra-Lightweight Camouflage Netting System (ULCANS) should raise this area to **GREEN** by the end of the far-term.

Sustainment Engineering

Construction Equipment. RED in the near-term due primarily to aging equipment and shortages. The Army inventory of construction equipment is approximately $3.0 Billion. This equipment is critical to survivability and mobility in tactical areas and COMMZs. Replacing and modernizing this equipment has been a low to non-existent priority over the past twenty years. Results of a 1993 CAA study imply that the Army must spend a minimum of $50 Million annually to show improvement in fleet aging and shortage fill.

Critical shortfalls or excessive aging problems currently exist in compaction, general construction, and lifting and loading equipment. A 74% increase in procurement spending through FY01 will improve the fleet slightly but will not improve the assessment of **RED** in the mid- to far-terms without massive investment.

Deployable Universal Combat Earthmover (DEUCE). Will replace light bulldozers in airborne and light engineer battalions. More deployable by air as well as having improved self mobility throughout small tactical areas. FUE in FY98. Minor positive impact to overall condition of construction equipment fleet.

Hydraulic Excavator (HYEX). A key system to construction equipment modernization. Initial procurement in FY97 through FY00 will fill nearly 80% of FP1. Again, a minor positive impact to overall construction equipment fleet.

Topographic Engineering

Combat Terrain Information Systems (CTIS). Introduction of the Digital Topographic Support System (DTSS), Quick Response Multicolor Printer (QRMP), and Multi-Spectral Image Processor (MSIP) to topographic engineer units in the near-term will improve their ability to produce and disseminate rapid terrain analysis products in support of force projection operations. **AMBER** through the mid-term due to limited procurement; **GREEN** by the far-term when all units have been equipped and current R&D funding continues.

High-Volume Cartographic Production. Topographic engineer companies are required to produce high-volume paper products with TOE presses. Current presses are approaching 20 years old and getting harder to maintain. **AMBER** in the near- and mid-terms. The future of high-volume cartographic production lies in digital technology; with programmed RDTE and procurement funds commencing in the mid-term, assessment should rise to **GREEN** by the end of the far-term.

Soldier Systems

The Soldier System is an integrated system of systems that includes the individual soldier and everything worn, consumed, or carried for his individual use in a tactical environment. The soldier is the fundamental part of a much larger set of warfighting instruments consisting of major weapon systems comprising aviation, artillery, armor, communications and other platforms. The soldier is a crucial and inextricable component of the successful employment of all other weapon systems. Moreover, the soldier is a weapons system as well, called the Soldier System. Soldier System Programs Assessment is further defined with respect to the mission, capability or modernization objective that is addressed by each program system (see Figure B-4). These five missions/capabilities/modernization objectives include: Mobility and Maneuver, Firepower and Lethality, Digitization, Protection, and Sustainment.

SOLDIER SYSTEM PROGRAMS ASSESSMENT				
MISSION/CAPABILITY OR MOD OBJECTIVE	SYSTEMS	NEAR-TERM FY 96-98	MID-TERM FY 99-01	FAR-TERM FY 02-11
MOBILITY & MANEUVER	SOLDIER ENHANCEMENT PROGRAM	AMBER	AMBER	AMBER
	CENTRAL FUNDING & FIELDING	AMBER	AMBER	AMBER
	LAND WARRIOR	AMBER	AMBER	GREEN
	MOUNTED WARRIOR	AMBER	AMBER	GREEN
	AIR WARRIOR	AMBER	AMBER	GREEN
	21ST CENTURY LAND WARRIOR	AMBER	AMBER	GREEN
FIREPOWER & LETHALITY	SOLDIER ENHANCEMENT PROGRAM	AMBER	AMBER	AMBER
	LAND WARRIOR	RED	AMBER	AMBER
	AIR WARRIOR	RED	AMBER	AMBER
	21ST CENTURY LAND WARRIOR	RED	AMBER	AMBER
DIGITIZATION	SOLDIER ENHANCEMENT PROGRAM	AMBER	AMBER	AMBER
	LAND WARRIOR	RED	RED	AMBER
	MOUNTED WARRIOR	RED	RED	AMBER
	AIR WARRIOR	RED	RED	AMBER
	21ST CENTURY LAND WARRIOR	RED	RED	AMBER
PROTECTION	SOLDIER ENHANCEMENT PROGRAM	AMBER	AMBER	AMBER
	CENTRAL FUNDING & FIELDING	AMBER	AMBER	AMBER
	LAND WARRIOR	AMBER	AMBER	AMBER
	MOUNTED WARRIOR	AMBER	AMBER	AMBER
	AIR WARRIOR	AMBER	AMBER	AMBER
	21ST CENTURY LAND WARRIOR	AMBER	AMBER	AMBER
SUSTAINMENT	DOD FOOD PROGRAM	AMBER	AMBER	AMBER

Figure B-4

Modernizing all soldiers is a continuous but evolutionary process. It is intended to integrate, package, and provide synergistic improvements to the individual soldier's combat capabilities on the digitized battlefield. These systems also recognize the need to fulfill varied and tailored requirements of each "type" of soldier.

The soldier of 1996 and beyond faces threats from a myriad of adversaries - from professional soldiers, to organized militias, to ad hoc gatherings of a hostile local populace. To deal with these threats, the Army needs to overmatch its adversaries in all combat capability areas, ranging from the soldier's ability to maneuver on the battlefield to providing protection for the individual soldier in dangerous situations. Presently, Army soldiers are not fully prepared to meet all the possibilities they are expected to face. Chemical agents, antipersonnel devices, kinetic and directed energy weapons, and harsh environmental factors are but a few of the threats to the safety and effectiveness of the Army's soldiers.

Soldier modernization will be accomplished through integrated acquisition programs embodying procurement approaches ranging from Non Developmental Items (NDI)/modified NDI through integrated programs. The first approach addresses quick fixes in 36 months or less from concept to completion through the Soldier Enhancement Program. The second approach addresses modular improvements to clothing and individual equipment and individual combat ration components which require more than

36 months from concept to completion. The third approach addresses the more technically challenging area of integration, balance, and digitization in the soldier system efforts, Land Warrior, Mounted Warrior, and Air Warrior.

Soldier Enhancement Program (SEP). In 1990, Congress mandated that the Army and Marine Corps focus attention on enhancing the combat capabilities of dismounted warfighters through the Soldier and Marine Enhancement Program (SEP/MEP). Congress directly funded this program for three years and required the services to budget for appropriate funds during the next POM cycle. SEP has successfully provided soldiers with 59 different new items of state-of-the-art clothing and equipment. A list of SEP efforts completed in FY95 is provided in figure B-8. Figure B-9 shows a list ongoing and projected new SEP efforts for FY96.

Several critical items currently under development in the SEP program are:

- Close Combat Optics (CCO) will provide a non-magnified, long eye relief collimator-type sight for the M16A2 rifle and M4 carbine. The aiming dot on the lens is easily placed on the target, improving combat marksmanship up to 300 meters. It will allow the soldier to fire with both eyes open, providing increased situational awareness. The CCO is scheduled to begin procurement in FY96;

- Modular Weapon System will provide a system of mounting rails on M16 rifles/M4 carbines for attaching day and night sights, ancillary weapons, and other accessories, allowing custom configuration of the weapons based upon mission needs;

- The Monocular Night Vision Device is a lightweight, monocular, 3rd generation image intensification device, can be handheld, head or helmet mounted, or mounted on a weapon. It has performance characteristics similar to the AN/PVS-7B Night Vision Goggle. The MNVD is funded for type classification during FY95, and is **not funded for procurement**; and

- The Lightweight Leader Computer (LLC) is a small lightweight computer that integrates leaders from squad to company to the digital battlefield. It helps leaders plan operations; prepare and distribute orders, reports, and alert messages; quickly access stored information; perform simple graphics capabilities; and interface with SINCGARS for data transmission. The LLC is currently undergoing Research and Development (through FY96). **Production for the LLC is unfunded.**

No procurement tail exists to obtain the required quantities of newly adopted SEP items. Because of the rapid development process (typically 18-24 months), SEP items are adopted before the Army can adequately plan for procurement funds in future POMs. SEP items must therefore compete for production funding with the routine clothing and individual equipment items purchased through the **Central Funding and Fielding (CFF)** program for all soldiers in Force Packages 1 and 2. The inadequate production tail for SEP items and the competition for limited CFF dollars rate SEP as **AMBER**.

Clothing and Individual Equipment. CIE programs remained unorganized until recently and produced suboptimal results. CIE improvements were primarily accomplished through isolated modular improvements to specific items such as small arms, body armor, load bearing equipment, and chemical protective systems. These efforts required significant development, taking 48 to 60 months for development and adoption by the Army. The near-term goal of modular improvements is to systematically provide increased survivability, lethality, and mobility, as well as improved command and control, sustainment, and versatility. CIE is **AMBER** in the near-, mid- and far-terms due to lengthy development cycles and the lack of stable procurement funds.

Central Funding and Fielding. Primary production funding for CFF is provided though the Operations and Maintenance, Army (OMA) appropriations. The CFF program is currently targeted to meet only 60% of the FP1 and FP2 total requirements. However, the $60M annual funding level is insufficient to meet even that restricted target. Subsidizing SEP procurements by using CFF funding lines exacerbates the shortfall and places the Army further below the 60% target. A stable funding level is critical to plan procurements to ensure that faster fielding is achieved through acquisition reform and maximize the economy of scale buys required for successful soldier system modernization. The CFF process is **AMBER** due to funding shortfalls which preclude reaching the target to provide sufficient CIE items for 60% of FP1 and FP2.

Warrior Programs (Land Warrior, Mounted Warrior, Air Warrior). Current efforts to modernize the soldier started in 1989 when the Army Science Board (ASB) concluded that the soldier must be treated as a system. The Soldier Integrated Protective Ensemble (SIPE) ATD demonstrated and assessed the technological feasibility and operational benefit of component and subsystem integration, as well as the potential of new capabilities and/or enhanced operational effectiveness in operational environments. The technologically mature, high payoff capabilities are being pursued through tailored, modernized strategies for the Warrior Programs in order to field equipment as fast as technology allows.

Today's Army, the best fed, best led, best equipped, and best trained fighting force in the world, still lacks the capabilities required to meet the vision of the 21st Century Army. A general review of current capabilities (to be provided by the many ongoing efforts in the categories above) highlights the difficulties faced by today's soldier:

Maneuver and Mobility. Soldiers must be prepared to maneuver in any potential operational scenario in any environment. All soldiers, both dismounted and crew based (mounted and aviation), must be able to see in all types of weather and through a variety of obscurants, to know their exact location with the aid of navigational devices, and to approach and engage their assigned targets with their combat equipment loads. Attaining this capability is considered **AMBER** in the near-term because soldiers have only limited ability to identify and acquire targets in poor visibility conditions and because equipment aids in this area are not available to all soldiers who need this capability. The **AMBER** rating changes to **GREEN** in the mid- and far-terms since the requisite technologies are expected to become more available and affordable via the Warrior Programs.

Firepower and Lethality. Soldiers must be able to defeat superior hostile forces in unfamiliar territory. Lethality is attained by the sheer power of a weapon, and by other factors such as accuracy, range, versatility, the level of exposure required of the soldier using a weapon, and the ability of the soldier to identify and acquire a target. This area is considered **RED** in the near-term, because the technology available today does not integrate all variables in a manner that provides soldiers with the decisive edge. **AMBER** in the mid- and far-terms because of the risks and costs inherent in developing new technologies.

Digitization. The ability to send and receive digitized information about conditions, missions, troop movements, locations of friendly forces and other crucial information is essential for soldiers to successfully complete missions in the future battlefield. This area is considered **RED** in the near- and mid-terms because linking the individual soldier into digital communications nets involves relatively expensive technology. Availability of requisite equipment to all soldiers needing it is also limited due to the costs associated with development and distribution. **AMBER** in the far-term as technology becomes more affordable, but concerns over adequate levels of procurement dollars prevent a higher rating.

Protection. Protecting soldiers from battlefield dangers extends beyond body armor; protection also includes the capability to reduce a soldier's exposure to danger. However, this capability is considered **AMBER** in the near-term because the technologies required for advanced protection are not available to today's soldier. **AMBER** in the mid- and far-terms: although technologies will be available, the Army cannot afford sufficient quantities beyond FP1 requirements.

Sustainment. The Department of Defense (DoD) centralized the research and development of food (both garrison and operational rations) into a single food program. The result of this joint service DoD Food Program has been a substantial savings in resources, greater interplay and standardization among the services, and a focused and integrated program. The Army is the Executive Agent, conducting the program for the benefit of all DoD components. Funding for this program is included in the Army's annual RDT&E appropriation. The ultimate goal of DoD research and development efforts is the development of rations that have extended stability, reduced weight and volume, heightened acceptance, and enhanced nutrition and performance to give warfighters in the field the ability to perform their assigned missions with a sharpness and vigor that ensures success, despite the harshness of the environment and the rigors of the global battlefield.

This ability is **AMBER** in the near- to far-terms due to difficulties optimizing delivery systems and balancing the percentage of nutrients that are required to ensure enhanced performance.

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

Science and Technology Objectives

Mounted Forces

Advanced Tank Armament System (ATAS). The ATAS program is the foundation for the next generation of tank improvements. ATAS is a synergistic approach to armament system improvement. It integrates component developments to achieve increased SEE, HIT, and KILL capabilities. The ATAS development program has two technology demonstrations (TDs) that seek to maximize capabilities in gun, ammunition, autoloader, and fire control technologies. TD I incorporates five Technology Demonstrations Items (TDIs): M1 Thermal Gunner's Sight (TGS), Commander's Second Generation Tank Sight (CSGTS) with integrated laser designator, hunter/killer capability, 120mm XM291 gun, auto boresight and autotracker. Demonstration will occur in FY00. TD II incorporates improved fire-on-the-move capability, autoloader, and 360 degree sight/autotracker/hunter killer configuration. Demonstration will occur in FY01. **The POM funds two Technical Demonstrations.**

Target Acquisition (TA) Advanced Technology Demonstration (ATD). TA ATD is a Science and Technology (S&T) base program that will demonstrate automated wide-area search an target acquisition, prioritization, and tracking at extended ranges. Automation of these capabilities will reduce crew workload, shorten timelines to acquire targets, and as a result effectively direct fire. The Target Acquisition ATD is composed of a multispectral suite of sensors. Specifically, the suite will consist of a second generation forward looking infrared (FLIR) sight, millimeter wave radar, multi-function laser (rangefinding, designating, and high density profiling), and a day TV. The sensors will be complemented by the inclusion of aided target recognition algorithms. **The Target Acquisition ATD is approved for FY95-98.**

Armament Enhancement Initiative (AEI). AEI is a comprehensive program to accelerate fielding of tank ammunition and ensure the continued lethality of the U.S. tank fleet (in view of the rapid and worldwide development of armored vehicle protection technology). Current developments are in the areas of kinetic energy, guided kinetic energy, and smart top attack rounds. To date five rounds of ammunition have been incorporated into this initiative: M900, 105mm Armored Piercing Fin Stabilized Discarding Sabot-Tracer (APFSDS-T): M829A1, 120mm APFSDS-T; M829A2, 120mm APFSDS-T; M830A1, 120mm HEAT-Multipurpose (MP)-T; and the XM943, 120mm Smart Target Acquisition Fire and Forget (STAFF). The M900 and M829A1 are currently completing production, the M829A2 and M830A1 are in production, and the STAFF round is in development. **STAFF is fully funded in the POM through EMD but has no production funds.**

Suite of Survivability Enhancement Sensors (SSES). SSES is a group of new countermeasure and sensor technologies that reduce the detection and increase the survivability of armored vehicles. **SSES is not funded for development or procurement.**

Hit Avoidance (HA) ATD. HA ATD is a S&T base program to field demonstrate a low cost, near-term, Active Protection (AP) system against Anti-tank Guided Missiles (ATGMs) and other hit-to-kill threats. It will also develop and demonstrate the necessary hardware and software integration for a Commanders Decision Aid to achieve sensor fusion/threat assessment and integrated countermeasure prioritization. **HA ATD began in FY95 and will complete in FY97.**

Advanced Tank Technology (ATT) ATD. ATT ATD is a S&T base program to provide the Mounted Force a survivable, lethal, and more deployable tank. Advanced Tank Technologies, demonstrated on a surrogate chassis, include integrated aided target acquisition, hit avoidance and reduced crew operation. **The Advance Tank Technology ATD is scheduled to begin in FY99 and complete in FY02.**

Composite Armored Vehicle (CAV) ATD. CAV ATD is a S&T base program to demonstrate a lightweight ground vehicle that uses advanced composites for armor and structure with integrated signature management technologies. CAV technologies have the potential to be applied to several future combat vehicles, but CAV is currently focused on providing a platform for the Future Scout Vehicle. **The CAV ATD started in FY94 and completes in FY97.**

Scout Vehicle (SV) Technology Demonstration (TD). SV TD is a S&T base program to demonstrate the technologies to develop the Army's first dedicated scout/reconnaissance vehicle. The SV TD scheduled for to start in FY98 and complete in FY01;. Future Scout Vehicle (FSV) is funded for development beginning in FY02, **GREEN**. FSV capability is needed in the near-term and funding is not available.

Crewman's Associate (CA) ATD. CA ATD is a S&T base program that demonstrates crew station technologies to reduce crew work load and enhance crew performance which will result in increased weapon system operational effectiveness. The enhanced Crew Station Soldier Machine Interface will provide improved situational awareness, user friendly interface to the digital battlefield, and enhanced operations on the move. The crew station is being emulated in a man-in-the-loop reconfigurable simulator. **CA ATD began in FY93 and will complete in FY96.**

Intra-Vehicle Digitization (IVD) TD. IVD TD is a S&T base program follow-on to the CA ATD to demonstrate advanced crew station hardware and software in a System Integration Laboratory (SIL). This TD will demonstrate enhanced crew station hardware and the necessary electronic interfaces to integrate all vehicle subsystems such as target acquisition, fire control, hit avoidance, command and control, etc. **IVD ATD begins in FY97 and will complete in FY01.**

Direct Fire Lethality (DFL) ATD. DFL ATD is a S&T base program to integrate selected components and subsystem demonstrations of promising technologies enhancing the direct fire hit and kill capabilities of the Abrams tank, AGS, and Bradley combat vehicles. The Advanced KE and STAFF Enhancement programs will provide for increases in effective range and armor penetration. Modern turret drive and stabilization techniques will be used to reduce system errors and increase probability of hit under moving conditions. These systems will combine to defeat the 2005 Explosive Reactive Armor (ERA) threat. **DFL ATD begins in FY97 and will complete in FY00.**

Close Combat - Light

Objective Individual Combat Weapon (OICW). The OICW will provide a fully integrated target detection, acquisition, and engagement system for the individual soldier using both precision bursting and kinetic energy munitions. The OICW is one of a family of three weapons envisioned to replace the current inventory of small arms weapon systems; the others are the Objective Crew Served Weapon and the Objective Personal Defense Weapon. The Army has funded a Technology Base effort through FY99 when the project will transition to Engineering and Manufacturing Development. Procurement is planned to begin in FY06.

Objective Crew Served Weapon (OCSW). The OCSW is a Tech Base program to design the next generation of the crew-served automatic weapon. It will be carried by two soldiers, will have a laser range finder and day/night sight, and will fire a family of bursting and kinetic energy munitions.

Objective Personal Defense Weapon (OPW). The OPW will provide close self-defense and some extended offensive capability. A Technology Base effort is scheduled to begin in FY97.

Objective Sniper Weapon (OSW). The OSW will provide greatly increased effectiveness against personnel and material targets at significantly increased range. It will be capable of operating in all types of environments with equivalent day and night performance, and weigh no more than the current M24 Sniper Weapon with its basic load of ammunition.

Line of Sight-Antitank (LOSAT). The LOSAT provides a dedicated, highly mobile, all-weather, day/night, direct fire antitank kinetic energy weapon capable of defeating future advanced tanks at ranges much greater than the TOW missile. The LOSAT incorporates a 2nd Generation FLIR system. The LOSAT firing module is mounted on an Armored Gun System chassis and is transportable in C-130, C-141, C-5, and C-17 cargo planes. Currently, LOSAT is in Tech Base as a Technology Demonstration FY 94-98, and is **not funded to enter development.**

Engineer and Mine Warfare

Intelligent Minefield (IMF) ATD. This program conducts breadboard component demonstrations of communication links between control stations, smart local controllers and sensors, and demonstrates common component modules which link WAM and other mines to create an IMF. In FY96, the program initiates an integrated IMF demonstration which includes advanced acoustic sensors and ends in FY97. Acoustic sensors developed for IMF will be used in the Rapid Force Projection Initiative to enhance situational awareness and provide targeting interaction.

Off Route Smart Mine Clearance ATD demonstrates, in FY96, the ability to protect combat and support vehicles from top and side attack, anti-tank smart standoff mines, which are not vulnerable to conventional breaching and clearance means. In FY97, the program demonstrates limited real-time on-the-move performance.

Vehicular Mounted Mine Detector demonstrates, in FY97, ground vehicle mounted sensor technologies to detect metallic and non-metallic mines.

Joint Countermine ACTD. The objective of the Joint Countermine ACTD is to demonstrate the capability to conduct seamless amphibious mine countermeasure (MCM) operations from sea to land. The demonstration will be accomplished by integrating Army, Navy, and Marine Corps technology developments and fielded military equipment. This ACTD will demonstrate the coupling of selected current capabilities with developing capabilities, leading to enhanced integration of joint capabilities to conduct countermine operations. The ACTD will also seek to identify improvements in the capabilities being developed or envisioned. The ultimate goal is to demonstrate emerging MCM technologies, operational concepts, and doctrine in MCM support of amphibious and other operations involving Operational Maneuver From The Sea (OMFTS) and follow-on land operations.

Mine Hunter Killer demonstrates an infra-red detection scheme on a combat vehicle which applies a mounted forward looking microwave detection device in FY96 and a brassboard directed energy/explosive neutralizer in FY98. By the end of FY99; these are then integrated into a single system capable of detecting and killing mines at a standoff range.

Rapid Obstacle Creation demonstrates, by the end of FY96, the technology to effectively plan and execute countermobility missions within the maneuver commander's decision window while reducing time, manpower, and explosives. By FY97, this program provides software packages that evaluate the effect of different countermobility operations.

Construction Materials and Methods provides the capability for rapid construction and repair of in-theater transportation and facilities infrastructure to sustain a deployed force with limited engineer resources. This program develops methods to stabilize dry soils. By the end of FY97, the program provides the technology to affect soft soils; and by the end of FY98, the program develops models for engineering in cold regions.

Field Fortifications develops technology required for expedient protective systems that reduce manpower, material, and logistic requirements for survivability missions for brigade and division C2 without sacrificing mobility. By FY97 this program demonstrates protective structures using advanced materials.

Battlefield Visualization Technologies develops and demonstrates rapid 3-D battlefield visualization, dynamic terrain and environment capabilities that operate in field environments to create high resolution, geometrically correct, 3-D battlefield scenes. By FY97, this program uses these developments in a virtual reality environment for tactical and training applications.

Digital Terrain Data Generation and Update Capability develops software, special processor cards, and techniques to provide field commanders with the capability to update digital terrain information that the DMA provides, or to develop their own high resolution database of areas of critical interest not covered by DMA. By FY97, this program provides the technology and capability for tactical level topographic engineers/terrain analysts to automatically identify terrain features.

Digital Topographic Data (DTD) Standardization develops an initial software architecture for DTD input, datum transformation and coordinate conversion, display, and other common DTD applications. By FY97, this program develops additional software which training and acquisition communities can use to validate their systems' effectiveness in the implementation of military standard DTD software.

Soldier Systems

Clothing and Individual Equipment (CIE) Technology Research. CIE research addresses the full range of combat, environmental, and special purpose protective materials and components. Programs include: textile and composite-based material systems and design concepts for individual ballistic protection; percutaneous chemical/biological protection (to include selectively permeable membranes and/or enhanced adsorbent components); countermeasures to sensors; multi-functional materials (to include environmental and flame/thermal protection); warrior performance and endurance enhancement (to include microclimate conditioning); laser eye protection; and integration of soldier system modular components. Supporting technologies include bioengineered materials for protection, and analytic tools with resolution to capture battlefield effects such as fatigue, load, environmental exposure, hydration, and terrain.

CIE related STOs include:

- Small Arms Protection for the Individual Soldier - provides armor materials to minimize penalties associated with small arms protective body armor (e.g., excess weight, thickness, and cost; rigidity of materials; manufacturing methodology), and demonstrates advanced material systems for protection against combined fragmentation and small arms threats. Supports 21st Century Land Warrior (21CLW), GEN II Soldier ATD; and Department of Justice;

- Helmet Mounted Displays - investigates new technological approaches and production methods related to component physical and operational parameters, including displays/display life, temperature range to provide for fabrication of improved chip size, and pixel display devices. Supports 21 CLW, GEN II Soldier ATD (vision systems);

- Thermal Signature Reduction for the Individual Combat Soldier - integrates signature reducing materials/technologies into a textile substrate while maintaining basic fabric characteristics (durability, flexibility, breathability, etc.) and other soldier's operational capabilities. Supports 21CLW and GEN II Soldier ATD; and

- Batteries and Power Management for the Individual Soldier - provides lighter weight, rechargeable batteries by the use of new primary battery and improved rechargeable battery chemistries. Batteries will be used in FY96 21 CLW Soldier System Demo and in FY98 Field Demo (21 CLW/GEN II); and

- GEN II Soldier ATD (Described Below).

21st Century Land Warrior (21CLW). The Army's primary soldier technology demonstrations for the remainder of the decade are captured under the 21CLW Integrated Technology Program (ITP). 21CLW is an integral part of Warrior Programs, the overarching strategy to provide block enhancements to soldiers during the next ten years. Land Warrior is discussed below.

The 21 CLW was established to explore substantially enhanced operational capabilities for the far-term Army mission needs as well as to reduce size, weight and power requirements of system components. 21CLW uses a series of operational tests and technical demonstrations to prove out future capability enhancements before making investments into product development. Specifically, 21CLW attempts to demonstrate how to make the soldier more lethal and survivable by improving total situational awareness, real time automated targeting, linkages to the digitized command and control network, multiple threat protection, and leveraging of commercial microelectronics, telecommunications, and other advancements.

Generation II Soldier (GEN II) ATD. The cornerstone of the 21 CLW ITP, GEN II employs advanced headgear that integrates communications, informational displays, vision amplifiers, and linkages to other subsystems controlled by the Individual Soldier Computer/Radio (ISC/R) subsystem. Other major GEN II subsystems are: Weapons Interface System (WIS), Protection Subsystem (PS) and Interface and Power Subsystem (IPS). In addition to GEN II Soldier ATD, other component programs of 21 CLW System of Systems include: Objective Individual Combat Weapons (OICW) ATD, Forward Maneuver/Forward Air Controller (FO/FAC) USMC ATD, Advance Image Intensifier (AI2) ATD, Advanced Manportable Sensors for the Dismounted Warrior TDs (Integrated Sight Modules and High Resolution Display System), Multipurpose Individual Munitions/Predator (MIPM/Predator) TD, In-Stride Mine Avoidance TD, Individual Portable Power TD, Combat Identification for the Dismounted Soldier (CIDS), and Objective Crew-Served Weapon Demonstrations. Other Soldier Demonstrations (not part of 21 CLW ITP) are: Self-Heating Individual Meal (SHIM), High Heat Food Stabilization, Performance Enhancing, Objective Personal Weapon (OPW), and Improved Water Purification Demonstrations.

21 CLW is a joint Army/Marine Corps effort and culminates in a platoon-level demonstration of field and simulated exercises, in FY98, with several demonstrations and experiments throughout the execution of the program to provide the following:

- Automated, accurate target hand-off;
- Near real time battlefield intelligence;
- Integrated POS/NAV;
- Digital maps/overlays;
- Secure, voice-controlled intra/intersquad voice/data radio;
- Digitally linked personnel status monitoring, Combat ID and CB detection;
- In-stride mine avoidance;
- Small arms body armor;
- Signature suppression/control;
- Unexposed viewing/firing;
- Enhanced night time maneuverability;
- Information management (reports, op orders, FRAGOs);
- Embedded training/mission rehearsal;
- Modular, lightweight, mission-tailorable system; and
- Components for optimal task organization.

A single systems contract was awarded in 26 Aug 94 to Motorola Corporation to facilitate an optimal system integration and maximum leveraging of the commercial sector, particularly in microelectronics and telecommunications. Significant emphasis is being placed on Integrated Product and Process Development (IPPD) to ensure maximum producibility, reliability, and affordability of the system and its components.

DoD Food Research. The DoD Food and Nutrition Research, Development, Test, Evaluation, and Engineering Program was established by the DoD Directive 3235.2 and provides the Office of the Secretary of Defense and the DoD components a science and technology base to support the formulation and execution of food service system management decisions. Proposed food and nutrition research funding, included in the annual budget request to Congress, is based on the needs of the DoD components, as submitted to the Army as DoD Executive Agent, and for the maintenance of the food and nutrition science and technology base.

Research efforts focus on sustaining the warfighter by supplying them with high quality nutritious rations that are essential to their survival and overall effectiveness and performance.

Food related STOs include:

- Family of Operational Rations - Self-heating, ready to eat characteristics of self heating individual rations will be demonstrated by FY96; and

- Rapid Deployment Food Service for Force Projection - Integrates multifuel, combustion and heat transfer technologies, power generation, advanced insulating materials, and non/low powered regenerative refrigeration into a rapidly deployable, fuel and water efficient field feeding system providing premium quality hot meals to all fighters, including the first-to-fight, in forward and remote areas.

Research, Development and Acquisition

Mounted Forces. RDA strategy is based on continual development of leap-ahead technologies for subsystems and parent systems. This strategy ensures overmatching lethality and survivability against a potential enemy.

Mounted Forces RDA Summary

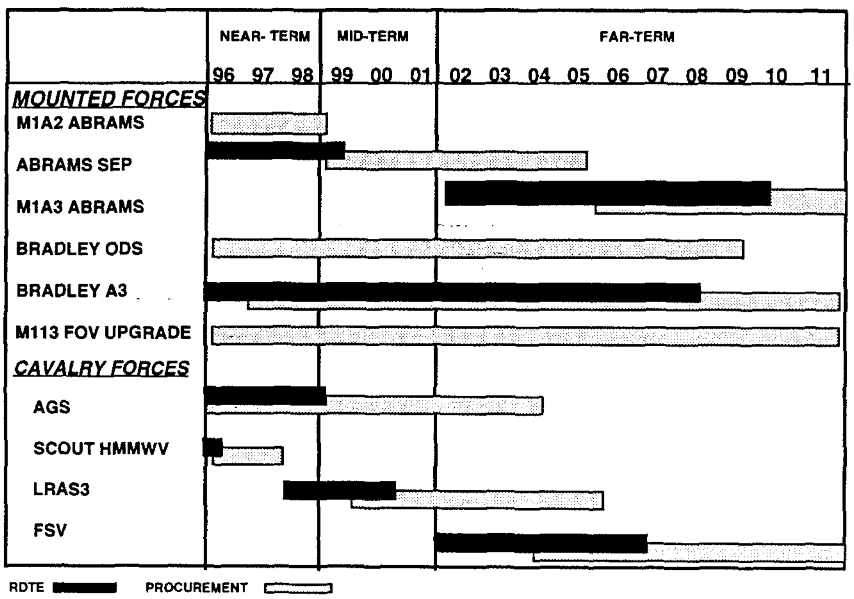


Figure B-5

Close Combat - Light. RDA strategy is based on a balanced approach to development that weighs developments in lethality, survivability, and protection.

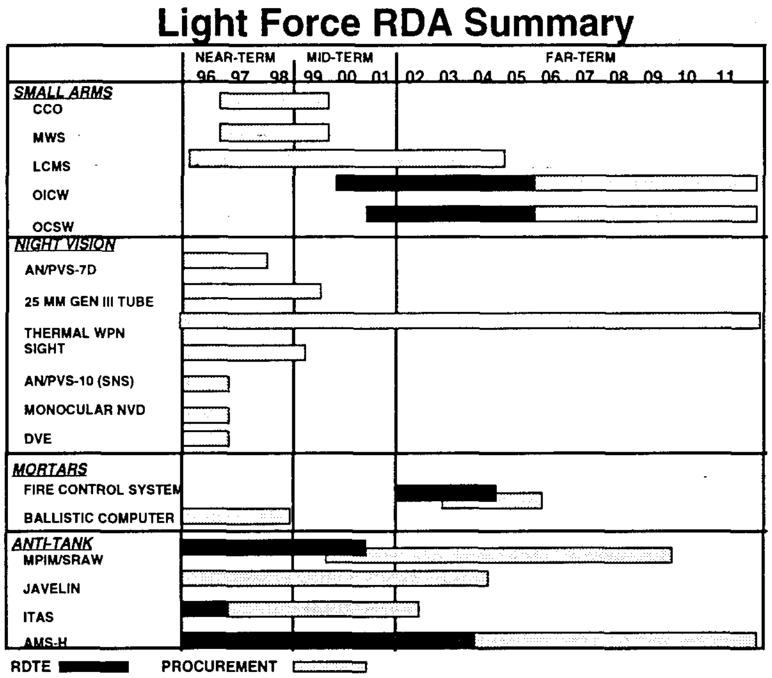


Figure B-6

Engineer and Mine Warfare. Whenever possible, engineer systems are acquired by procuring developed commercial items, products of sister services, or products of foreign sources. Research and development is undertaken when this strategy is not feasible.

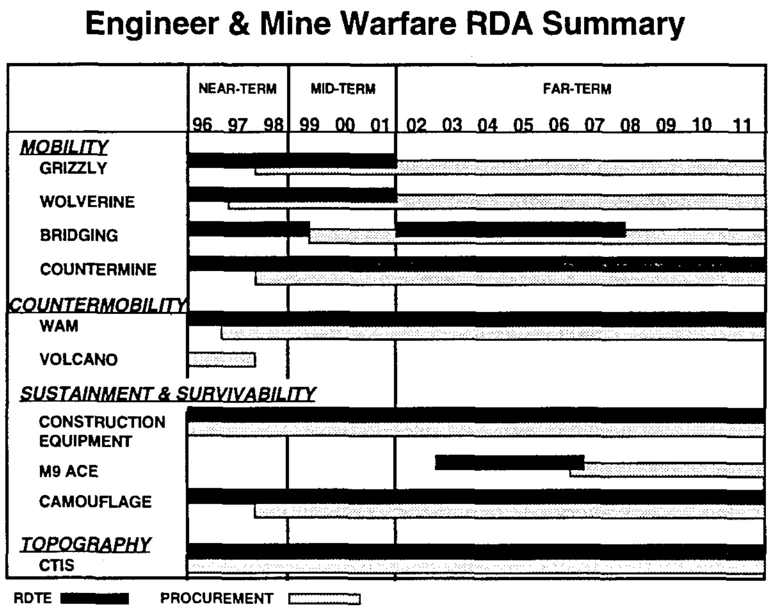


Figure B-7

Soldier Systems. The Army's premier and overarching soldier modernization program is comprised of the Warrior Programs (Land Warrior - to include the follow-on effort supported by the 21 CLW ITP, Air Warrior, and Mounted Warrior). These programs focus on the soldier as a system and modernizing that system in block improvements. The strategy is twofold: (1) get the best available technology into the hands of soldiers as fast as possible, and (2) look at promising yet presently immature technologies and transition them as they mature, using streamlined development and procurement programs.

SOLDIER SYSTEM

SOLDIER ENHANCEMENT PROGRAM
FY95 RDT&E COMPLETIONS

M24 FLASH SUPPRESSOR/BLAST ATEN	CLOSE COMBAT OPTICS
XM144 STRAIGHT TELESCOPE	5.56 MM AP ROUND
MINIATURE BINOCULARS	7.62MM AP ROUND
XM67 PORTABLE PERISCOPE	.50 CAL MULTI-PURPOSE ROUND
M249 COLLAPSIBLE BUTTSTOCK	MEDIUM MACHINE GUN
STUN GRENADE	ELECTRONIC TOOL SUPPLY CATALOGS
DUAL MOUNT MR/MK 19	INTERIM WATER, IND PURIFICATION SYS
30 ROUND MULTI-MAGAZINE HOLDER	IMPROVED MECHANICS COVERALLS
IMPROVED SKI BINDINGS	IMPROVED HOT WEATHER BOOT
INDIVIDUAL SOLDIER ENHANCED RATIONS	IMPROVED SOCK SYSTEM
IMPROVED PASGT HELMET SUSPENSION	ENHANCED TACTICAL LB VEST
IMPROVED RAINSUIT	SMALL UNIT SHOWER
IMPROVED SHELTER HALF	PARACHUTIST IMPACT PROTECTION
IMPROVED BUTT PACK	

Figure B-8

Land Warrior (LW). The LW is the follow-on development to the operational capabilities successfully demonstrated in the 1992 Soldier Integrated Protective Ensemble (SIPE) ATD. LW will develop and field a first generation, integrated fighting system for dismounted combat soldiers. It will provide improved capabilities in lethality; survivability; mobility; sustainment; and command, control, computers and intelligence (C4I). LW is the lead program and the technology carrier for Warrior Programs as a whole. Land Warrior will field an integrated soldier fighting system by 1999 and fully outfit the maneuver units of a division by 2003. This first fielding is called Block I.

Maturing technologies identified during the 21CLW ITP will feed directly into the LW Block II acquisition program, which is scheduled to provided a complete, or block, upgrade of LW Block I. This upgrade starts in 2003 and ends in 2010.

Mounted Warrior is an integrated system comprised of mounted crewmen and their fighting vehicles. It includes modular subsystems that improve the performance of combat ground crewmen. The operational capabilities and requirements of the Mounted Warrior are linked to the Land Warrior program through technology insertion.

Air Warrior is a conceptualized mission tailorable system that standardizes, integrates, and achieves optimum synergy of benefits for several types of current rotary wing Aviation Life Support Equipment (ALSE), and the development of new and improved ALSE. AW is a joint Army/Navy Acquisition Category (ACAT) III program designed to enhance aircrew warfighting capabilities through the development and systems integration of a wide range of individual components and technologies. Those portions of the AW system which will interface with air vehicle mounted systems will be integrated through a common interface and design-in compatibility.

Items such as flight clothing, body armor, Nuclear, Biological and Chemical (NBC) equipment, and some helmet functions are improved to protect the wearer against hazards associated with crashes, fires, and threat weapons. ALSE items, such as flotation gear, antiexposure suits, personal weapons, and radios integrate with and compliment each other to improve air crew mission capabilities by relieving the stress of excessive nonintegrated ALSE equipment.

SOLDIER SYSTEM

SOLDIER ENHANCEMENT PROGRAMS

FY96 NEW STARTS

- SELECTABLE LIGHT WEIGHT ATTACK MUNITIONS
- MID-SIZED RIOT CONTROL DISPENSER
- 40MM GRENADE (LESS THAN LETHAL)
- LIGHT WEIGHT BALACLAVA
- SHIN/KNEE GUARDS FOR RIOT CONTROL
- ANTI-REFLECTION SHIELD
- COMPRESSION SACK
- 5.56MM CARTRIDGE (LESS THAN LETHAL)

FY96 CARRY OVER EFFORTS

- Soldier Fighting Cover
- Imp. C/B Protective Mask
- Modular Weapon System
- 40MM IR Illum Round M203
- Mounted Crewman Boot

FY96 CARRYOVER EFFORTS (Continued)

- LtWt Chem Prot Overgarment
- HMMWV Machine Gun Mount
- CBT Medic Vest System
- Stabilizer Binoculars
- Fighting Position Revetment Kit
- Inconspicuous Body Armor
- LtWt Leader Computer
- Enhanced Incendiary Grenade
- Improved 40MM Smoke Round
- Stun Grenade
- Medium Machine Gun Upgrade
- Optic Sight M249, M60, M240G
- Individual Sandbag Accessory
- Individual Soldier Radio
- Armor Crew/Inf Protective Mask
- Improved Personal Flotation Sys

Figure B-9

SECTION 4

CONCLUSION

Mounted forces of the future must be able to project lethal and survivable combat power anywhere in the world. The Abrams tank and the Bradley Infantry Fighting Vehicle will continue to be the cornerstone systems for future mounted warfare. They combine with Crusader, Comanche, and Apache Longbow to interface on the future battlefield and give the American soldier unsurpassed lethality. Upgrades to both systems must continue to exceed the increasing technological capabilities of potential adversaries. The introductions of the Grizzly breaching vehicle and the Wolverine assault bridge to mounted force operations are long overdue. Technological advances for weaponry, armor, and for all combat maneuver systems must be parallel in the future.

Close combat forces must also capitalize on advances in technology to allow increased lethality and survivability of the individual soldier. Soldier Systems are an integral and inextricable part of the future digitized battlefield. Modernization of Soldier Systems (whether ground, mounted, or air) will continue to capitalize on emerging technologies that enhance existing soldier capabilities and provide new capabilities to ensure land force dominance. Priorities for the future must focus on the ability of the dismounted soldier to acquire targets and observe the battlefield in all weather -- day and night, engage targets with lighter weapons with greater lethality, and survive both hostile fire and the environment under a wide range of conditions.

Future emphasis on Engineer and Mine Warfare systems will be diverse. Mobility support to the force must be continued through development and fielding of standoff mine detection and breaching technologies as well as programs to replace and enhance bridging equipment. The future of countermobility lies in Intelligent Minefield technology with the Hornet and smart/brilliant mines. Survivability and Sustainment are both linked to the quality and quantity of modern construction equipment in order to meet the demands of worldwide support to our force projection Army; recapitalization of this fleet must receive more attention in the future. Tactical topography must maintain pace with technology if we are to provide rapid generation of terrain related products in support of our force projection strategy.

Overall, our combat maneuver systems are rated **AMBER** through the far-term. The proper identification and development of future Army requirements is ongoing. The correct focus on maintaining the technological edge in equipment for our soldiers is providing us that advantage. However, the reality of budget constraints often causes disjointed and tiered fielding of modern systems. The effects on soldiers is they often must maintain duplicate generations of equipment, multiple sets of repair parts, and maintenance capability. Fielding programs are often spread over several years in the same divisions and product update modifications may be applied before fielding to a single unit is complete.

Funding must remain robust enough to field to soldiers state-of-the-art, high quality ground combat equipment that links them to other Army and Joint components of the 21st Century battlefield. In doing so we must continue to better synchronize new equipment fieldings across the spectrum. The goal is to provide units the best capabilities of the most modern equipment in a reduced time.

The success of future missions that support our National Defense Imperatives and the survival of our warfighting soldiers depends upon sufficient and stabilized funding to field 21st Century technology.

ANNEX C

COMMAND, CONTROL, COMMUNICATIONS, AND COMPUTERS (C4)

SECTION 1

INTRODUCTION

The **"Information Age Army"** will be characterized by revolutionary developments in computing, rapid insertion of information and communications technologies, and major changes in strategic and domestic environments. These characteristics are spawning unprecedented modernization requirements for Force XXI C4.

Essential Elements Of Force XXI C4

C4 modernization will support Force XXI by exploiting "leap ahead" information transport, processing, and security technologies that are designed to give commanders overwhelming decision cycle superiority. Figure C-1 depicts the Essential Elements that ensure dominance of Force XXI C4.

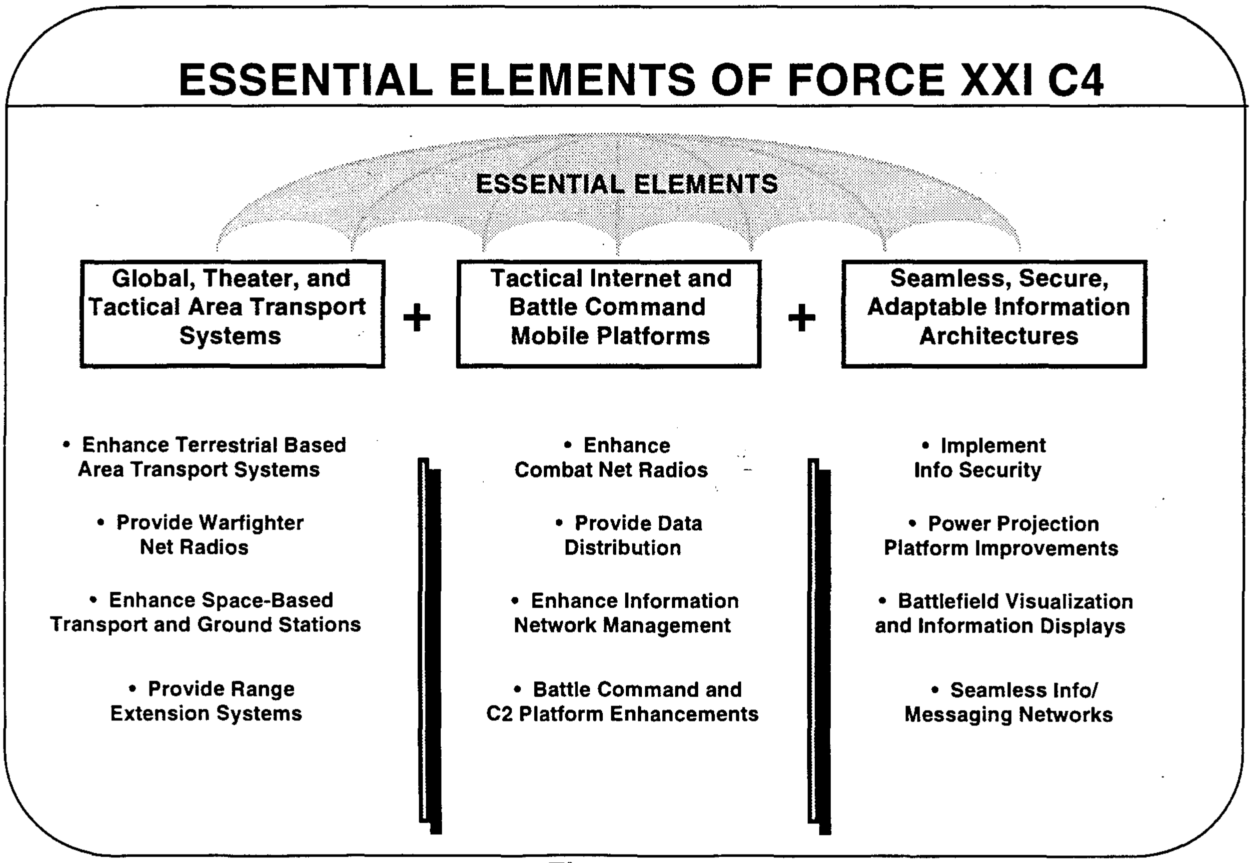


Figure C-1

Global, Theater, and Tactical Area Transport Systems: Global, Theater, and Tactical Area Transport Systems provides a broadband, high capacity, terrestrial, over the horizon, and satellite-based transmission and broadcast system that supports **high volume information operations** throughout the theater and to the strategic and sustaining base domains. Additionally, it is a multi-functional, interoperable, asynchronous transmission switching system with video, voice, and data switch capabilities that "plugs" directly into theater and strategic entry points. These items are all essential for force projection, split-based, and theater/tactical operations.

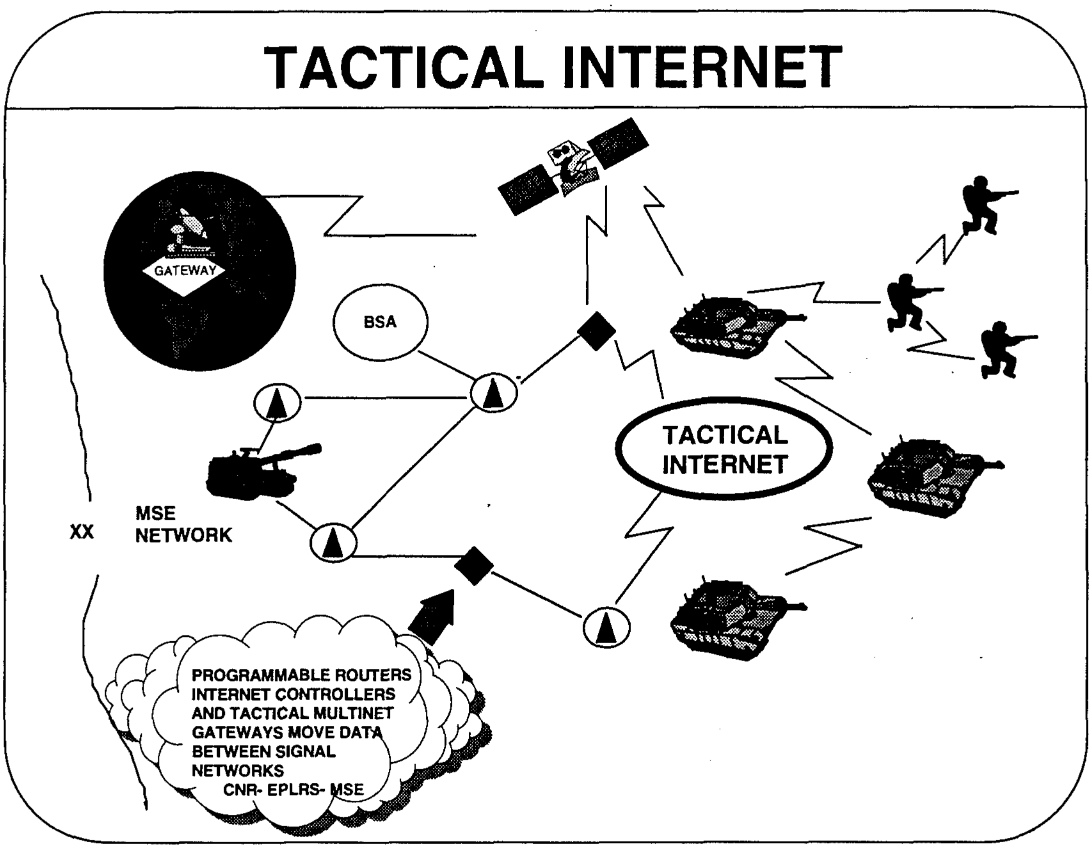


Figure C-2

Tactical Internet and Battle Command Mobile Platforms: Figure C-2 depicts the wireless internet and communication technologies that **transport essential battle command information, near real-time situational awareness, and virtual presence video** to key command and control cells within the digitized force during all phases of the operation. Commanders and staffs must have the capability to exchange critical information while moving or stationary in a variety of platforms, including aircraft, tracked or wheeled vehicles, and fixed or tactical command posts. The tactical internet will "plug" into the tactical communications system that carries information to theater and higher information centers. Tactical locations or platforms will house future digital radios with miniaturized components and multiple waveform capabilities, common interfaces, and open system protocols that handle video, imagery, data, and voice.

The radios will employ conformal phased array or multiplexed antennas that provide an uninterrupted full duplex exchange of information while stationary or on the move.

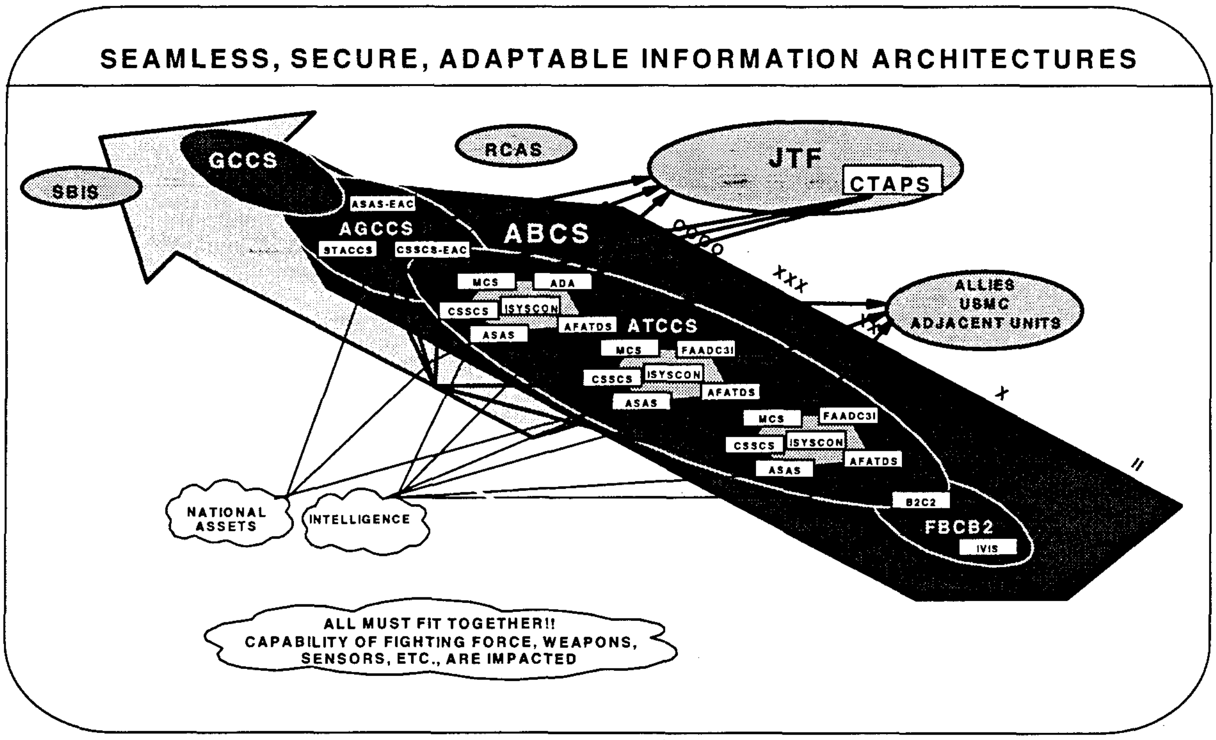


Figure C-3

Seamless, Secure, Adaptable Information Architectures: The Army Battle Command System (ABCS), integrated with Army Global Command and Control Systems (AGCCS), provides seamless, secure, adaptable information architectures to support battle commanders and staffs at all echelons, as depicted in Figure C-3. ABCS exchanges force level information within dynamic, fluid, rapidly changing joint and combined battlespace environments. The architecture will provide common applications use of state-of-the-art information management technologies at every level, provide for **horizontal and vertical integration** of information, and implement **open system common operating environments established by the technical architecture (TA)**. Adherence to the TA will facilitate integration with commercial capabilities and services.

Twelve C4 Support Modernization Objectives

Following are twelve C4 Support modernization objectives, with near-term and far-term capability descriptions, that support the essential elements of Force XXI C4. They represent a combined modernization strategy that (1) improves/enhances existing capabilities, and (2) takes advantage of "leap ahead" technologies.

Enhance Combat Net Radios: This initiative improves the single channel frequency hopping combat net radios across the Army. Combat Net Radio modernization will provide optimal throughput improvements, key user enhancements, and interface capability for the Force XXI tactical internet in the near-term. Additionally, it provides significant throughput increases, multiband and multifunctional future digital radios, in the far-term.

Implement Information Security: Given the vulnerabilities of information systems to information warfare attack, the capability to detect, react, resume and restore information operations is critical. This capability implements multi-level security and processing systems to protect against intrusions, disruptions, and network hijacking. It provides minimal security in the near-term through the use of network encryption systems and secure network server firewalls that allow non-secure information to pass from the "secret-high" tactical networks to the Not Classified but Sensitive Internet Protocol Router Network (NIPRNET) only. In the mid-term, it will provide the transition to defense messaging products to allow crossover from tactical to sustaining base information systems. In the far-term, it incorporates trusted work station concepts with end-to-end encryption devices and user identification cards.

Provide Data Distribution: In the near-term, there is a requirement exists to provide data distribution radios in the field to off load some information from combat net radios. The initiative improves the data rate and integrates EPLRS with the Force XXI tactical internet. It begins development of an increased throughput data radio in the mid-term, and migrates with combat net radio to develop the future digital radio in the far-term. Additionally, it supports air defense data distribution requirements, and integrates them for joint engagement and force operations that provide theater missile defense for Force XXI.

Seamless Information/Messaging Networks: This objective supports the standardization of computer hardware, software, and applications. It provides client/server architectures that have secure writer-to-reader defense messaging capabilities regardless of message origin, termination, or classification. It also provides for interfaces between combat service support systems and sustaining base automated information systems. Additionally, it provides interfaces for tactical radio systems in support of the tactical internet and mobile gateway systems for reach-back connectivity to strategic and sustaining base information/messaging systems. This initiative opens the pathways to support split-base operations and force projection.

Provide Warfighter Net Radios: This program provides the single channel UHF tactical satellite radios that ensure the means for the commander to command the force in an unrestricted geographical environment in the near-term. These are currently limited by existing satellite channel capacity. The enhanced manpack user terminals, that use demand assigned multiple access channels, will eliminate this constraint in the mid-term. The far-term goal is a migration to the **future digital radio** with multiband and multimode capabilities.

Enhance Terrestrial Based Area Transport Systems: In the near-term, modifications that improve terrestrial transport system (MSE/TRITAC) interoperability, switching capacity, and efficiency are critically needed to support deployability. Improvements will increase network management capabilities and provide network management tools to monitor information flow. In the far-term, fielding of downsized equipment for roll-on roll-off capability; integration of future switches that use asynchronous transfer mode; and digital cellular capabilities to transport video, data, and voice information are required. Additionally, this concept develops small personal wireless cellular telephone systems that will replace current systems. The improvement of the terrestrial transport system supports the mobility and rapid installation requirements of Force XXI.

Enhance Space-Based Transport And Ground Station Systems: In the near-term, a Universal Modem for DSCS will provide an Anti-Jam (AJ) capability for critical traffic. Modernizing existing satellite ground stations for DSCS terminals will increase the data rate requirements for the force projection army. The procurement of STAR-Ts will provide greater reach-back capability through the use of commercial frequency bands. This tri-band (C, X, and Ku) satellite capability, combined with embedded switching that allows full use of both commercial and military satellites to support surge requirements, will be provided. Additionally, Milstar provides hardened, anti-jam, and LPI/LPD to the warfighter at Corps and below.

Power Projection Platform Improvements: Upgrades telecommunication infrastructure at designated power projection sites that deploy forces early. Includes improvements in voice, data, and video switching; outside transmission cabling; and network gateways to allow for "plug in" capability from the deployed force to the sustaining base.

Enhance Information Network Management: This modernization objective provides integrated systems control that facilitates planning and enables continuity of operations, security management, dynamic routing and access, frequency management, and information flow management.

Provide Range Extension Systems: In the near-term, UHF follow-on satellites will prevent lapses in global coverage. In the far-term, surrogate satellites and high altitude endurance unmanned aerial vehicles with tailorable C4 payloads and communications relay packages resolve over-reliance on current space based assets and create reliable alternatives for range extension.

Battle Command And C2 Platform Enhancements: This objective provides key C2 platforms with stable reliable power, quick erect antenna masts, and continues development of conformal phased array antennas to support mobility and rapid installation. Tracked platforms are given a vehicular information system that improves intercom and radio access communications. This initiative improves the secure enroute communication packages for forces rapidly deployed on aircraft enroute to an area of operations.

Battlefield Visualization And Information Displays: Battlefield Visualization enhances presentation of information in command posts by providing large screen flat panel displays that are capable of terminating video and automated information. This initiative improves battlefield visual documentation and information equipment to include digital cameras, automated editing, processing, recording, and storing. Development is begun on a battlefield video teleconferencing system that is transported on existing transmission systems.

Horizontal Technology Integration

The rapid exchange of information via high speed digital networks and data transfer systems is an absolute requirement of Army modernization. Digitization of the battlefield is a major component of Winning the Information War; it applies digital processes to capture the dynamics of the modern battlefield. The warfighter uses that information to direct forces in ways that will quickly defeat the enemy. C4 modernization is enhancing and defining the Horizontal Technology Integration of digitization into dissimilar systems (e.g., armored vehicles, aircraft, and command and control vehicles) with common C4 technology.

Summary

C4 modernization is critical to each of the Army's five Modernization Objectives: Project and Sustain, Protect the Force, Win the Information War, Conduct Precision Strike, and Dominate the Maneuver Battle. This annex specifies those programs that support the C4 modernization azimuth and the development of an Information Mission Area (IMA) infrastructure which can reach this goal.

SECTION 2

CURRENT PROGRAM ASSESSMENT

This section describes key modernization programs to overcome threats and challenges to battlefield command and control. These programs are the weapons with which we can "Dominate the Information War."

Command, Control, Communications And Computers (C4)

Force XXI is dependent on C4 to ensure success. Specific C4 modernization programs to meet the needs of the Force XXI battlefield commanders are set forth below.

Army Battle Command System (ABCS)

The system that will provide common picture, situational awareness, and digitization of the battlefield is ABCS. ABCS is a conceptual and technical evolution of the existing Army Tactical Command and Control System (ATCCS) Battlefield Functional Area Control Systems (BFACS), AGCCS, and Force XXI Battle Command Brigade and Below (FBCB2) system. The FBCB2 initiative is the centerpiece of the Army's efforts to digitize a Brigade (FY97), elements of a Division (FY98), and elements of a Corps (FY99). ABCS is the migration of subsystem functional application software programs to a common operating environment (COE) shared by all subsystems. The COE provides horizontal interoperability among all battle command systems from fighting platform to sustaining base. The COE ensures that applications from all subordinate systems will run side by side and will share information, giving "plug-and-play" functionality to the commander.

As OSD and JCS develop the joint common operating environment, and select common support modules, they will be incorporated within ABCS. The joint COE will provide joint interoperability needed by joint task force commanders for force projection command and control.

Army Global Command and Control System (AGCCS). AGCCS is the Army component system that directly supports implementation of the Joint Global Command and Control System (GCCS) and provides the Echelons Above Corps (EAC) portion of the ABCS. AGCCS supports operations from peace to war, including contingency and natural disaster operations. It supports the Army Component Commands, Army CINCs, Army JTF Commands and Components, and HQ, Department of the Army. Likewise, AGCCS supports all staff sections within a headquarters, and all phases of conflict. AGCCS can host necessary applications to support JTF HQ functionality. The primary purpose is to provide a single, seamless command and control system that supports joint, multi-national, and both Army strategic and operational levels of conflict.

AGCCS is built around the Joint COE and is an interoperable component of the GCCS. Its design ensures software and technology reuse and minimizes duplication among command and control systems.

The AGCCS objective system is being achieved through the evolutionary process of fielding hardware, software, and communications components. These components provide commanders and staff officers the functional capabilities currently defined in the Army World Wide Military Command and Control System (WWMCCS) Information System (AWIS), Standard Theater Army Command and Control System (STACCS), and Combat Service Support Control System (CSSCS) life cycle documents.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	GREEN	AMBER

System development is fully funded in the near and mid-term. AGCCS is rated **AMBER** in the near-term because the software has not been operationally demonstrated and schedule delays will cause a need for further funding. The mid-term is rated **GREEN** because all the hardware and software requirements will be developed and fielded. The far-term is rated **AMBER** because the system is programmed for technological advances but not for hardware replacement.

Army Tactical Command and Control System (ATCCS). ATCCS incorporates both the development of software applications to support the force level commander and his staff, and the integration of applications from the ATCCS Battlefield Functional Area Command Systems: Maneuver Control System (MCS), Advanced Field Artillery Tactical Data System (AFATDS), Combat Service Support Control System (CSSCS), All Source Analysis System (ASAS), and Forward Area Air Defense Command and Control (FAADC2) System into the common applications support software (CASS). This results in an Army Common Operating Environment (ACOE). It integrates modernization of these five computerized/automated command and control systems. The ACOE specifies common protocols, system languages, report formats, and necessary interfaces for each of the five independently developed systems to ensure an overall cohesive and compatible C2 system for the force. Additionally, ACOE provides the common connectivity means between the five arms of the C2 architecture and allows battlefield commanders to rapidly acquire and integrate information, determine optimal battlefield actions, direct their implementation, and control their execution in joint and/or multinational environments. Only MCS is discussed in detail in this annex. For information on AFATDS, see Annex E; CSSCS, see Annex I; ASAS, see Annex D; and FAADC2, see Annex F.

Maneuver Control System (MCS) is the primary battle command system, providing the common picture, decision aides, and overlay capabilities to support the tactical commander and the operational staff via interface with the force level database.

MCS features maximum interoperability, hardware and software commonality, and a digitized database.

NEAR-TERM (FY96-98)	MID-TERM (FY 99-01)	FAR-TERM (FY02-11)
RED	AMBER	AMBER

MCS is rated **RED** in the near-term due to funding and testing issues. There is an unfunded requirement (UFR) in FY96 to support software integration efforts in support of the 1st Quarter FY97 Initial Operational Test and Evaluation. Software integration efforts will be used during Task Force XXI Advanced Warfighting Experiment (AWE). If the FY96 UFR is not resolved favorably, software integration efforts and ultimately the program schedule will slip at least one year. Although MCS will be 100% fielded by FY03, in accordance with the current fielding plan, it is rated **AMBER** in the mid-term and far-term because the fielded system will be unable to keep abreast of rapidly changing automation technology.

Common Hardware/Software (CHS) is provided to the Army battlefield functional areas to minimize the number of unique hardware and software systems used for Army Command and Control. Hardware and software will evolve through a series of buys, each infused with the latest technology. CHS also includes the Common Software (CS) initiative. CS consists of the Joint COE along with common applications. The CS initiative will extend the COE with products to be used by a wide variety of Army systems.

NEAR-TERM (FY96-98)	MID-TERM (FY 99-01)	FAR-TERM (FY02-11)
GREEN	GREEN	GREEN

CHS is adequately funded. Funding provides support for the research, development and contracting requirements of current and future hardware/software systems. Program is rated **GREEN.**

Standard Integrated Command Post System (SICPS) is a family of standardized command post facilities developed to house the ABCS across all battlefield functional areas. Variants include a Modular Command Post Tent (MCPT), Rigid Wall Shelter (RWS), track vehicle CP (M1068), 5-ton expando van CP, M988 HMMWV CP, and Large SICPS Shelter (LSS). SICPS variants facilitate C2 functions at Corps through Battalion. Fielding of the MCPT to light divisions has been completed. The bulk of fielding to Contingency forces will begin in FY97.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	AMBER	GREEN

SICPS is rated **AMBER** in the near- and mid-terms, because only a limited number will be fielded to the contingency force units. SICPS is rated **GREEN** in the far-term, because all units will be fielded by FY08.

Communication Systems

The **Communications Systems** that link the elements of the Army's C4 architecture on the battlefield are the Area Common User Communications System (ACUS), Combat Net Radios, the Army Data Distribution System, Information Security, and the Military Satellite Communications Systems. Transition to commercially accepted internet-like technology will greatly improve seamless data transport capabilities.

Area Common User System (ACUS) is an all digital telecommunications system for the battlefield composed of switching, transmission, network control, and subscriber terminal equipment. The corps and below area common user system is Mobile Subscriber Equipment (MSE). Echelons above corps communications is provided by Tri-Services Tactical (TRI-TAC) systems. MSE and TRI-TAC will become fully interoperable in FY97, using a common flood search circuit switched network and tactical packet switch network to provide automated, secure voice and data communications. ACUS links command posts from maneuver brigade to the JTF/ ARFOR HQ, provides "cellular-like" access for mobile subscribers, and interfaces with strategic voice and data systems. The Integrated System Control (ISYSCON), a joint program, provides technical planning, management, and technical control of tactical communication networks which are collectively referred to as the wide area network (WAN). The Tactical Packet Network (TPN) aspect of ACUS is the backbone of the Tactical Internet and will allow ACUS subscribers to exchange data with SINCGARS/ EPLRS data subscribers via router gateways and bridges. The ACUS data network will evolve to be the battlefield component of the Integrated Tactical Strategic Data Network - Army (ITSDN-Army), providing seamless connectivity between strategic/sustaining base data subscribers and the deployed force.

The technologies used in the current ACUS equipment have recognized limitations that will hinder seamless, robust support of the digital battlefield. The ACUS - System Improvement Program is designed to transition the ACUS to commercial technologies such as Asynchronous Transfer Mode (ATM), Integrated Services Digital Network (ISDN), wide-band/Synchronous Optic Network (SONET) transmission and router-based data networks. These improvements will provide the efficient use of increased bandwidth required to support multi-media subscriber devices, Personal Communications Services (PCS), Video Teleconferencing (VTC), and the tremendously expanded data traffic expected on the future battlefield. The future ACUS system, Warfighter Information Network (WIN), will be interoperable with evolving Joint Systems and will use Multi-Level Security (MLS) equipment to provide a seamless interface between the Tactical Internet and strategic data networks in support of force projection and split-based operations.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	AMBER	AMBER

ACUS is rated **AMBER** in the near-term because funding for crucial technology insertion improvements has been whittled away to resource various unfunded modernization requirements; thus accelerating the technological obsolescence of the fielded ACUS system. Once the ABCS systems are fielded, mid-term ACUS will lack the bandwidth capacity and network management capabilities necessary to fully support the digitized battlefield, rating an **AMBER**. In the far-term, the Army plans to upgrade ACUS with commercial switching, router, and transmission technologies, but Extended Planning Annex (EPA) funding is uncertain and the ability to provide this required capability for the total force is rated **AMBER**.

Combat Net Radios (CNR) are the Single Channel Ground and Airborne Radio System (SINCGARS), the Improved High Frequency Radio (IHFR), and the Future Digital Radio (FDR).

Single Channel Ground and Airborne Radio System (SINCGARS) replaces the VRC-12 family of radios to provide commanders with a reliable, easily maintained, secure radio for Command and Control (C2). SINCGARS incorporates effective electronic countermeasures against threat jamming through the use of frequency hopping spread spectrum technology. The radio has been consistently improved through technology insertion. The SINCGARS family of radios provides voice and limited data transmission capabilities. The current SINCGARS System Improvement Program (SIP) specifies the integration of Global Positioning System technology; improved data throughput rates; decreased weight; and improved interoperability, both voice and data, with Mobile Subscriber Equipment (MSE) and EPLRS through use of internet controllers. The SIP SINCGARS, which is an integral component of the tactical internet, debuts in FY96 and will be retrofitted to Force Package I/II units; SINCGARS A/B model radios will be cascaded to lower priority units. The program is to be completed in FY04 with fielding of SINCGARS to the total force. An accelerated fielding program is being considered which would complete fielding by FY98. The accelerated program is contingent on additional funding. The Frequency Hopping Antenna Multiplexer, used with up to four co-located SINCGARS radios, allows use of a single antenna. This reduces both electromagnetic interference and the electromagnetic signature of high priority sites and mobile battle command platforms.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
GREEN	GREEN	GREEN

Program is rated **GREEN**. The SINCGARS System Improvement Program is on schedule and will be fielded to TF XXI.

Improved High Frequency Radios (IHFR). The Signal Center identified a requirement for a new family of Improved High Frequency Radios (IHFR) to provide the Army an over-the-horizon communications capability that would be user owned and operated. The new radio must have embedded COMSEC and an internal modem for ease of data transmissions. The radio would interface with ATCCS common hardware and software and be user friendly. Various versions of the radio would be developed: manpack, low power vehicular mounted, high power vehicular mounted, high power rack or bench mounted, and low power aircraft mounted.

A formal IHFR operation requirements document has not been completed; therefore, this item is unresourced in the POM.

Future Digital Radio (FDR). To meet the demands of battlefield communications requirements, the Force XXI Army will use a Future Digital Radio (FDR) that employs redundant ECCM techniques, multi-layered communications security systems, programmable/selectable and in some instances simultaneous, multi-band-multi-mode operating modes, and state-of-the-art digital signal processing systems. Taken to its theoretical limit, FDR will replace all push-to-talk radios (SINCGARS, EPLRS, TACSAT, and IHFR) and mobile telephones on the battlefield, and many other communications terminals now in use. The FDR will be used in manpack, vehicular, shelter/bench mount, and airborne configurations.

A formal requirements document has not been completed; therefore, FDR is unresourced in the POM, but is recognized in the EPA.

Army Data Distribution System (ADDS) is a Command, Control, Communications, and Computers network which provides medium and high volume, real time data communications to support the ABCS. ADDS consists of the Enhanced Position Location Reporting System (EPLRS), the Near-Term Digital Radio (NTDR), and the Joint Tactical Information Distribution System (JTIDS).

EPLRS is a robust, reliable system that provides the passage of targeting data, combat orders, Situation Reports (SITREPS), intel data, and messages between friendly units at the tactical level. EPLRS enhances situational awareness by automatically tracking and identifying friendly units to other EPLRS equipped units. The system reduces fratricide and is interoperable with the USMC PLRS system.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	AMBER	AMBER

Currently EPLRS is being fielded to a limited number of Force Package 1 units at a reduced BOIP level. EPLRS acquisition strategy will include the procurement of the remaining balance to complete the fielding of a data radio to Force Package 1. This strategy is viewed as an evolutionary step to the Near-Term Digital Radio and, ultimately, to the Future Digital Radio. EPLRS is rated **AMBER** in the near-, mid- and far-terms due to limited fielding.

NTDR is the Army's data communication backbone from platoon to brigade. NTDR will be adaptive in terms of data handling capability for large data files, i.e.

imaging and near real-time video. It will have an open hardware architecture to permit technology growth.

JTIDS, a joint program, is a computer-based radio terminal which is integrated into host Army Air Defense Command and Control Systems. It provides necessary real time, high volume data communications between users and joint (USAF and USN) targeting platforms. Annex F (Air Defense) further outlines the funding requirements of the JTIDS program.

Information Security (INFOSEC) secures Army-wide tactical, strategic, and sustaining base communications. It contributes to the C2 Protect aspects of information warfare and supports security of strategic requirements for the national command authority. INFOSEC is needed to secure army-wide tactical, strategic, and sustaining base communications for command and control, electronic warfare, and information systems, and to provide security interface and interoperability of joint systems. It is integrated into the Total Package Fielding (TPF) from multiple sources in order to support all weapons and telecommunications systems. INFOSEC provides protection to telecommunications and information systems that process classified or national security related information and is necessary to ensure authenticity, confidentiality, integrity, and the availability of those systems.

Multi-level Security (MLS) will permit communications over the entire classification spectrum to share the same transmission paths. The MLS objective solution is one of the most difficult issues to solve under current technical and budgetary constraints. With the rapid advance of information technology, it is extremely difficult to field a standardized product in a timely manner. The goal is to identify affordable alternative solutions to our expanding Force XXI and Joint requirements.

Secure Terminal Equipment (STE) is an integrated communications terminal device, which can be used at strategic and tactical echelons, and is capable of traversing analog and digital domains. It provides secure (end-to-end encrypted) voice and data communications in support of any mission at any level.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
RED	RED	AMBER

Multi-level Security (MLS) procurement is unfunded in the near- and mid-terms, thus the **RED** rating. The INFOSEC MDEP (MX5T) took a >50% cut in FY 95-01 during the FY94 POM cycle. Due to those cuts insufficient funds are allocated to field AIRTERM to all Force Package 2-4 units. Funding is **AMBER** in the far-term (FY 02-11 as projected in the EPA) because of the uncertainty of funding and whether available technology will solve MLS architecture and fielding issues. EPA funding should field Secure Terminal Equipment (STE) to the force (strategic and tactical).

Military Satellite Communications Systems

The **Defense Satellite Communications System (DSCS)** is a Joint, world-wide military satellite system which supports long-haul communication requirements of deployed warfighters. DSCS provides super high frequency (SHF) wideband and anti-jam satellite communications, supporting critical national strategies and tactical C3 requirements. The Army is designated Executive Agent for DSCS ground segment and is responsible for five DSCS Operations Centers that control and maintain communications access. The AN/GSC-39 medium and AN/FSC-78/79 heavy terminals provide strategic satellite communications support to the Defense Communications System via DSCS satellites. Currently, there are several plans to modernize current DSCS ground environments.

- The Heavy Terminal/Medium Terminal (HT/MT) Modernization Program replaces aging low rate reliability equipment with state-of-the-art equipment and extends terminal life by fifteen years. This program also maintains performance requirements and reduces operating and overall support costs.

- The Universal Modem System (UMS) is being developed as the first modem to fully implement the NATO waveform standard. The UMS will be used in strategic and tactical applications, providing a seamless architecture for joint/combined operations.

- The DSCS Operation Control Systems (DOCS) provides critical subsystem enhancements that will remedy technological obsolescence, decrease facility manpower requirements, combine control functions on common computer systems, and enhance mission performance through modernization of the Army's SATCOM control capability.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	AMBER	GREEN

The DSCS program is rated **AMBER** in the near- and mid-terms because the Universal Modem System (UMS) is not fully fielded. The program is rated **GREEN** in the far-term based on UMS fielding completion.

The current **Army Milstar** program is developing the **Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T)** and the **Single Channel Anti-Jam Manportable (SCAMP)** terminal to support corps and below units. The SMART-T provides a multi-channel range extension to the Army's Mobile Subscriber Equipment in the EHF band. The SMART-T operates in both low and medium data rates (LDR/MDR) and has the inherent capability of low probability of intercept/low probability of detection (LPI/LPD). The SCAMP is a EHF single channel terminal designed to interface with the Milstar LDR payload which operates in point-to-point and broadcast modes. SCAMP Block I (Manportable) provides critical command and control communications between

Theater/Corps Headquarters and their subordinate elements. The SCAMP Block II (Manpackable) significantly reduces terminal weight and provides point-to-point and Combat Net Radio range extension for conventional and special operations forces. Both the SMART-T and SCAMP transmit in the EHF band and receive in the SHF band.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
GREEN	AMBER	GREEN

SMART-T is not fully funded in the mid-term. The shortfall, creating the **AMBER** rating, impacts the development and deployment of the Milstar network control architecture management tool.

Tactical Satellite Communications (TACSATCOM) is currently the Army's primary tactical range extension satellite communications (multi-channel and single-channel) for C2 operating in the ultra high and super high frequency (UHF and SHF) ranges. Current modernization programs are the **Enhanced Manpack UHF Terminal (EMUT)** and the **SHF Tri-band Advanced Range Extension Terminal (STAR-T)**. The EMUT (AN/PSC-5) program modifies the existing family of single channel radios with embedded encryption and Demand Assigned Multiple Access (DAMA) capability. This allows better support of user demands for increased satellite access and better portability. The STAR-T is a HMMWV mounted, C-130 transportable (Roll on/Roll off), multichannel TACSAT terminal which operates with any commercial or military transponder-based satellite system within the X (DSCS), C and Ku (commercial) frequency bands. The STAR-T will have two versions; standard and switch. The standard version will consist of communications equipment, power generation, and an antenna system. The switch version will be identical to the standard unit with the addition of embedded automatic switching equipment. The STAR-T will replace AN/TSC-85B/93B ground mobile forces multichannel TACSAT terminals at Echelons Above Corps.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	AMBER	GREEN

Tactical Satellite Communications systems are rated **AMBER**, in the near- and mid-terms, due to insufficient funds to procure the required EMUT terminals. Program is funded, in the far-term, to field the acquisition objective of EMUT terminals, therefore TACSATCOM is rated **GREEN** in the far-term assuming continued funding of the program.

NAVSTAR Global Positioning System (GPS). GPS is a satellite-based, global, all weather radio navigation system that provides highly accurate positioning, velocity, precise timing information, and a common military grid for an unlimited number of users. It consists of three segments: Space Segment (GPS satellites operated by USAFSPACOM); Control Segment (ground control stations operated by USAF); and User Segment (GPS Receivers). Army GPS user equipment consists of passive receivers for air, ground, and sea users. These provide accurate navigation information for maneuver and support forces; precise positioning for firing platforms and target location for precise munitions in support of deep fires, indirect fire systems; and precise timing for communications and command and control systems. GPS is a robust system capable of denying full military accuracy to unauthorized users (Selective Availability-SA) and overcoming the threat's ability to use GPS signal generators to degrade or deny GPS to authorized military users (Anti-Spoofing- AS). GPS is considered essential to **dominating the maneuver battle**.

Space Segment

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
GREEN	GREEN	GREEN

User Equipment Segment

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	GREEN	GREEN

The current constellation of GPS satellites reached initial operational capability (IOC) in 1993 with full operational capability (FOC) achieved in 1994 and will continue at FOC with follow-on replacements as required. The User Equipment (UE) Segment is rated **AMBER** in the near-term because a limited capability exists for air applications. However, the near-term rating for ground and sea applications is rated **GREEN** because of on-going accelerated fieldings. UE mid-term rating is **GREEN** because adequate capability will exist in all applications. The GPS receiver is fully funded in the EPA of the 97-01 POM for the next generation of ground receivers and all weapon systems and aircraft are scheduled to have GPS integrated by the year 2002; therefore, GPS is rated **GREEN** for User Equipment in the far-term.

Command and Control Vehicle (C2V). C2V provides a tactical platform for state-of-the art communication/command and control systems and is capable of housing up to eight members of battle staff. The C2V is designed for robust integration of systems which are able to receive or transmit digital voice/data, significantly enhancing the decision making process. Key features are four computer workstations, an environmental control system, NBC overpressure, wireless local area network, and a 600 horse power engine, enabling it to keep up with the maneuver force.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
RED	RED	GREEN

The C2V program is in the Engineering and Manufacturing Development phase. The program is rated **RED** in the near- and mid-terms, because limited funding slows fielding. The First Unit Equipped will not be fully capable of Command and Control on the Move until FY01. The program is funded, in the far-term, to field the acquisition objective of 467 vehicles, therefore the C2V program is rated **GREEN** assuming continued funding into the EPA.

Information Mission Area (IMA) Infrastructure

The following programs are major modernization initiatives for supporting the Army's global information architecture. These programs focus first on modernizing "backbone" information processing and transfer capabilities vital to the daily operations of MACOMs and installations. Programs focus constrained modernization resources on those installations from which warfighters must maintain optimum readiness and be able to mobilize and deploy consistent with force package strategy and guidance.

IMA infrastructure programmed improvements allow the Army to better support the National Military Strategy by providing continuous, more responsive information flow from the National Command Authorities to the battlefield. The IMA infrastructure modernization strategy includes the major modernization programs discussed here.

Sustaining Base Information Services (SBIS). SBIS initiates the transition of existing Army-wide sustaining base information services to an open systems (non-proprietary) operating environment. This program provides software and hardware for installation and MACOM management applications, supporting base operations, and sustainment functions. Sustaining base functions encompass all information management resources and activities used to plan, organize, train, equip, deploy, control, sustain, and redeploy forces. Approximately 53 application modules will be fielded to 70 Army installations. Software and supporting hardware are fielded from FY96 through FY04, and are sequenced based on "go to war" support priorities.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	AMBER	AMBER

SBIS is **AMBER** for the near and mid-term periods (FY 96-01). The current SBIS funding profile does not support the development and fielding of SBIS required for Army infrastructure modernization and power projection. Budgetary constraints limit modernization to the fielding of 20 applications to 22 installations versus a requirement for 53 applications to 70 installations. This is primarily due to a FY95 Congressional reduction, a $100M POM reduction, and program restructuring in response to the Joint Applications Development Process. The program is **AMBER** in the far-term (FY 02-11) because SBIS will only be fielded to 43 sites by FY04, and not be fielded to the objective of approximately 70 installations.

Power Projection Command, Control, Communications, and Computer Infrastructure (PPC4I). PPC4I upgrades telecommunications infrastructure at Army installations in support of the Army's Power Projection strategy. For the program period, PPC4I upgrades those installations which project early deploying forces. PPC4I combines four existing telecommunications infrastructure component programs: (1) telephone switch; (2) outside transmission media cable plant; (3) backbone data network; and (4) the data gateway to communications networks external to the installation.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
AMBER	AMBER	AMBER

PPC4I is **AMBER** due to budgetary constraints which limit C4 infrastructure modernization to 38 of 72 installations to meet Army power projection platform objectives.

Defense Message System (DMS). DMS provides a single, secure, global interservice messaging capability extending from the sustaining base to the warfighter. DMS enables the closure of obsolete, resource-intensive telecommunications centers. DMS tactical implementation provides the warfighter with messaging support for the Joint Task Force environment and across the continuum of Army operations. DMS features: (1) user operated service; (2) a single form of message service and simplified message format; (3) multi-level secure message processing through the use of Multilevel Information Systems Security Initiative (MISSI) products as they become available; (4) automated local distribution via information transfer networks; and (5) multifunction workstations for most Army users.

NEAR-TERM (FY96-98)	MID-TERM (FY99-01)	FAR-TERM (FY02-11)
GREEN	GREEN	GREEN

The DMS program is rated **GREEN** and will be fielded in accordance with the Army Installation Sequence List (ISL). The objective goal is to provide a DMS messaging capability to both organizational and individual E-Mail users. The current funding level will allow us to provide a secure DMS messaging capability to organizational users, who currently have message release authority. This funding level will allow Army to continue to close resource intensive Telecommunications Centers and AUTODIN Switching Centers. DMS products will become available for limited IOT&E in 3rd quarter FY96. Fielding of program components will begin 1st quarter FY97 and will be integrated to provide the warfighter writer-to-reader messaging capability across the battlespace using a single C4 system on a single platform.

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

The C4 RDA strategy focuses on Land Force Dominance and primarily emphasizes **Winning the Information War** through the use of digital electronic technology.

The evolution of battlefield C4 into the 21st Century begins with existing systems as a baseline. In order to preserve investments, an evolutionary approach is used. Proposed improvements are modeled and simulated to determine military value and cost effectiveness prior to development and acquisition. Advanced Technology Demonstrations (ATDs), Advanced Concept Technology Demonstrations (ACTDs), and Advanced Warfighting Experiments (AWEs) involve the user via the Battle Labs. They examine emerging technologies for potential military applications to ensure that both operational and technical capabilities are achieved.

Army modernization efforts fall into the following general areas: battlefield digitization (also can be considered command and control) and communications. Battlefield digitization is the application of information technologies to acquire, exchange, and employ timely digital information throughout the battle space, tailored to the needs of each decider (commander), shooter, and supporter, allowing each to maintain a clear and accurate vision of his battle space necessary to support both planning and execution. Digitization allows the warfighter to communicate vital battlefield information instantly, rather than through slow voice radio and even slower liaison efforts. The baseline objective of the digital battlefield is to Win the Information War. Some key technology programs are listed below.

Digital Battlefield Communications ATD (FY 95-99). This ATD will exploit emerging commercial communications technologies to support multimedia communications in a highly mobile dynamic environment. It will supplement and in some cases replace "legacy" military communications systems which are unable to keep pace with the rapidly increasing demand for communications bandwidth and global coverage in support of the digitized battlefield and split-based operations.

Combined Arms Command and Control (CAC2) ATD (FY 93-96). The CAC2 ATD develops and demonstrates C2 functionality and shared situational awareness for brigade and below to include armor, aviation, mounted infantry, and fire support.

Battlefield Combat Identification (BCID) ATD (FY 93-98). This ATD aims to solve the combat ID problem. This effort leverages existing technologies and pursues new technologies to develop and demonstrate systems that will solve the ground-to-ground and air-to-ground battlefield ID problem emphasizing covert and secure operations in the mid-term (FY 99-01). This ATD provides the Army's contribution to the Joint Combat Identification ACTD.

Battle Space C2 ATD (FY 97-00). This program builds on the results of the CAC2 ATD and Task Force XXI and will expand situational awareness and force synchronization capabilities to Division, Corps, Joint, and Coalition forces, as well as provide seamless information management and transfer between upper echelons and the brigade task force.

Speakeasy Multiband Multimode Radio (MBMMR) (FY 95-00). This program develops and demonstrates the ability of the MBMMR to meet advanced communications needs. Demonstrations include a radio access point with asynchronous mode switching, and digital cellular radio applications.

Rapid Terrain Visualization ATD (FY 97-00). This program will provide to the Battlefield Visualization concept 3D computer generated scenes of terrain and local environment that will quickly provide realistic views of the battlefield.

Total Distribution (TD) ATD (FY 95-97). The TD ATD is demonstrating advanced logistics planning, situational awareness, decision support, and information management. TD will provide for seamless integration and operation with the Army's legacy and emerging C4 systems, logistics data bases and STAMIS.

Generation II Soldier ATD (FY 94-98). This program will demonstrate enhanced soldier effectiveness by combining advanced technologies for lethality and survivability with a sophisticated sensor/C4 package.

Ground Intra-Vehicular Electronic Architecture (FY 96-01). This project demonstrates technologies to optimize power distribution and information distribution and processing in ground vehicles. It will reduce the crew workload through an advanced soldier-machine interface in a series of advanced crew stations.

Phased Array Communications Antenna (FY 96-99). This program will provide antenna technology needed for meeting warfighter communications-on-the-move (OTM) requirements.

Range Extension ATD (FY 97-99). This ATD will develop key technologies required for airborne applications of a suite of communications packages, designing and integrating specific systems, and conducting system tests and demonstrations. Specifically, this ATD should evaluate the High Altitude Endurance (HAE) Unmanned Aerial Vehicle (UAV) with the UAV Communications Node.

Digital Battlefield Communications (DBC) Enhancements (FY 96-99). This program will enhance the ability of the DBC to support Task Force XXI. It will insert additional technology into the CECOM Digital Integrated Lab/Testbed (DIL) and Battle Lab experiments sufficiently early to support the Task Force XXI warfighting exercise.

Battlefield Information Transmission System (BITS) (FY 95-08). This umbrella program addresses the improvement/replacement of legacy communications systems to meet the increased data transmission requirements identified under the Army Digitization Master Plan.

Science And Technology (S&T) For C4

The Army S&T program is directed to provide the technologies, architecture, protocols, standards, mathematical algorithms, and software for integrating the communications assets throughout the battlefield. Products will promote the migration of task force operations into a seamless, user friendly environment in which all C4 functionality will be carried out. This includes highly automated operational planning, rehearsal, and execution with real time command and control, using electronic maps, resource availability data, intelligence information, and operational procedures.

Emphasis is placed on establishing the C4 substructure of the digitized battlefield to provide mission planning with optimal use of resources throughout the task force. Additionally, it supports mission rehearsal of force components in a synthetic environment that generates the most likely battlefield situations, and automation assisted mission execution able to quickly adjust mission plans to battlefield changes. The architects of the C4 and IMA infrastructure have a vital interest in the findings of these programs to leverage information dominance. Timely analysis of these findings will facilitate C4 planning, and assure effective horizontal integration of the Information infrastructure with the digitized battlefield.

The S&T program provides a significant adjunct to planning for future requirements and capabilities. S&T findings support IMA architecture decisions to ensure compatibility with the objective of the horizontal integration of systems from the supporting bases to the deployed warfighter.

IMA Development And Acquisition

IMA Infrastructure technology improvements continue at an exponential rate. Leading edge technologies are expensive. In recognition of this, the acquisition strategy to satisfy the vast majority of IMA Infrastructure requirements continues to rely principally on Commercial Off-The-Shelf (COTS) and Nondevelopmental Item (NDI) solutions.

COTS/NDI solutions are usually cost effective since leading edge products are already developed, tested, and can be fielded in less time and with less risk. IMA technology improvements are leveraged and inserted into the Army's information architectures as the competitive market place continues to drive the migration to standards, open systems environments, and greater systems interoperability. Compliance with the Army's Technical, Operational, and Systems Architectures is the key in providing C4I systems which interoperate in joint and combined operations, and assure C2 decision cycle superiority.

Acquisition strategies that favor COTS/NDI equipment (hardware with embedded software) will provide near-term solutions to requirements as well as the foundation for future product improvements. Equipment must support the Open Systems Environment (OSE) and be compatible with existing systems. Equipment which meets OSE requirements helps eliminate solutions based on proprietary technology, which usually has higher life cycle support costs and often limits future system expandability. Compatibility with existing systems will allow selective upgrades of systems as state of the art advancements offer performance improvements. COTS/NDI components and systems will continue to migrate to the tactical level, thus ensuring seamless interfaces with the sustaining base.

Software

The Army must invest in the development of smart software that provides quantum leap ahead capabilities for warehousing, fusing, searching, and retrieving of battle command information. Commanders need the capability to manipulate these applications with voice recognition technology. To reduce the cost of software development, acquisition, and life cycle management, software engineering will be carried out in an Integrated Computer Aided Software Engineering (ICASE) environment and will also use COTS/NDI to the maximum extent possible. All new software acquisitions will be open systems environment compatible with existing systems to ensure interoperability.

Policy and procedures are under development to ensure cost effective implementation of software engineering requirements. The draft Army Software Reuse policy serves to ensure reusable principles in software design and development. This will leverage economies that allow other programs to reduce development costs and schedules. Strict adherence to data standards will greatly reduce interoperability problems between similar systems. The use of ICASE tools enables efficient management and development of large scale systems while providing effective means to perform software maintenance.

The draft Army policy on software life cycle process, based on business case analysis, provides guidance on the most cost effective means to develop, field, and support Army software and standard DoD developed software. Other policies are already in effect. Such policies guide system developers throughout the Army as they strive to meet the Force XXI objective of achieving HTI among systems that support efficient information transfer between the sustaining base and the deployed force.

SECTION 4

CONCLUSION

The future of C4 has been mapped along a path for the modernization of Force XXI. This annex has focused on the C4/IMA modernization strategy and actions that will support achieving Land Force Dominance in the 21st Century. Overall, Army C4/IMA systems are rated **AMBER**. Communication architectures that will improve and enhance existing capabilities are not yet fielded to the warfighter. The on-going and future efforts in C4 Horizontal Technology Integration and implementation of the Enterprise Strategy will move communication architectures towards achieving a seamless digitized force. Continuing on the modernization path, as outlined in this annex, will insure the Battlefield Commander has the "leap ahead" technology to dominate the Information War.

Figure C-4 summarizes C4/IMA program resourcing under the **FY 97-01 Program Objective Memorandum (POM)**. Funding shortfalls across the POM limit our ability to transition to a digitized force. MCS software integration efforts are unfunded in FY96. MCS software integration is urgently needed for Operational Testing and will also be used during the Task Force XXI Advanced Warfighting Experiment (AWE). Multi-Level Security (MLS) is totally unfunded. MLS is designated to permit communications over the entire classified spectrum and this effort will be important for Force XXI and Joint requirements. Limited mid-term funding of ACUS causes the program to fall further behind commercial state-of-the-art telecommunication advances.

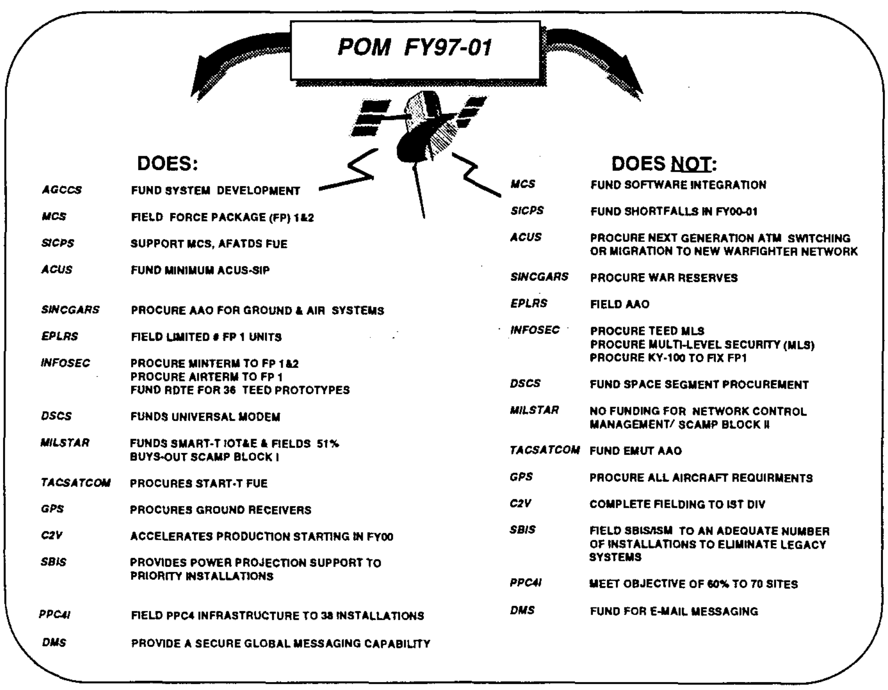


Figure C-4

ANNEX D

INTELLIGENCE AND ELECTRONIC WARFARE

SECTION 1

INTRODUCTION

Force XXI will depend on potent Intelligence and Electronic Warfare (IEW) capabilities to dominate modern battlefields. Highly skilled soldiers must operate technically advanced sensors and powerful processors to collect, correlate, and fuse disparate bits of information into a coherent picture of enemy forces and their capabilities throughout the battle space. This dynamic and common view of the battlefield must then be presented to warfighting commanders at all echelons in a timely and understandable fashion and be continuously updated.

Intelligence XXI is the conceptual basis for modernizing Army IEW capabilities to meet these challenges with a family of powerful systems and an efficient force structure for Force XXI. This annex will first introduce the underlying doctrine, need for jointness in intelligence operations, basic capabilities, and force structure. Against this background, it will then provide a detailed look at IEW system modernization and at the overall strategy for research, development, and acquisition of IEW systems.

Military Intelligence Doctrine

Five Military Intelligence (MI) doctrinal imperatives have evolved to support warfighting commanders and are depicted in Figure D-1.

Intelligence must be continuously **synchronized** with the operational concept and battle plan to ensure that the **commander's requirements** are satisfied. Intelligence must be rapidly disseminated to all users, including light, heavy, and special operations units, through all means with an emphasis on **broadcast** nets. **Tactical tailoring** of intelligence and electronic warfare (IEW) units supports operational flexibility across the spectrum of conflict. Intelligence must have the capability to support **split-based operations** as a part of Force Projection; this ensures continual support to the commander and reduces both the strategic mobility requirement and the number of American soldiers placed in harm's way.

IEW modernization is in step with this doctrine. Systems and organizations have been developed that allow intelligence staff to focus on providing tailored intelligence to commanders in near real time and to effectively synchronize intelligence collection, analysis, and dissemination with operational requirements. Participation in broadcast intelligence nets is made possible through specialized radios embedded in intelligence and combat systems. Both hardware and units have been structured to provide maximum tailorable intelligence support with minimum forward presence.

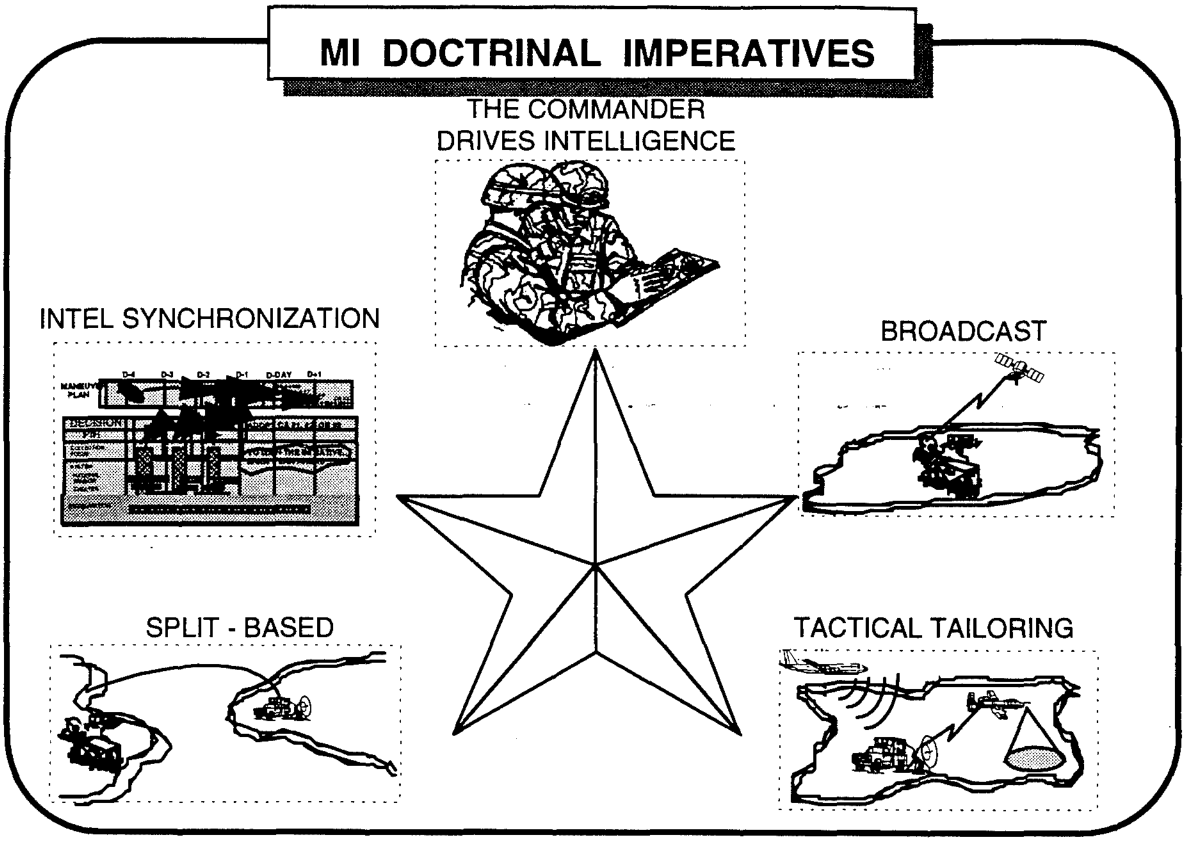


Figure D-1

Emphasis on Jointness

Modern warfare demands that the Services fight as a joint team. The Army integrates its intelligence efforts in unified operations with the other Services, with other national and non-governmental agencies, and frequently with allied or coalition forces.

Joint warfighting doctrine, constraints on deployment capacities, and limited acquisition resources all dictate a need for Joint Task Force and Service intelligence assets to operate closely together to meet intelligence requirements. Information collected from sensor systems operated by one Service must be available to all Service components as well as to joint headquarters to ensure comprehensive coverage and common view of the battle space.

For each IEW system, program managers address the technical specifications of how the system exchanges data and products with sister Service, Special Operations Forces, joint, and national IEW equipment. Army intelligence is also working closely with Army and Department of Defense standards groups to reduce the number and type of translations that need to be made between systems as data is passed through the network of systems to the warfighter. One example of this cooperative effort is the Joint Airborne SIGINT System (JASS) program which seeks synergies among Service efforts to develop next generation collection systems across the electromagnetic spectrum.

Functional interoperability is a key aspect of Army IEW modernization. The All Source Analysis System (ASAS) is an example of this. It is compliant with DoD standards and ongoing joint efforts to maximize interoperability with the Marine Corps' Intelligence Analysis System (IAS) and plans to extend this interoperability to the intelligence analysis systems of all Services. The multitude of inputs to the All Source Analysis System and its products form the lead capability for the Army to generate the common joint picture of the battlefield. The capability to rapidly fuse data using standard DoD approved formats and protocols will carry IEW into future joint operations.

21st Century Intelligence Capabilities

The Army vision of intelligence capabilities in the 21st Century is shown in Figure D-2. It reflects the IEW systems and functions that are being developed and fielded to meet warfighter requirements on the joint battlefield and also reflects some of the dependency on systems operated by other Services discussed above.

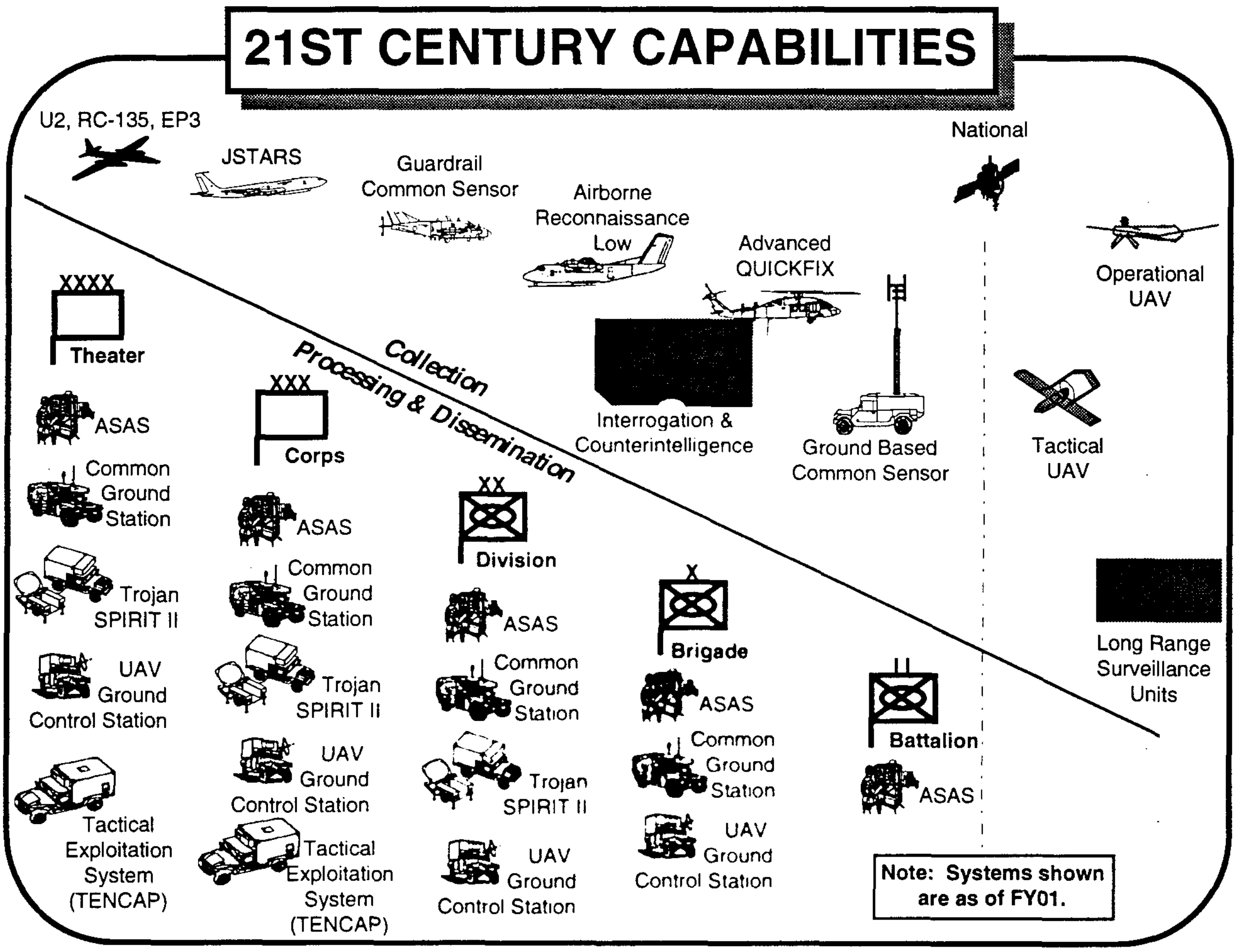


Figure D-2

This vision includes a balance of signals, imagery, and human intelligence collection capabilities with processing and fusion systems that correlate and present the right intelligence to the right commander at the right time. It employs the power of

ASAS work stations, combined with downlinks from multiple sensors, to allow a common understanding of the battlefield to be shaped and to facilitate effective warfighting decisions. This vision also employs sensors with targetable accuracy, which are focused through the common understanding of the battlefield. These trigger sensors are linked through broadcast intelligence nets or the Common Ground Station to shooters to meet the commander's targeting needs.

This vision depends on national, joint, theater, other Service, and Special Operations Forces (SOF) systems to create a seamless intelligence architecture with all required capabilities. Systems that are developed and procured by DoD for fielding to the Army, such as unmanned aerial vehicles, are key components. While Figure D-2 and this Annex focus on requirements and capabilities that are specifically part of the Army's IEW BOS, the comprehensive intelligence and combat information structure includes assets such as scouts, reconnaissance helicopters, air defense and artillery radar systems, and Army Special Operations Forces (ARSOF) with organic collection and processing capabilities.

Section 2 of this Annex details the warfighting impacts and capabilities of the individual systems the Army will employ and assesses the status of modernizing the force to this vision over time.

Intelligence Force Structure

The soldiers behind this advanced technology, organized to maximize effectiveness and to facilitate flexibility and deployability, are essential to making the envisioned architecture work. The Army is continuing the process of restructuring tactical intelligence and electronic warfare units to focus the intelligence soldiers and their efforts at the point of the spear--the commander who must fight the next battle. The concept of this design is shown in Figure D-3.

The restructure incorporates the new systems and capabilities depicted in the vision above, and more effectively uses limited manpower. At the division level, Direct Support companies will provide processing, imagery, and human intelligence capabilities to brigades; a General Support company employs multidisciplined sensors that serve the entire division, and the MI battalion headquarters contains intelligence management, analysis, and fusion capabilities. Corps MI brigades are reducing ground based assets while integrating more accurate systems like Guardrail Common Sensor and Short Range unmanned aerial vehicles to better support the Corps' deep battle. These efforts balance corps and division level capabilities more evenly across the signals, imagery, and human intelligence disciplines.

Theater MI brigades exploit intelligence from theater and national sources in support of the theater ARFOR commander, furnish Corps Military Intelligence Support Elements (CMISE) as links to coalition forces, and provide reinforcing elements to Corps to maximize their utilization of theater and national intelligence. Army Special Operations Forces provide similar liaison teams to corps and division (SOCCORD and SOCCE) to provide signals, imagery, and human intelligence from ARSOF units.

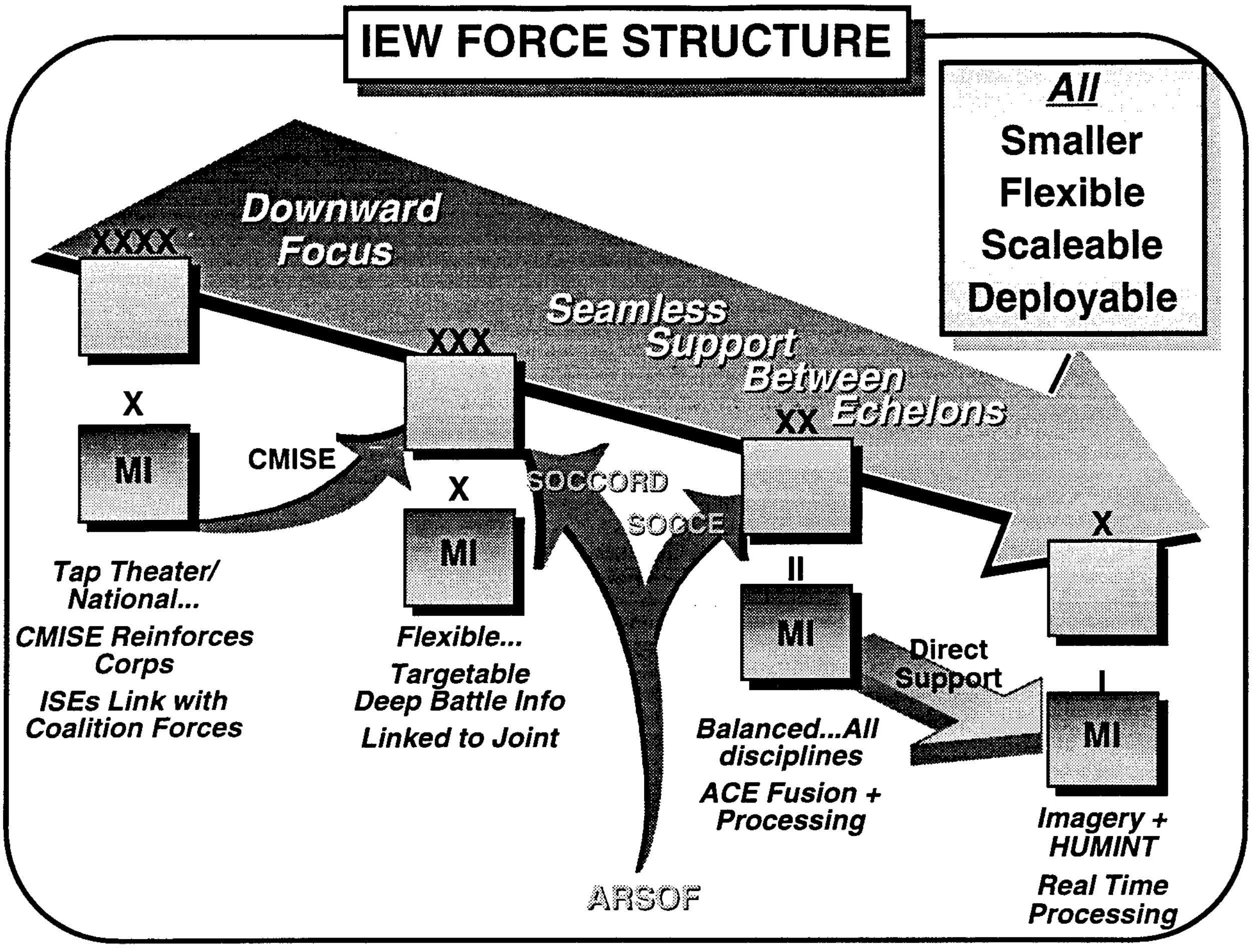


Figure D-3

Intelligence management and analysis operations have been concentrated into a single hub, the Analysis and Control Element (ACE), at corps and division. The ACE, equipped with ASAS, exploits this powerful tool to streamline collection management, processing, analysis, and fusion functions in a smaller but more effective organization.

This restructure of intelligence organizations emphasizes modularity. Capabilities are organized into discrete teams with specific levels of capability. This modular approach allows for rapid and flexible tailoring of a force to meet different requirements because the number of teams can be sized to the mission. Deployability is enhanced as all associated manpower and equipment are incorporated into a documented team, allowing an appropriate force to be identified and deployed without time consuming task organization.

SUMMARY

Developments in intelligence doctrine, hardware, and force structure are being synchronized to modernize the IEW BOS to fulfill the concepts of Intelligence XXI. They are focused on a single vision and will provide a smaller, more capable, and more flexible intelligence force to support the Force XXI Army.

SECTION 2

CURRENT PROGRAM ASSESSMENT

The Intelligence XXI program provides open-architecture, multi-functional, digital systems that will support the Force XXI Army. The program includes a series of individual systems, which collectively fulfill the Intel XXI vision. The systems are scaleable to meet force projection deployability requirements, tailorable to meet mission requirements, and will have connectivity and be interoperable with other Army Battlefield Operating Systems, joint and other Service intelligence systems within the theater, and national intelligence systems. This section describes the individual systems that allow the Army to transition to the architecture of Intel XXI and provides a current assessment of each system in the program. It organizes intelligence systems into flagship categories that collect, process, and fuse intelligence, and then addresses some of the key supporting systems.

One Family of Unmanned Aerial Vehicles (UAV) to Find Targets

The family of UAVs enables commanders at each echelon to see their battle space. **Tactical UAV** provide targeting, force protection, and situation development directly in response to division and brigade commanders. **Operational UAV** will be employed in support of the corps and division deep battle and provide coverage over the battlefield for extended periods of time at extended ranges for theater/JTF/ Corps level commanders and deployed SOF units. **Strategic UAV** will provide long endurance high altitude platforms that respond to the needs of theater commanders and higher staffs, as well as supporting early entry and special operations.

The Tactical and Operational UAV are described separately in subsequent paragraphs, but are complementary parts of a synergistic family of UAVs. This family provides an ability to exploit the wide and rich selection of targets throughout the total battle space.

Tactical UAV Program Objective/Warfighting Impact

- Tactical UAV systems will provide reconnaissance, surveillance, target acquisition, and Battle Damage Assessment (BDA) beyond the FLOT in direct support of the division and brigade fight. They require few soldiers, a small launch and recovery area, and minimal deployability assets, yet provide these tactical commanders an essential ability to 'see over the next hill.'
- Variants of Tactical UAV will be developed with the appropriate range and endurance to provide real time, day/night, targetable imagery to the tactical commanders at each echelon within their areas of operations.
- Description. Tactical UAV systems will consist of: common, interoperable Ground Control Systems (GCS) electronically linked to an air vehicle carrying electro-optic (EO) and infrared (IR) sensor payloads; launch and recovery systems; and Remote

Video or Graphic Display Terminals to receive imagery at tactical locations separate from the GCS. Objective systems will include a multi-sensor remote reception terminal capability, such as the Common Ground Station (CGS).

- Basis of Issue: The basis of issue will be determined following evaluation and demonstration of system capabilities. Current assessments call for from three to four systems per division and ACR.
- The status of Tactical UAV is **RED** in the near-term as Hunter UAV production has been interrupted and Maneuver UAV prototype development will begin in FY96, making the system first available for demonstration in FY97. Tactical UAV are **AMBER** in the mid-term with full rate production expected to result in fielding of significant quantities beginning in FY00. Tactical UAV will become **GREEN** when full fielding is complete in the far-term.

Operational UAV Program Objective/Warfighting Impact

- Operational UAV systems will provide division, corps, and theater or Army component commanders, and deployed SOF units with a dedicated deep targeting and broad area coverage capability. In addition, division commanders will have near real time access to targeting and BDA information from these systems.
- Operational UAV air vehicles will provide over 40 hours endurance on station at ranges greater than 650 km with EO/IR/Synthetic Aperture Radar (SAR) sensor payloads. The UAV can be controlled and imagery intelligence reports collected through satellite relay.
- Description. An Operational UAV system includes three air vehicles with EO/IR/SAR sensors, one Mission Planning Station/Ground Control Station, one Trojan SPIRIT system for SATCOM linkage, and a number of remote video terminals for JTF/Corps/Division access.
- Basis of Issue. The basis of issue will be determined through an operational and supportability evaluation in the near-term.
- The Operational UAV program is currently an Advanced Concept Technology Demonstration (ACTD). With no program yet in place for production and fielding, the system is **RED** for all time periods, although it is capable of supporting limited operational contingency missions.

Airborne Systems to Look Deep (Special Electronic Mission Aircraft)

The Army is in the final stages of replacing the RV-1D Electronic Intelligence (ELINT) and Improved Guardrail Communications Intelligence (COMINT) airborne collectors with the Guardrail Common Sensor (GRCS). The Army is also completing fielding of Airborne Reconnaissance-Low (ARL) as a low profile multi-disciplined airborne intelligence collector for MOOTW through lesser regional conflicts. As these fielding actions are being completed, concept development of a next generation airborne system has begun. This development will combine GRCS and ARL functions in a single platform and replace the two systems when they complete their life cycle. A draft Operational Requirements Document for Aerial Common Sensor (ACS) has been developed. The Army will work with the Defense Airborne Reconnaissance Office to ensure the ACS is interoperable and consistent with the future joint airborne architectures.

GRCS Program Objective/Warfighting Impact

- GRCS integrates COMINT, ELINT, and precision emitter location capability in a single system that provides targetable information to corps or task force commanders and theater users.
- The fourth GRCS system will be fielded to XVIII Airborne Corps in FY98 and is designed to deploy early in force projection operations. In addition to normal line of sight links from aircraft to the processing facility, its airborne sensors can be linked to processors and analysts back in garrison via a Direct Air Satellite Relay (DASR), in force projection operations, reducing deployment requirements.
- GRCS provides airborne Signals Intelligence (SIGINT) and precision location information through broadcast intelligence directly to the Common Ground Station and the All Source Analysis System (ASAS) for integration into the complete intelligence and combat information picture. The broadcast is via Commander's Tactical Terminal/Joint Tactical Terminal (CTT/JTT), which makes this information available to multiple Army combat systems and joint intelligence users.
- Gradual fielding of GRCS has allowed the insertion of current technologies in each system as it was developed. Interoperability with older generation GRCS systems remains an essential design requirement for each newer design, however, complete commonality will not exist among the four GRCS systems. Programmed upgrades will bring all fielded systems to core GRCS capabilities, including precision location, and will add or modernize network reporting. Other capabilities that were added with the newest systems, such as the Ground Tethered Satellite Remote (GTSR), could be added to the older fielded systems if their requirement becomes a priority.
- Description. Principal GRCS components are the Airborne Relay Facility (ARF), Common Data Link (CDL), Integrated Processing Facility (IPF), CTT/JTT, and the Communications High Accuracy Location System--Expanded (CHALS-X) package. CHALS-X provides emitter location information with targetable accuracy. The CDL transfers signals information between the aircraft and IPF for processing, and processed intelligence reports between the IPF, aircraft, and CTT/JTT for dissemination and exploitation. An objective set consists of 12 aircraft with associated ground support and processing equipment.
- Basis of Issue. A total of four GRCS systems will be fielded with one system each at III Corps, V Corps, XVIII Airborne Corps, and Eighth Army (Korea).
- GRCS is rated **AMBER** in the Near-Term. With FY98 fielding of the fourth GRCS, retirement of the final Improved Guardrail system, and completion of selected upgrades to early GRCS systems, the status of GRCS capabilities is rated as **GREEN** in the mid- and far-terms.

ARL Program Objective/Warfighting Impact

- ARL is a low-profile airborne platform providing communications intelligence and live imagery information for tactical commanders. ARL provides commanders a self-deployable and flexible intelligence collection suited for low to mid-intensity conflicts, counter-drug, and unconventional warfare environments.
- Description. ARL integrates COMINT and IMINT sensors aboard a modified DeHavilland aircraft. The ARL program will provide six multi-sensor systems which combine infrared/electro-optical sensors with communications intercept and direction-finding radios covering the HF, VHF, and UHF bands. Currently fielded single-discipline (COMINT or IMINT) ARL aircraft will be upgraded to multi-sensor capability by FY99. All ARL will also integrate CTT/JTT by FY98 to improve access to ARL information by tactical commanders.
- Basis of Issue. Six aircraft in the CONUS-based theater MI brigade. A requirement for nine ARL aircraft has been identified. Only six aircraft are funded at this time.
- ARL is rated **AMBER** for all time periods due to the shortfall between required and programmed system quantities.

One Division Sensor System For All Signals (IEW Common Sensor)

In the transition from the Cold War era family of division ground based and heliborne signals intelligence sensors and jammers to the IEW Common Sensor (IEWCS), the number of vehicles is being reduced by 60 percent and the intelligence capability is being increased ten-fold. This reduction in systems and the composition of IEWCS (Advanced QUICKFIX plus either Ground Based Common Sensor (GBCS)-Heavy or GBCS-Light) is shown in Figure D-4. IEWCS will be less expensive to maintain, require fewer soldiers to operate, and need fewer lift assets to deploy. At the same time, IEWCS leverages state of the art technology to provide the commander the ability to target modern communication and non-communication emitters for destruction in near real time, and to exploit or deny enemy communications. GBCS and AQF are modular systems with an open architecture that allows for inexpensive future upgrades to the systems to adapt to emerging signals technology.

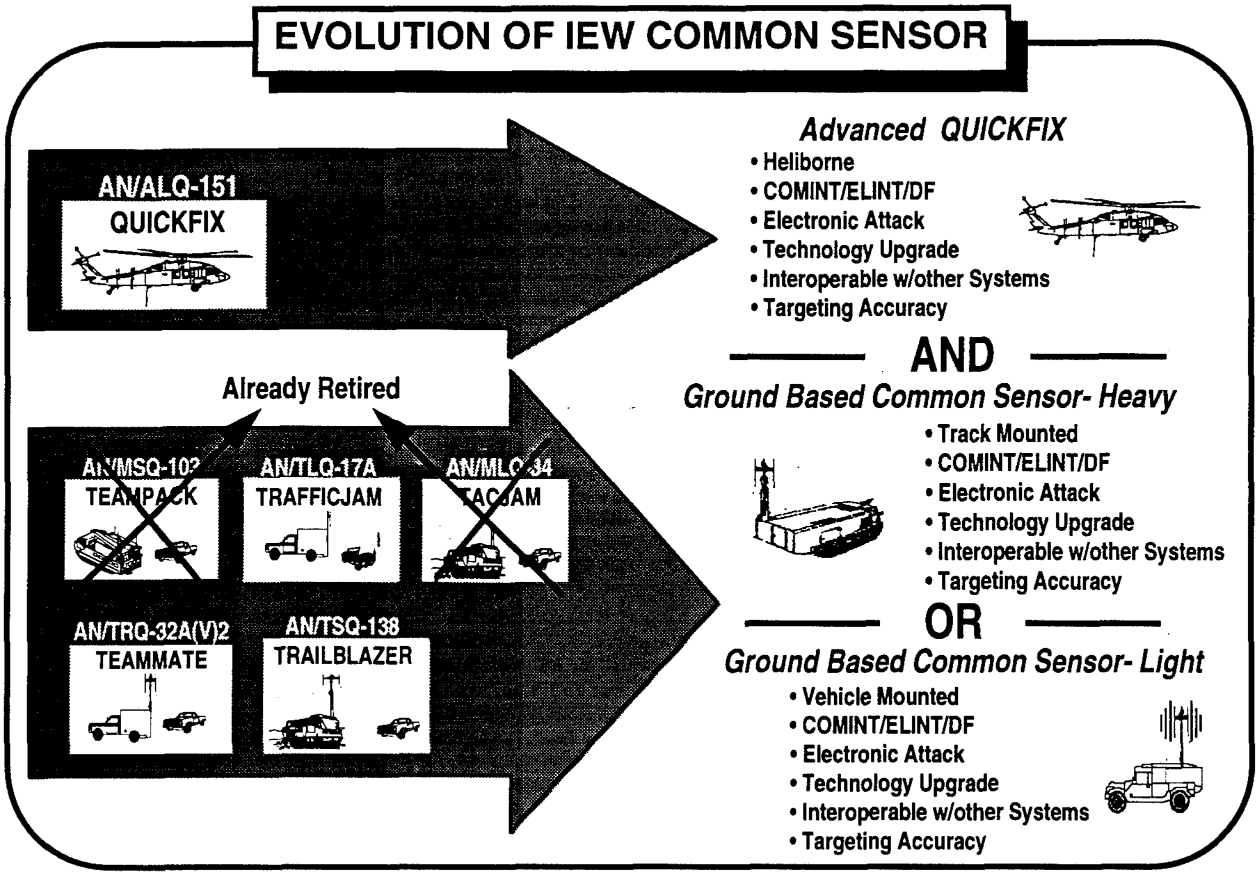


Figure D-4

Ground Based Common Sensor - Heavy And Light (GBCS-H/GBCS-L) Program Objective/Warfighting Impact.

- Operating in tandem with the Advanced QUICKFIX (AQF) in both heavy and light divisions, GBCS will provide precision emitter location, signals intelligence, and electronic attack (EA) capabilities with internal cross-sensor cueing. It provides these capabilities against emerging threats and signals types, and provides 24 hour/day all-weather operations.
- GBCS's interoperation with AQF provides a precision emitter location capability at extended ranges. This capability meets artillery target selection standards for target accuracy, and enables the identification, suppression, and/or destruction of enemy C2 and fire control systems.
- Description. Initial limited procurement GBCS-L systems provide signals intercept and precision location capabilities on a Heavy HMMWV, with FUE in FY97. The objective GBCS-L adds the EA subsystem on a second HMMWV. GBCS-H will integrate all components on a tracked carrier, which will provide the survivability, collect on the move capability, and mobility required by heavy forces.
- Basis of Issue. Four GBCS-L will be fielded to each light division, light ACR, and the separate brigade. Six GBCS-H will be fielded to each heavy division, and four GBCS-H to each Heavy ACR.

- GBCS is rated **RED** in the near-term as a small number of limited procurement-urgent systems begin being fielded in FY97. It becomes **AMBER** in the mid-term as full rate production and fielding provide a capability to all top priority contingency forces, and becomes **GREEN** in the far-term upon completion of procurement in FY06 and final system fielding in FY08.

Advanced QUICKFIX Program Objective/Warfighting Impact

- Advanced QUICKFIX (AQF) is the airborne component of IEWCS. Its altitude and mobility improve accuracy of the IEWCS team as it operates in tandem with GBCS and enables AQF to provide intelligence on deeper threats.
- Description. AQF is an evolution of the fielded EH-60A QUICKFIX. The AQF mix of sensors is identical to that of GBCS, including COMINT, ELINT, EA, and precision emitter location with cross-sensor cueing. It integrates these components on an EH-60L helicopter, with FUE in FY98.
- Basis of Issue. Four aircraft per division and ACR.
- AQF is rated as **RED** in the near-term as low rate production in FY96 and FY97 will bring a minimal number of systems into the force with first unit fielding in FY98. It becomes **AMBER** in the mid-term as full rate production and fielding provide more of the force with a capability, and becomes **GREEN** in the far-term upon completion of procurement in FY07 and final system fielding in FY09.

One Common Ground Station to Fight the Now Battle

The Common Ground Station (CGS) is the objective variant of the JSTARS Ground Station Module (GSM). It will receive broadcast intelligence reports through CTT/JTT, live video imagery, secondary imagery from national and theater sources, and information from JSTARS aircraft to enable immediate targeting or cross-cueing of other sensors to confirm locations and identification of high value/high payoff targets. It uses ASAS assessments and information from these sensors to depict a picture of the battlefield from brigade to corps.

GSM/CGS Program Objective/Warfighting Impact

- GSM/CGS provides commanders a near real time, dynamic, multi-sensor view of the battlefield for sensor planning, targeting, and execution of current operations. CGS will be deployed at command posts, intelligence nodes, and targeting cells throughout the battlefield.
- Description. GSM consists of communications systems to receive data, and two workstations to display and correlate Moving Target Indicator (MTI), Fixed Target Indicator (FTI), and synthetic aperture radar (SAR) data from JSTARS; video from UAV; and intelligence reports from GRCS, U-2, RC-135, EP-3, and TENCAP via the CTT/JTT. GSM are HMMWV or 5-ton truck mounted. FUE with GSM was in FY95, with low rate initial production units mounted on 5-ton trucks.

- Transition to CGS comes with the addition of access to Secondary Imagery Dissemination System (SIDS) in systems being fielded in FY98 and beyond. Receipt of IEW Common Sensor reports, RAH-66 Comanche imagery and digital data, and other sensor information will be added in block upgrades in the far-term. CGS is mounted on a Heavy-HMMWV.
- Basis of Issue. Two per theater MI Brigade, six per corps, six per division, one per ACR, and one per separate brigade.
- CGS is rated **AMBER** in the near- and mid-terms as full rate production and fielding continue. Completion of fielding and insertion of upgrades linking CGS to additional systems improve the rating to **GREEN** in the far-term.

One All Source Analysis System (ASAS) That Fuses All Information

ASAS brings together all the relevant, available intelligence; correlates and fuses the data, and provides the commander with the intelligence he needs to make reasoned decisions in time to affect the outcome of the battle.

ASAS automated processing capabilities, including the integration of information from Integrated Meteorological System (IMETS) and Digital Topographic Support System (DTSS), eliminate the intelligence bottleneck, allowing analysts to do their analysis and threat integration. Centralized collection management capabilities assure assets and sources from all echelons are integrated and coordinated. Gaps in intelligence are quickly identified and resolved, assuring that the collection effort is synchronized with the commander's intent and scheme of maneuver. Direct communications connectivity to a wide variety of national and tactical sensors provides the basis for an "all source" product, and provides commanders with the intelligence to clearly view the total battlefield.

With a combination of real time situation development and distributed simulation, ASAS will enable better conduct of Intelligence Preparation of the Battlefield (IPB). Predictive analysis using validated algorithms of tactical movement and damage, coupled with threat parameters, weather, and terrain data, will generate highly accurate depictions of the battle space.

ASAS Program Objective/Warfighting Impact.

- ASAS provides near real time fusion of all source data, direct support to situation and target development, support to target engagement, automated collection and asset management, and the intelligence interface to the Army Battle Command System (ABCS) and the Global Command and Control System (GCCS).
- Description. ASAS is designed to operate in unit command posts, from EAC to battalion level. ASAS Block I combines government developed militarized equipment and software to provide an initial operating capability to Army priority units by FY95. ASAS - Extended (ASAS Block I software on NDI hardware) will provide an ASAS capability to the remainder of the Active Component (AC) by FY96 and to Reserve Component (RC) enhanced readiness brigades by FY99. ASAS

Block II uses ABCS common hardware and software, provides enhanced functionality, and features an open architecture to enhance the system's capability to keep pace with technological advancements. It embeds CTT/JTT capabilities and is fully compliant with the GCCS/Advanced GCCS technical architecture operating DoD Common Operating Environment. Joint Deployable Intelligence Support System (JDISS) functionality is also fully embedded. Upgrades to ASAS Block III will provide full objective functionality as well as the full complement of required computer terminals.

- Basis of Issue. One ACE system for each theater MI brigade, corps, and division. Remote workstations for each ACR, brigade, and battalion, including the 15 RC enhanced readiness brigades.
- ASAS is rated **AMBER** in the near- and mid-terms as fielding of the interim capability (Block I/ASAS-Extended) continues until FY99 and fielding of ASAS Block II begins in FY00. ASAS is **GREEN** in the far-term as all units are upgraded to Block II and Block III functionality to keep pace with expanding requirements and technology.

One Processor to Exploit National Capabilities

Tactical Exploitation of National Capabilities (TENCAP) systems are an integral component of the IEW architecture. They provide assured access to intelligence from national and selected theater systems and provide timely support to the commander for tactical decision making, targeting, battle planning and BDA. The Army is migrating from the current family of TENCAP processors to a single objective TENCAP system--the Tactical Exploitation System (TES). The TES will be a highly flexible, scaleable, and modular system which will serve as a pre-processor for all national systems data, and for data from selected theater and Corps systems. Until development and fielding of TES, the Army TENCAP program uses a series of preplanned product improvements to insert the latest technology in fielded systems and keep these systems current with national architectures. The focus of these interim upgrades is to eliminate stovepipe systems and migrate to systems which are multi-disciplined, provide joint interoperability, and can be tailored to meet commanders' requirements.

Corps and Theater TENCAP Program Objective/Warfighting Impact

- Corps and theater-level TENCAP systems receive imagery and signals intelligence directly from national sources to provide tactical commanders at these echelons with information in support of the deep battle. Information is pre-processed and passed to ASAS and Common Ground Station (CGS) for correlation in the complete intelligence picture.
- Description. A series of four systems provides the current TENCAP capability at Corps and Theater levels:
  - The Enhanced Tactical Radar Correlator (ETRAC) and the Modernized Imagery Exploitation System (MIES) provide for the receipt, processing, exploitation,

storage, and dissemination of imagery intelligence from national and selected theater collectors. Fielding and modernization will be complete in the near term.

- The Electronic Processing and Dissemination System (EPDS) receives, processes, correlates, and disseminates ELINT. It provides an electronic picture of the battlefield based on receipt of data from national, theater, and corps sensors.
- The Enhanced Tactical Users Terminal (ETUT) provides the capability to receive and process selected ELINT data, manage IMINT reports and selected imagery products, and automate certain collection management functions via the Joint Collection Management Tools (JCMT) terminal. ETUT fielding is complete. ETUT collection management and secondary imagery capabilities will be retired as upgrades allow ASAS to assume those functions.

- The TENCAP program will reduce this grouping to three and then one system.
  - The program will incorporate EPDS functionality with remaining ETUT functions in the ETUT vehicles, renaming the resultant system Advanced EPDS (A-EPDS) while defielding the current EPDS vans. This effort will be completed by FY97.
  - ETRAC, MIES, and A-EPDS are programmed to be replaced by the objective TENCAP preprocessor for ASAS and CGS around the turn of the century -- the Tactical Exploitation System (TES). TES will be a multi-disciplined processing system that will be highly mobile, scaleable, modular, and provide an early entry capability. TES will provide critical links to theater and national platforms.
- Basis of Issue. One A-EPDS per Corps and selected theater MI brigade. One ETRAC and MIES per selected Corps and theater MI brigade. One TES per Corps and theater MI brigade.

Division/ACR TENCAP Program Objective/Warfighting Impact

- TENCAP systems at division and ACR level receive imagery and electronic intelligence from national sources. Information is received via intelligence broadcasts or can be pushed/pulled from Corps level TENCAP systems, following initial preprocessing.
- Description.
  - The Mobile Integrated Tactical Terminal (MITT) provides a mobile, HMMWV mounted capability to receive, correlate, and integrate secondary imagery and ELINT data on two workstations.
  - The Forward Area Support Terminal (FAST) is a downsized, transit case configured functional equivalent of the MITT. FAST has a single workstation, and provides these TENCAP capabilities to Armored Cavalry Regiments. FAST is also used at Corps and EAC MI Brigades to augment their TENCAP systems described earlier.
- MITT and FAST are scheduled to be retired as the Common Ground Station (CGS) is fielded and upgraded with secondary imagery dissemination capabilities.

- Basis of Issue. One MITT per division and at XVIII Airborne Corps. One FAST per ACR and Corps, multiple FAST per selected EAC MI Brigade.

TENCAP capabilities are rated **GREEN** in all time frames as open architecture upgrades to existing systems and fielding of new systems will keep capabilities at levels needed to meet increasing requirements.

Supporting Systems

Beyond the six flagship categories of systems above, other systems play key roles in supporting the provision of intelligence, and conduct of electronic warfare. Some selected programs are briefly discussed below.

Trojan SPIRIT

Trojan SPIRIT provides high capacity point-to-point communications to Army tactical commanders via tactical SATCOM terminals mounted in HMMWVs. These systems rapidly disseminate high volume intelligence products, data bases, and imagery from national to tactical levels and throughout extended areas of operations. Trojan SPIRIT fielding is at a reduced basis of issue that will provide some capability to all units. Fielding will be completed in FY96, with upgrades inserted from FY97-FY99. Fielding is to Corps, Division, ACR, separate brigade, and theater MI brigades.

Commander's Tactical Terminal/Joint Tactical Terminal

CTT/JTT allow tactical commanders to exploit broadcast intelligence networks for situation development and targeting applications. CTT/JTT will receive and relay information from Army GRCS and ARL, Air Force U-2 and Rivet Joint systems, Navy EP-3, and national broadcast nets. They are being embedded in Army intelligence systems including ASAS, CGS, ETRAC, TES, and the Joint Tactical Ground Station (JTAGS), as well as in combat systems such as AFATDS, FAADS, THAAD, and A2C2. Other Services are also procuring and integrating CTT/JTT in their intelligence systems. This joint aspect will culminate in migration of CTT/JTT and other broadcast intelligence receivers to Common Integrated Broadcast Service Modules (CIBS-M) in the mid-term, building on proven capabilities while establishing joint standards to maximize interoperability and efficiency. Army procurement and integration of CTT/JTT/CIBS-M is programmed for completion in the far-term.

Integrated Meteorological System

IMETS receives, processes, and collates weather data to provide products such as NBC/smoke effects, illumination or visibility overlays, and tactical weather effect depictions tailored to meet supported commanders' requirements. The data processed includes forecasts, weather observations, and climatological information. IMETS provides automation and communications support to Air Force weather teams assigned to Army S2/G2 sections. Fielding at a reduced basis of issue will be completed in FY97 and provide some capability to each corps, division, ACR, separate brigade, and to selected aviation brigades, special forces groups, and EAC headquarters.

Theater Rapid Response Intelligence Package (TRRIP)

TRRIP is a suitcase-sized system that enables intelligence teams to transmit data and digital hand-held imagery from a deployed site to tactical commanders in near real time. Use of TRRIP by interrogation and counterintelligence teams ensures timely exploitation of perishable information. It is especially valuable in MOOTW and regional conflicts. TRRIP is being procured for theater MI brigades, and also provided to corps and division units when available.

SHORTSTOP

SHORTSTOP is an electronic warfare system that automatically senses and deceives artillery and mortar Radio Proximity Fuse munitions to increase survivability of friendly troops and materiel. SHORTSTOP is being developed in the near-term, with production and fielding to combat forces through the mid- , far-terms, and beyond.

These supporting systems are collectively rated as **AMBER** in all time frames due to the reduced quantities of Trojan SPIRIT, IMETS, and TRRIP, as well as the protracted SHORTSTOP production program.

Summary

The assessments and shortfalls of the IEW systems are compiled in Figure D-5.

IEW PROGRAM ASSESSMENT - WRAP UP

MISSION/ CAPABILITY	SYSTEMS	NEAR-TERM FY 96-98	MID-TERM FY 99-01	FAR-TERM FY 02-11
Family Of UAV	Tactical UAV Operational UAV	RED	AMBER	AMBER
Airborne Systems	Guardrail Common Sensor Airborne Reconnaissance Low Aerial Common Sensor	AMBER	AMBER	AMBER
IEW Common Sensor	Ground Based Common Sensor Advanced QUICKFIX	RED	AMBER	GREEN
Common Ground Station	JSTARS Ground Station Module Common Ground Station	AMBER	AMBER	GREEN
All Source Analysis	ASAS	AMBER	AMBER	GREEN
Processor for National Capabilities (TENCAP)	Mobile Integrated Tactical Terminal Forward Area Support Terminal Advanced Electronic Processing & Dissemination System Enhanced Tactical Radar Correlator Modernized Imagery Exploitation System Tactical Exploitation System	GREEN	GREEN	GREEN
Supporting Systems	Commander's Tactical Terminal/Joint Tactical Terminal Trojan SPIRIT Integrated Meteorological System Theater Rapid Response Intelligence Packages SHORTSTOP	AMBER	AMBER	AMBER

Figure D-5

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

To accommodate the requirements of the future, IEW takes maximum advantage of other Army and joint efforts for efficient use of resources, and uses open architectures to provide for inexpensive upgrade as technology changes. These azimuths of the IEW RDA strategy ensure that IEW systems will be modernized, and new IEW systems are built to achieve maximum capability and deployability. IEW focuses on the Army's five modernization objectives to guide its efforts.

Leveraging Resources and Efforts

To maximize system capabilities and interoperability with each other and with joint systems, the Army leverages other Army and DoD efforts.

Horizontal Technology Integration (HTI) allows IEW systems to integrate with and benefit from other Army digitization efforts, including battlefield combat identification, communications, and display systems that are being developed by the Army Digitization Office. HTI modernizes by aggressive exploitation of leading-edge technologies across multiple systems to improve their warfighting capability. The resulting commonality among systems pays dividends in reduced life cycle costs, focused technology development, economies of scale in production, simplified maintenance, and concentration of critical skills.

Army Technology Base basic research activities continue to be essential to HTI and the modernization of IEW systems. Display and visualization technologies to provide faster processing, larger memory capacity, artificial intelligence, and automatic target recognition to support intelligence analysis and targeting and new sensor technologies to improve collection capabilities are all critical to maintaining the edge in combat capability--which technology can provide.

The Defense Cryptologic Program provides DoD resources to support development of Army sensors. This National Security Agency oversight of development ensures interoperability and utilization of recent developments in technology.

Another DoD-wide initiative which is leveraged to support the Army's IEW architecture and systems will be the Global Broadcast Service. GBS will provide an ability to 'push/pull' critical data from national sources for intelligence and other battlefield disciplines. Sharing this common broadcast system will be significantly more efficient in using limited satellite communications resources to meet a host of needs.

Open Architectures and Block Upgrades

IEW systems are built with an open architecture. Components are modular and are built to industry standards, which facilitates upgrade through preplanned product improvements as the enabling technologies progress. Examples of this approach include the components of IEW Common Sensor and of the Common Ground Station. This open architecture approach reduces costs in the long term by allowing major upgrade of systems to be made by replacing individual components or circuit cards rather than building new systems from the ground up.

As current technology is a constantly moving target, and time is required to translate the technology into capabilities, program managers must periodically stop developing and start inserting upgrades, or new technologies will never be realized. Block upgrades, are performed by grouping a series of related improvements, and inserting them into a system while a separate effort continues to exploit newer technologies to develop the next block.

The combination of open architectures and block upgrades ensures that the maximum current technology is embedded in systems that are in the hands of warfighters, yet better technologies can be added rapidly and relatively inexpensively.

The evolution from current to future IEW systems (Figure D-6) moves IEW from single mission systems on individual carriers to multi-mission systems on common carriers. In this evolution, IEW systems become more deployable, more capable, and less costly to operate and maintain.

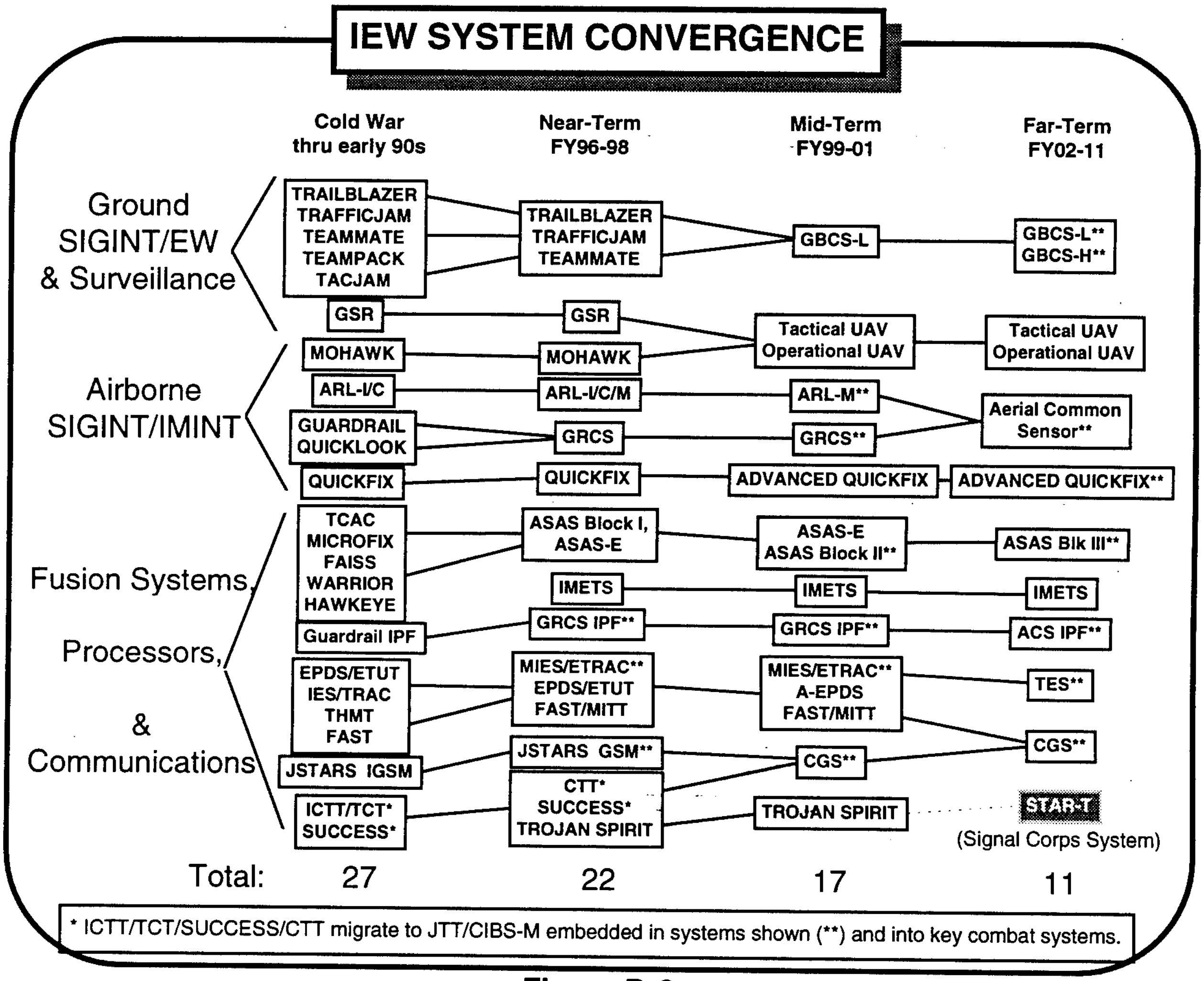


Figure D-6

Modernization Objectives

Force XXI focuses the efforts and expenditures of the IEW RDA Strategy on accomplishing the five Army Modernization Objectives. IEW systems are developed and acquired to enable the integrated intelligence system to fulfill its role in meeting the force modernization objectives.

Project and Sustain the Force

IEW RDA efforts develop systems that facilitate operations with fewer forward-deployed intelligence assets and personnel, supporting force projections with reduced sustainment requirements. The conduct of split-based intelligence operations, use of broadcast intelligence, and robust communications are key to this effort. Both the Force XXI and Intel XXI visions require IEW to establish a support base from which to sustain intelligence operations and provide access to national and departmental intelligence assets. This also facilitates the tactical tailoring of the IEW force to fit within the constraints of the power projection force. Major contributors to force projection and sustainment are ASAS, CGS, Trojan SPIRIT, CTT/JTT, FAST, and GRCS systems equipped with satellite remote capability.

Together, these systems allow the IEW force projection component to be scaled and tailored. IEW may form and deploy either a Minimum Deployable Intelligence Support Element (Mini-DISE), a Deployable Intelligence Support Element (DISE), or a full Analysis and Control Element (ACE) as dictated by METT-T. In all cases, the full range of intelligence receipt, processing, correlation, fusion, display, and dissemination capabilities afforded by ASAS and CGS are made available to the warfighter by Trojan SPIRIT connectivity and CTT/JTT access to broadcast intelligence. FAST provides a highly deployable ability to access national sources, and GRCS deploys aircraft forward, linked to non-deployed processors by satellite relay. These actions reduce the deployment requirement while maintaining full intelligence support for deployed forces.

Protect the Force

RDA efforts will also focus on protecting friendly forces. Surveillance of wide areas and focused reconnaissance will provide combat information to prevent surprise and allow friendly forces to be maneuvered to meet all threats. Electronic Warfare capabilities are also being developed to protect personnel and critical equipment. Two significant contributors to force protection in the IEW RDA program are Tactical UAV and SHORTSTOP.

Tactical UAV protects the force by providing brigade commanders with an ability to see "over the next hill" to prevent surprise and identify threats from enemy maneuver forces. It can monitor open flanks, perform reconnaissance of potential avenues of approach, and support rear area security.

SHORTSTOP will play a key role in protecting the force. This Electronic Warfare system will cause premature detonation of proximity fused munitions, diverting their destructive power away from personnel, high value equipment, and critical battlefield nodes.

Win The Information War

Another major thrust of future RDA efforts will be in the area of Information Warfare. Winning the Information War is one of the keys to decisive victory and is essential to success. To win we must exploit, disrupt, and destroy an adversary's information system, while protecting friendly information flow to ensure that our commanders receive accurate intelligence in time to use it. IEW will employ the full range of systems described in this annex to exploit, disrupt, deny, and damage threat information systems, while securely and rapidly passing, fusing, and presenting intelligence information critical to friendly decision making and operations.

Conduct Precision Strike and Dominate the Maneuver Battle

The last two focus areas of the IEW RDA effort will be to support the conduct of precision strike and domination of the maneuver battle. A force projection army will frequently be called upon to fight numerically outnumbered, relying heavily on technological superiority to overcome its enemies. The ability to accurately identify, locate, and attack critical targets, and then rapidly shift attention to other targets, is essential.

In conducting precision strike, IEW systems play a key role in target development, target acquisition, and post strike damage assessment. In dominating the maneuver battle, IEW systems will contribute through situation development and providing a common picture of the battlefield. The fused intelligence information produced by ASAS will support development and prioritization of target sets. That same information will also provide an accurate, timely, and relevant picture of the enemy situation from which the warfighter can synchronize his operational plan to dominate the maneuver battle.

The IEW RDA strategy develops and acquires precision location systems such as IEW Common Sensor (IEWCS) and GRCS to provide targeting accuracy locations; and "see over the next hill" capabilities, like UAV, to locate targets with sufficient accuracy for immediate engagement by indirect fires. Broadcast intelligence systems like CTT/JTT, and processors, like Common Ground Station, will provide the near real time links from these sensors to shooters. Information collected by UAV and national systems, and routed through the same processors, will provide battle damage assessment in near real time, confirming successful attack or supporting follow-up strikes.

SUMMARY

IEW RDA efforts maximize HTI, exploit technology demonstrations, and leverage other Army and DoD efforts to efficiently develop and adapt current technology in a dynamic environment. These efforts focus on effective IEW contribution to the Army's five Modernization Objectives.

SECTION 4

CONCLUSION

Army IEW is modernizing to provide the intelligence capability to conduct 21st Century military operations. The new systems are digitized and modular; they incorporate state of the art technology; and they can be readily upgraded as new technology becomes available. They are smaller, lighter, and more easily deployed in a force projection role. Accurate sensors, enhanced communications, and faster processing capabilities will ensure on time targeting information to the shooter. ASAS will be fully interoperable with other Army command and control node systems, joint and other Service systems, and systems in the national intelligence community. This will keep Army intelligence operations synchronized with the rest of the Army and with the intelligence community, and will ensure that the right information needed to support the warfighting commander at any echelon, no matter how it was collected or who controlled the collection platform. There is more commonality in components and vehicles across the systems to improve maintenance capability and increase the operational readiness of the intelligence units.

There are two shortfalls in the program as a result of funding constraints. First, procurement of some systems has been reduced below the quantities required. Second, there are low acquisition rates for the procurement of the new systems, resulting in extended times to complete fielding. These shortfalls result in an overall adverse impact on operational readiness, training, interoperability, and logistics.

Within the resources available, these shortfalls are being accommodated within the program by:

- Giving fielding priority to the first-to-fight units in accordance with the National Military Strategy. This priority applies to both order of fielding and quantities fielded, and at times provides interim systems to a high priority unit, which are later cascaded to lower priority units.
- Fielding some systems at reduced levels until all units have a basic capability, then rounding out fielded quantities to full basis of issue.
- Maintaining the older systems and upgrading selected components as funding permits to improve capability and provide connectivity with the new systems.
- Using ACTD, prototype, and test and evaluation phase systems to support crisis and contingency operations.

ANNEX E

FIRE SUPPORT

SECTION 1

INTRODUCTION

> "Prior to the ground war I lost 10% of my tubes. In the initial phase of the ground assault I lost all my remaining guns to massed indirect fire."
>
> Captured Iraqi Artillery Commander

Fire support is the collective and coordinated use of indirect fires, target acquisition data, armed aircraft, and other lethal and nonlethal means against ground targets in support of maneuver force operations. The mission of fire support is to integrate all available means of fire support to destroy, neutralize or suppress adversaries with indirect fires.

Fire support responsibilities focus on close support fires in support of engaging maneuver units, counterfire (the attack of enemy indirect fire systems), and interdiction (the attack of enemy laterally and in depth). It includes field artillery, mortars, other non-line-of-sight weapons, Army aviation, naval gunfire, close air support, and electronic countermeasures.

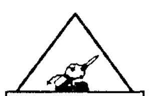
The National Military Strategy requires forces properly equipped to provide a flexible response across the full spectrum of conflict in uncertain global conditions. In the past few years, the Army conducted operations ranging from MOOTW to full-scale combat. Fire support must be prepared with the necessary operational capability to meet these varying needs, now and in the future. This annex describes the modernization status of the fire support battlefield operating system (BOS) through the year 2011.

Fire support operating systems of the future, as today, must be mission adaptive and capable of fighting as an integral component of joint forces. Organizations must be modular to rapidly reconfigure according to the shifting threats and environments. This versatility is paramount to support our force projection and early entry doctrine. Warfighting CINCs require this capability from the Army. Maintaining a mission adaptive posture requires both materiel and structural innovation. Systems must be more lethal, deployable, and versatile in the 21st Century.

Projecting and sustaining the force is an integral element of the fire support mission. Developing light weight, smaller, more versatile systems allows commanders greater flexibility in projecting forces into a theater or area of operations. The best systems in the world are useless if left behind due to limited lift capabilities. Traditionally, indirect fire systems required large amounts of resources to support continued operations. More durable, efficient weapons with matched support systems and more cost effective competent munitions will relieve some of the logistical sustainment burden and facilitate more rapid total force projection (extremely important, particularly during early entry operations). The Advanced Towed Cannon System (ATCAS) and High Mobility Artillery Rocket System (HIMARS) are prime examples of these type systems, while SADARM and BAT are examples of improved munitions.

Protecting the force takes many forms. Through proactive target acquisition and reactive counterfire, fire support systems will silence threat indirect fire means before they influence the battle. Deep attacks against enemy maneuver forces, surface-to-surface missile systems, air defense systems, and logistics units/facilities not only neutralize enemy capabilities but also limit his freedom of action while at the same time, enhance our freedom of action and force protection. Silencing enemy artillery and other indirect fire systems, the greatest killers on the battlefield, preserves our fighting forces and combat capabilities. Firefinder P3I and smart/brilliant munitions will do much to enhance this capability.

Winning the information war is nothing new to fire supporters. From the pre-automation days of firing charts and tables, fire supporters have sought better ways to capture, process, and use information. Our digitization process began in the late 1970s with TACFIRE. Today we have ten digital systems already fielded for employment on battlefields. And the Advanced Field Artillery Tactical Data System (AFATDS), the next generation fire support C4 system, will interface across the battle space with Army and joint C4I systems, providing a seamless link in the information network. The objective version 3.0, which is not currently fully funded, will complete the transition to fully automated fire support planning, coordination, and execution.



The ability to strike with precision at any range is a necessity in joint warfighting operations. This objective, more than any other, dominates the fire support BOS road to Force XXI. The ability to conduct such strikes directly supports shaping the battle space, dominating maneuver, and protecting and sustaining the force. Precision fires will provide joint and land commanders an unparalleled ability to strike targets when and where required. This unique capability is also of vital importance in some MOOTW. Precision effects are demanded in operations such as peace-making, where collateral damage plays an integral part in the rules of engagement. Precision strike munitions also relieve some logistical burden since they attain desired results with less ammunition expenditures. The Sense and Destroy Armor (SADARM) and Brilliant Anti-armor Technology (BAT) Submunitions are examples of these munitions.

Improvements in various pieces of supporting accuracy equipment, such as the Muzzle Velocity System and Met Measuring System, further enhance this capability.

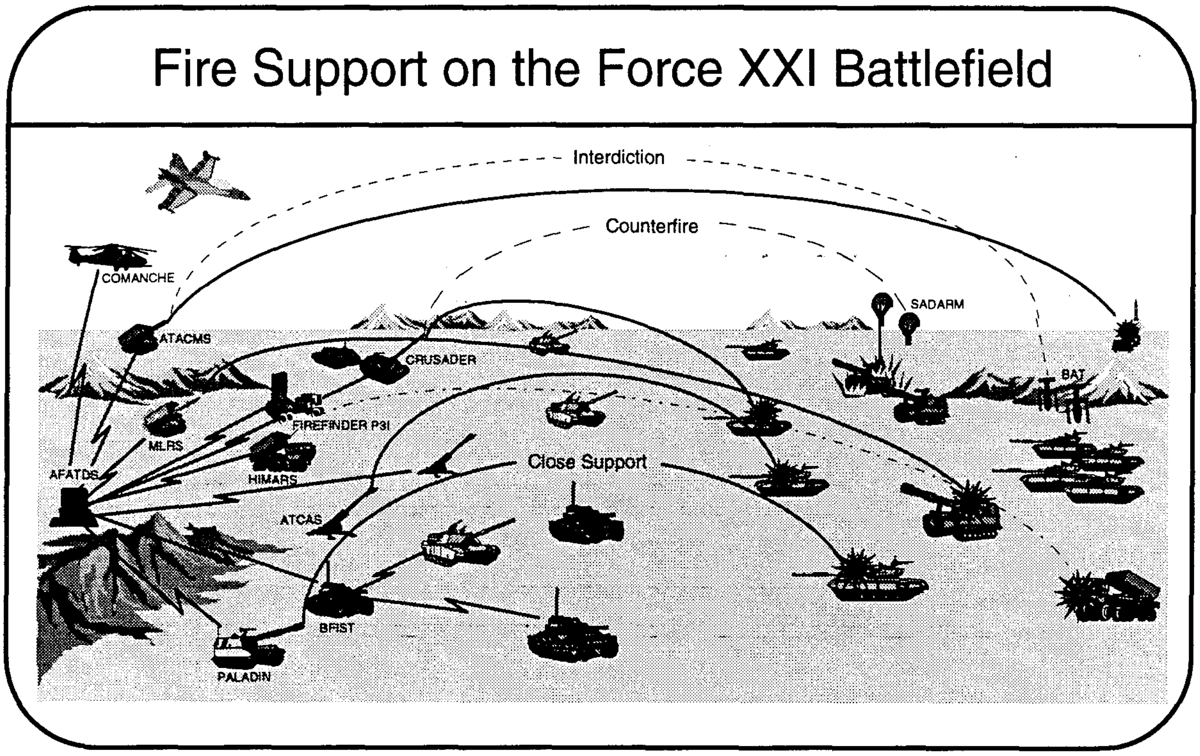


Figure E-1

Fire support begins shaping the battle space long before the close battle is joined. Deep and simultaneous attack will be key to this success. Technology makes it possible to strike the threat at ever increasing ranges with ever increasing lethality. The MLRS Smart Tactical Rocket (MSTAR) and the Army Tactical Missile System (ATACMS) leverage this technology. In the close battle, fire support systems will provide devastating fires, severely limiting the adversary's freedom of action allowing no opportunities to reorganize/reconstitute, and quickly subverting his will to fight. Crusader, formerly AFAS/FARV, will be the key weapon system. Controlling the battle space sets the conditions for dominant maneuver and decisive victory.

Fire support and associated artillery are truly a **system of systems**. Each system plays a vital role in forming the chain which brings devastating fires to the battle space. **The entire fire support system, like a chain, is only as strong as the weakest link.** For this reason all aspects of the fire support modernization process must move forward as an integrated program. We need modernized target acquisition systems (Firefinder P3I), precision munitions (SADARM and BAT) with more lethal effects than current area fire munitions, and delivery systems (HIMARS and Crusader) for use by the best trained soldiers in the world, configured in flexible organizations that can fight effectively as a part of joint and combined arms teams.

Fire support concepts, materiel and organizational innovations are designed to keep pace with Army and joint efforts into the 21st Century. Equipping the force with more deployable, lethal, durable, versatile, state of the art systems provides the foundation to respond as required across the broad spectrum of conflict. The figure below depicts a fully modernized **chain of fire support systems**.

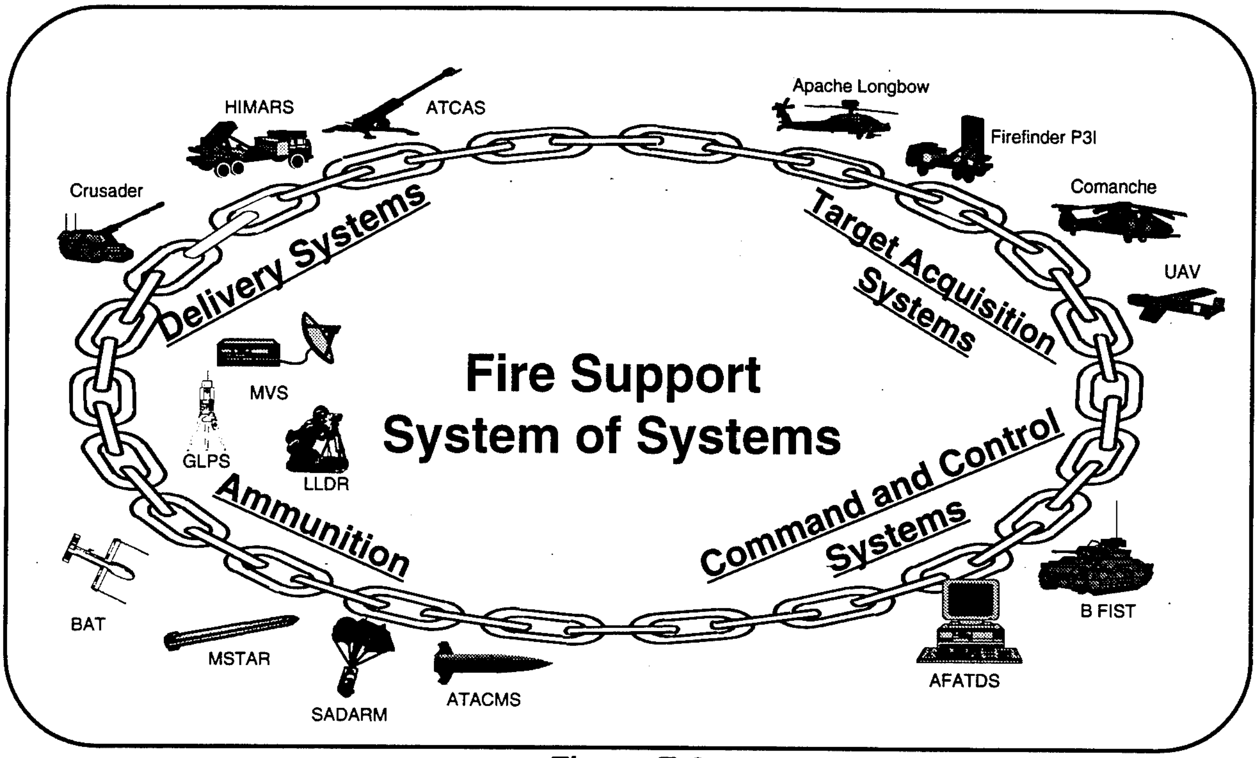


Figure E-2

SECTION 2

CURRENT PROGRAM ASSESSMENT

The ability of currently fielded systems to meet the future warfighting needs of the Field Artillery is assessed constantly. This section addresses the capability of our fire support system of systems to accomplish assigned major roles using the time frames and rating systems laid out in the Modernization Plan Introduction. Specific system descriptions are contained in Section 3, Research, Development, and Acquisition Strategy. Assessments address the significant issues in the categories of **weapons, target acquisition, command and control (C2), ammunition,** including **rockets** and **missiles,** and **supporting accuracy equipment**.

Close Support

Close support describes the fire support functions which support the immediate front line battle. A number of deficiencies exist in the **chain of systems** which support the close battle. These deficiencies are best illustrated by the M109A2/A3 Howitzer. This venerable system was developed in the 1950s and first fielded in the 1960s. While it has gone through a number of upgrades culminating in the M109A6 Paladin now being fielded, it is outranged by much of the world's artillery and cannot keep pace with the Abrams and Bradley equipped forces that it supports. The current fire support vehicle (M981 FIST-V) continually fails to meet Army operational readiness standards and is less mobile than its supported forces; **a weak link in the chain**. The M198 towed 155mm howitzer supporting our most mobile light forces has severe tactical and strategic mobility problems. The current TACFIRE command and control system is incapable of rapidly processing the volume and diversity of digital information in the fire support network; **another weak link in the chain.**

Near-term (Close Support)

Weapons. In the near-term, the M109A6 Paladin and Field Artillery Ammunition Supply Vehicle (FAASV) are fielded to all Active Component (AC) heavy forces. While a few heavy Reserve Component (RC) units are programmed to receive the Paladin, most are scheduled to receive the M109A5 howitzer. Not all Paladin howitzers will receive the companion FAASV due to procurement of insufficient quantities. **C2**. The Initial Fire Support Automation System (IFSAS) will displace the hard-to-maintain TACFIRE. IFSAS fields some of the equipment which will be used for AFATDS. **Accuracy Equipment.** The AN/TMQ-41 Meteorological Measuring Set (MMS) and its supporting AN/TMQ-42 Meteorological Hydrogen Generator (MHG) will improve the acquisition and dissemination of timely meteorological data. The assessment is **AMBER**.

Mid-term (Close Support)

Weapons. Mid-term improvements are keyed to continued fielding and planned system improvements to the Paladin. AFATDS is fielded in growing quantities to replace the aging TACFIRE C2 system. **Target Acquisition, C2**. Improvements include a Bradley Fire Support Team Vehicle (BFIST) with mobility equal to that of the supported force and enhanced horizontal communications with Force XXI maneuver forces. Targeting is further enhanced with the inception of aviation's Apache Longbow. This system brings a multiple target detection and tracking capability. The Apache Longbow is digitally integrated into the command/control and fire support networks. **Ammunition**. The 155mm SADARM adds improved munitions lethality. **Accuracy Equipment**. All forces need the Lightweight Laser Designator Rangefinder (LLDR) to provide man-portable and vehicle mounted precision munitions designation. The LLDR is unfunded. Computer Assisted Artillery Meteorology System (CAAMS) provides improved meteorological data to cannon and rocket systems. CAAMS is unfunded. The assessment is **Amber**.

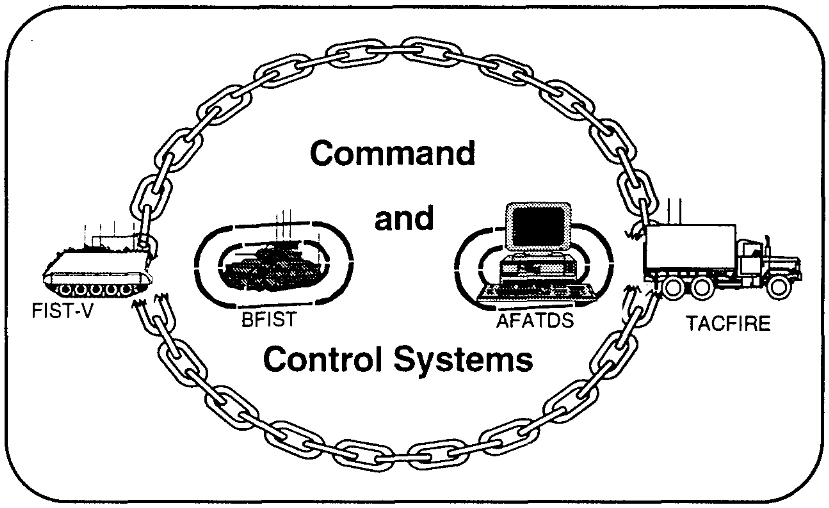


Figure E-3

Far-term (Close Support)

Weapons. The primary far-term improvement in close support is the replacement of the Paladin in heavy forces by the Crusader, formerly called the Advanced Field Artillery System (AFAS) and the Future Armored Resupply Vehicle (FARV). This single improvement significantly **strengthens the chain of systems**. As Crusader is fielded Paladin is cascaded down to lower priority units, allowing most older M109s to be retired. However, the combined procurement quantities of Crusader and Paladin are not enough to displace all older M109s. Some light forces will still retain Vietnam-era M102 105mm towed howitzers. The M198 155mm towed howitzer is replaced with the Advanced Towed Cannon System (ATCAS). Again the ATCAS is not funded to sufficient levels to replace all current M198 weapons. **Target Acquisition, C2.** The Comanche helicopter first appears in the far-term, increasing target detection and identification capability. The Comanche, like the Apache Longbow, is digitally integrated into the command/control and fire support networks. **Ammunition**. To complement new weapons, improved, more lethal, longer range projectiles such as the XM982 (formerly Extended Range Artillery Projectile) are required. It is currently unfunded and **the chain is only as strong as the weakest link**. **Accuracy Equipment**. Target Area Meteorology Sensor System (TAMSS) could upgrade meteorological collection techniques with the addition of meteorological profilers and UAV delivered meteorological sensors. Though **the chain of systems is stronger**, the assessment remains **AMBER** because of insufficient quantities of modernized howitzers for the total force.

Counterfire

Counterfire describes the mission designed to eliminate the enemy's fire support system. Proactive counterfire attacks targets before they are employed against friendly forces, while reactive counterfire attacks targets after employment. The current Firefinder counterfire target acquisition system is outdated, expensive to maintain and outranged by threat cannon and rocket systems. There is no imaging targeting system organic to corps to locate and identify high payoff counterfire targets. Operational fires with ATACMS Block I provide a capability to proactively engage surface-to-surface missile systems (SSMs) and heavy Multiple Rocket Launcher Systems (MRLS). However, tactical cannon and rocket fires lack the range to adequately protect the force; **a weak link**. The ability of current munitions to defeat modern self-propelled artillery and SSMs/MRLS that employ shoot and scoot tactics is inadequate. The ability to project and sustain a force is greatly hindered by inadequate munitions effectiveness and the resulting logistics burden; **another weak link**. Capability exists to provide early deploying forces with limited rocket/missile fires with strategic airlift, but no capability exists to move launchers within theater via C-130.

Near-term (Counterfire)

Weapons. The deployment of ATACMS Block IA and the fielding of two MLRS battalions with Improved Positioning Determining System/Global Positioning System (IPDS/GPS) interim launchers provides a capability to actively engage SSMs out to 300 km. However, the inability to continue funding MLRS launchers will leave the RC units with a serious counterfire deficiency. **Target Acquisition**. Improvements center on product improvements to the Q-36 counter-mortar radar system. Included are an electronics upgrade, increased range and greater target throughput. Short-range UAV provides a leap ahead in target acquisition capability. **Accuracy Equipment**. The AN/TMQ-41, Meteorological Measuring System will be fielded only to about one half the units required due to funding constraints. The Muzzle Velocity System (MVS) begins fielding replacing the obsolete M90 Chronograph. The MVS provides accurate measurement of cannon projectile velocity and automated calculation of velocity variations. Deficiencies in the range, effectiveness, and responsiveness of tactical cannon and rocket fires continue to hinder the Army's ability to dominate maneuver, protect, and sustain a deployed force. The assessment is **AMBER.**

Mid-term (Counterfire)

Weapons. MLRS will begin launcher fleet retrofitting with Improved Fire Control System and Improved Launcher Mechanical System (IFCS/ILMS) to improve responsiveness and survivability. **Target Acquisition**. Q-37 Version 8 Firefinder is an upgrade to the existing AN/TPQ-37 which improves target detection range, mobility, transportability, and maintainability. This upgrade enhances the reactive portion of the counterfire mission. Additionally, the planned introduction of UAV-Close Range improves accuracy and depth of target acquisition. The UAV, although it has many other functions, is a superb proactive counterfire tool. **C2**. AFATDS provides a common battle space picture while improving targeting efficiency. **Ammunition**. Improvements increase lethality with the introduction of cannon fired SADARM. It provides a quantum leap in counterfire efficiency and effectiveness but is currently limited to a 22 km range. There are still no long range smart counterfire munitions for MLRS. Conventional rocket fire ranges are increased by 50% with the deployment of Extended Range MLRS (ER MLRS) but are still outranged by some threat systems. The assessment is **AMBER**.

Far-term (Counterfire)

Weapons. The initial fielding of Crusader gives field artillery the "reach" to protect the force at even greater cannon ranges. HIMARS is fielded, thus providing a C-130 deployable rocket and missile capability for rapidly deploying light forces. **Target Acquisition**. The fielding of the Q-37 Firefinder P3I increases our counter-battery radar range to match that of available long-range cannon and rocket systems. Firefinder P3I's goal of 60 km range against cannons offsets threat cannons that can attack friendly troops and the radar without being detected. **Ammunition**. Deployment of MLRS Smart Tactical Rocket and ATACMS Block IIA provides the capability to effectively defeat stationary or moving shoot and scoot counterfire targets throughout the depth of the battlefield. Guided ER MLRS, currently unfunded, would further increase the effectiveness of rocket fires while reducing the logistics burden. Despite improvements to target acquisition and ammunition, the serious lack of MLRS launchers in the Reserve Components will not provide warfighting CINC's with the volume of fires required to adequately execute the counterfire mission and fully protect the force. The assessment remains **AMBER**.

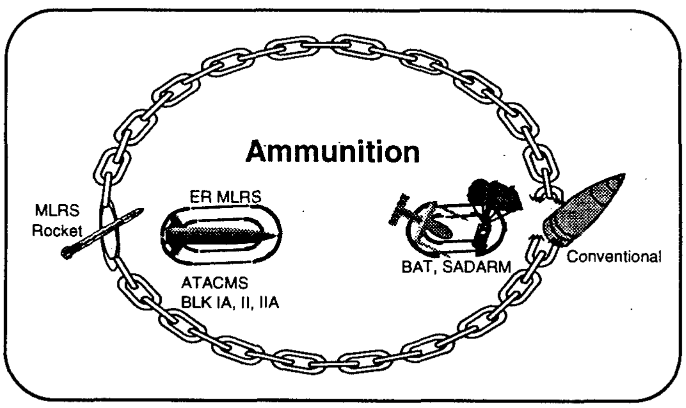


Figure E-4

Interdiction Fires

Interdiction refers to the mission associated with attacking the enemy at depth before their forces are employed in the close battle. Interdiction fires shape the battle space and set the stage for dominant maneuver. During Operation Desert Storm, the highly successful use of ATACMS demonstrated the Army's ability to execute interdiction fires in depth. Current munitions, however, are limited to unguided bomblets and do not achieve the range required to support the joint force commander with responsive effective fires. There is no effective capability to engage moving targets. The current command and control system does not provide seamless links and common distributed databases to maximize potential effectiveness. All are **previously noted weak links.**

Near-term (Interdiction)

Weapons and Ammunition. Two MLRS battalions are fielded with IPDS/GPS and the 300 km ATACMS Block IA missile is introduced. Rocket and missile fires lack the lethality to interdict armored targets and are ineffective against moving targets. Here, the same deficiencies and **weak links** exist for rockets and missiles as stated in the near-term counterfire assessment. **Target Acquisition.** Joint Surveillance and Target Attack Radar System (JSTARS), IEW Common Sensor, and Short-Range UAV are all on line to **strengthen the chain**. The assessment is **AMBER**.

Mid-term (Interdiction)

Weapons. IFCS/ILMS MLRS equipped battalions provide improved responsiveness with enhanced survivability. **Target Acquisition.** As before, the Apache Longbow brings enhanced targeting capability to the fire support system. **Ammunition**. ATACMS Block II is initially deployed, providing the capability to defeat moving armor formations at operational depth. ER MLRS becomes available to increase the capability of the MLRS system but still no tactical rocket capability to interdict hard or moving targets. With the continued acquisition of responsive sensors, the fielding of AFATDS, and horizontal integration of C4I assets, the Army's deep strike capability becomes much more robust. The assessment is **AMBER**.

Far-term (Interdiction)

Weapons. HIMARS provides strategic deployability and operational mobility to rapidly deploying early entry forces and warfighting CINCs. **Target Acquisition**. The Comanche helicopter, through digital links, adds situational awareness and increased targeting capability. **C2**. AFATDS must remain funded through the objective version to achieve maximum benefit and **remain a strong chain link** in the Army's objective seamless C4I architecture. **Ammunition**. Smart munitions (BAT, BAT P3I, and MSTAR) and the procurement of ATACMS Block IA, II, IIA and Extended Range MLRS provide lethal interdiction fires against hard/soft, moving/stationary, hot/cold targets throughout the battle space. By the end of the far-term, our fire support modernization strategy produces a lethal deep strike force. The assessment changes to **Green**.

Today's fire support systems possess greater capability than at anytime in history. However, proliferation of technology, proliferation of weapons of mass destruction, destabilized socio-political situations around the world, and increasing willingness of potential adversaries to risk regional conflict dictate that we continually modernize our forces. The fire support system will be smaller in the far-term and, if properly modernized, it will be much more deadly to enemy forces. The figure below depicts a modernized, integrated **system of systems chain with no weak links** affecting capability. Remaining synchronized with other BOSs as the Army modernizes toward Force XXI is key to future success. Synchronized modernization, as envisioned in the Army Modernization Plan, will provide the greatest combat capability to warfighting CINCs. The fire support modernization plan provides for investment in those areas that will give the greatest return in combat capability.

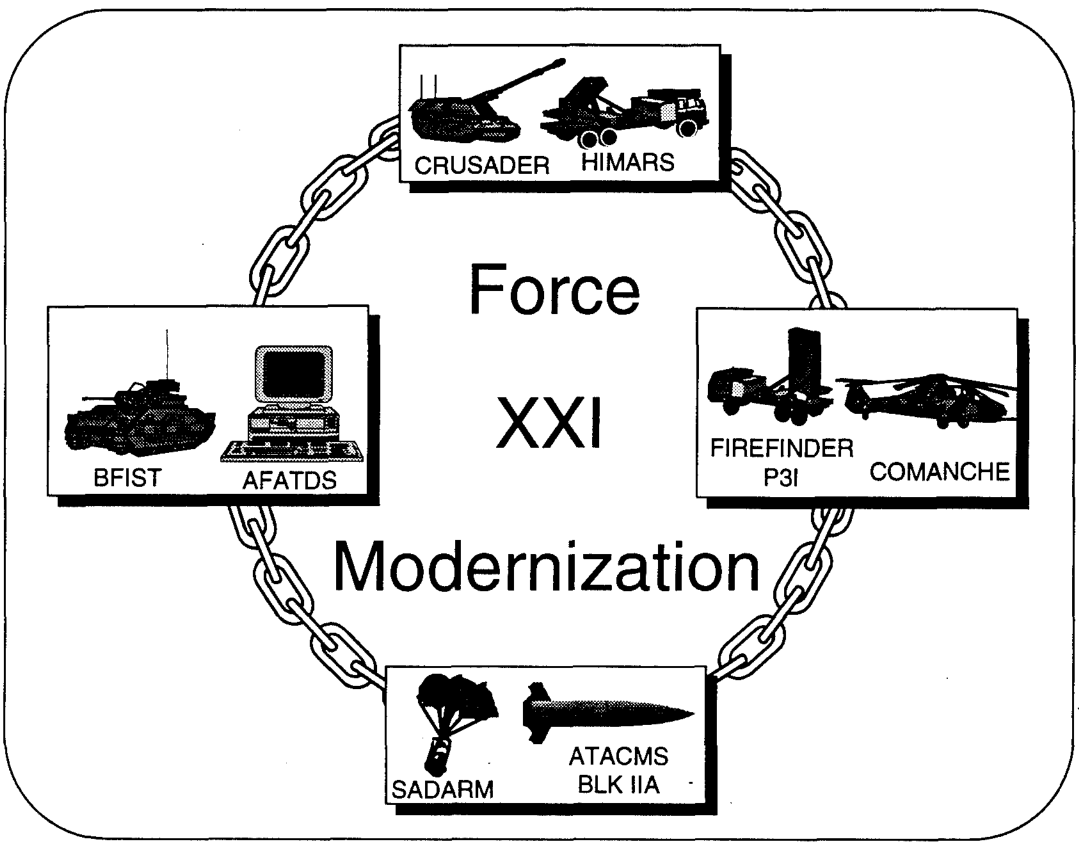


Figure E-5

Green assessment ratings are based on improvements and systems coming on line as forecasted. Should circumstances prevent these modernization efforts from coming to full fruition, the assessment ratings will fall at least one level.

Summary

FIRE SUPPORT PROGRAM ASSESSMENT

MISSION	SYSTEM	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
CLOSE SUPPORT	PALADIN, FAASV, CRUSADER, ATCAS, BFIST, IFCS/LMS, GLPS, SADARM, HIMARS, MMS, MHG, MVS, IFSAS, Q36 V.8, LLDR, LFED, TAMSS, CAAMS, XM982, AFATDS	AMBER	AMBER	AMBER
COUNTER-FIRE	PALADIN, IFCS/LMS, HIMARS, CRUSADER, MSTAR, ATACMS BLKIA+IIA, SADARM, Q-36/37 V.8, ER-MLRS, FFNDR MVS, CAAMS, TAMSS, AFATDS	AMBER	AMBER	AMBER
INTER-DICTION	HIMARS, ATACMS BLKIA+IIA, ER-MLRS, MSTAR, IFCS/LMS, MHG, MVS, UAV-SR+CR, CAAMS, TAMSS, AFATDS	AMBER	AMBER	GREEN

Figure E-6

Note: Unfunded Systems Underlined Above

AFATDS - Advanced Field Artillery Tactical Data System
ATACMS - Army Tactical Missile System
ATCAS - Advanced Towed Cannon System
BFIST - Bradley Fire Support Team Vehicle
CAAMS - Computer Assisted Artillery Met System
CRUSADER - Crusader, formerly AFAS/FARV
FAASV - Field Artillery Ammunition Supply Vehicle
FFNDR P3I - Q-37 Radar Preplanned Product Improvement
GLPS - Gun Laying Positioning System
HIMARS - High Mobility Artillery Rocket System
IFCS - Improved Fire Control System (MLRS)
IFSAS - Initial Fire Support Automation System
IPDS - Improved Positioning Determining System
LFED - Lightweight Forward Entry Device
LLDR - Lightweight Laser Designator Range finder
LMS - Improved Launcher Mechanical System (MLRS)
MHG - Meteorological Hydrogen Generator
MLRS - Multiple Launch Rocket System
MMS - Meteorological Measuring System
MSTAR - MLRS Smart Tactical Rocket
MVS - Muzzle Velocity System
PALADIN - M109A6 Howitzer
Q-36 V.8 - Q-36 Radar Version 8 upgrade
Q-37 V.8 - Q-37 Radar Version 8 upgrade
SADARM - Sense And Destroy Armor
TAMSS - Target Area Met Sensor System
UAV-CR - Unmanned Aerial Vehicle, Close Range
UAV-SR - Unmanned Aerial Vehicle, Short Range
XM982 - Extended Range Artillery Projectile

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

This section explains the significant fire support programs and systems that are required through the year 2011. Where noted some of the systems remain unfunded. The RDA effort falls into the same 5 categories as discussed in the previous section.

Science and Technology

S&T for Fire Support is focused principally on system upgrade opportunities and enhancements to artillery rockets, projectiles, and munitions. Technology demonstration programs are aimed at increasing such attributes as range, accuracy, lethality, rate of fire, and reduction of timelines. In a relatively new initiative, called Advanced Concepts Technology Demonstrations (ACTD), extensive simulations and large scale field exercises are conducted, followed by a period of time, typically two years, during which limited amounts of experimental equipment will be left with an operational unit to evaluate the new technologies as well as new tactics, techniques, and procedures.

- *Rapid Force Projection Initiative (RFPI).* RFPI is a system of systems demonstration which uses a "hunter/stand-off killer" concept to enable air deployable, early entry forces to defeat a heavy threat. It relies on forward deployed sensors of various types to provide rapid targeting for lightweight, stand-off weapons. Precision guided weapons are emphasized to increase lethality and survivability, and to reduce logistics burdens. Acoustic sensors play a key role in improving situational awareness, cueing other sensors, and performing targeting. The following efforts describe notable technology demonstrations under the RFPI that support this mission area.

- *Guided MLRS Advanced Technology Demonstration.* This demonstrates strap-on, low cost guidance technology for the Extended Range (ER) MLRS rocket, thereby substantially improving its delivery accuracy, reducing the number of rockets required to defeat the target, and expanding the MLRS target set to include precision targets. This program also supports integration into the RFPI of the High Mobility Artillery Rocket System (HIMARS), a lightweight launcher system capable of employing the full family of MLRS munitions.

- *155mm Automated Howitzer Technology Demonstration.* This demonstrates an advanced fire control system and automation of several functions. Such technologies as digitized fire control, including GPS, digital communications, and auto gun laying will significantly enhance towed artillery responsiveness. Proposed ACTD residual capabilities include eight advanced fire control systems to be installed and left with howitzers organic to the test unit.

- *Advanced Sensor Submunition Technology Demonstration.* This demonstrates sensors with a sufficiently large footprint to be effective against time critical and moving targets. It provides opportunities for upgrades to SADARM and MLRS submunitions.

- *105mm Terminally Guided Projectile.* This program will provide increased lethality, against point targets, and survivability to the light forces organic 105mm howitzer. The projectile will use the multi-mission common seeker being developed in the 120mm Precision Guided Mortar Munitions ATD.

- *Joint Precision Strike Demonstration (JPSD).* This program provides for the integration of high payoff technologies, new technical, architectural and operational concepts, along with existing and emerging systems to demonstrate enhanced precision strike and counterfire capabilities against ground targets at deep and extended ranges. The program will conduct a series of building block demonstrations to identify and address candidate solutions to technical and operational barriers for an adverse weather, day/night, end-to-end sensor-to-shooter precision strike capability.

- *Precision/Rapid Counter Multiple Rocket Launcher (MRL) Advanced Concept Technology Demonstration (ACTD).* This ACTD under the JPSD program demonstrates a significantly enhanced capability for U.S. Forces Korea (USFK) to defeat the 240mm MRL threat. The ACTD will address new concepts and technologies through simulation and live testing and will investigate methods of automating and integrating fire support and intelligence operations in order to respond within the adversary's timelines, control the tempo of operations, and defeat the threat.

Other significant S&T programs:

- *Extended Range Artillery (ERA) Projectile Technology Demonstration.* This program demonstrates a 155mm projectile concept combining base-burn and rocket assist technologies to address conventional artillery needs for increased range. The round will deliver DPICM cargo to extended ranges (40 - 50 km) from all currently fielded 155mm artillery systems.

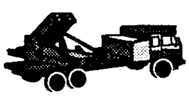
- *Low Cost Competent Munitions.* This program will demonstrate concepts to improve accuracy of the current inventory of 155mm artillery projectiles. The first demonstration features miniaturized global positioning system (GPS) technology in a 155mm fuze, which provides "should hit" versus "did hit" data. Follow on demonstrations will include a miniature inertial measurement unit either with a drag system to allow for range corrections or a canard system to allow for both range and deflection corrections.

- *Bistatic Radar for Weapons Location (BRWL) Advanced Technology Demonstration (ATD).* This ATD uses bistatic and other advanced radar techniques and technologies to demonstrate potential solutions for the Firefinder P3I requirement. The demonstration system has superior detection range compared to the AN/TPQ-37 and features reduced false locations as well as throughput of locations at a rate greater than 100 per minute. It will provide improved classification of counterfire targets, and will simultaneously perform friendly and hostile fire missions as well as detection, classification, and tracking of theater ballistic missiles.

- *Meteorological Improvement Program.* The requirement for accurate meteorological information increases as the range of cannon and rocket systems increases. Both Crusader and extended range rockets for the MLRS will require improvements to our current meteorological systems. The Meteorological Improvement Program (MIP) has two thrusts: Computer Assisted Artillery Meteorology System (CAAMS) and the Target Area Meteorological Sensors System (TAMSS). CAAMS (Block I) will provide the AN/TMQ-41 Meteorological Measuring System (MMS) with the capability to update information every 30 minutes. CAAMS 4D will add the capability to provide data out to 500 km in support of the deep attack. TAMSS will eliminate balloon borne sensors providing meteorological data using atmospheric profilers, UAV dropsondes and the Integrated Meteorological Systems Battlescale Forecast Model.

Weapons

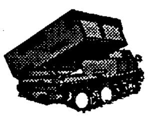
Crusader (AFAS/FARV). Crusader development remains fully funded and currently has subsystem components in technology demonstration. Crusader provides leap ahead technology for fire support. The introduction of automatic ammunition handling and loading provides a quantum leap in rate of fire which offsets the improved quality and quantity of threat artillery. The Crusader self-propelled howitzer and resupply vehicle, the centerpiece of fire support modernization, will reduce manpower requirements and exploit technology to improve rate of fire, range, mobility, reliability, accuracy, responsiveness, and survivability. The Crusader self-propelled howitzer's 52 caliber cannon will achieve a maximum range of 40 - 50 km with a rate of fire of 10 -12 rounds per minute. One howitzer will provide a 4 - 8 multiple round simultaneous impact capability. The Crusader resupply vehicle is a technology carrier for future armored vehicles. Technologies with horizontal integration potential include: robotics, vetronics, decision aids, survivability enhancements and advanced integrated propulsion system. The combined crew of six represents a 1/3 reduction in manpower over the current M109 system. This system is designed and expected to significantly influence the close battle while also contributing to the counterfire role. ***FUE: FY05***



High Mobility Artillery Rocket System (HIMARS). HIMARS is based on the need for a lighter weight, more deployable rocket and missile system that can be sent anywhere in the world to provide commanders with lethal, long-range fires at the very beginning of a conflict. HIMARS is a wheeled launcher that will be C-130 transportable to facilitate rapid relocation within theater. HIMARS will fire the entire MLRS Family of Munitions (MFOM) and will have a maximum crew of three. ***FUE: FY06***

Advanced Towed Cannon System (ATCAS, formerly LT WT 155 Howitzer). The ATCAS program is currently examining options for a lightweight 155mm howitzer. The Army is cooperating with the U.S. Marine Corps to identify a 155 howitzer which weighs less than 9,000 pounds, can achieve 30 - 40 km range with current rocket assisted projectiles, and is highly mobile. The ATCAS can be emplaced within three minutes and will replace the M198. This much needed weapon provides our most mobile light forces a cannon with mobility comparable to the maneuver elements and still delivers devastating 155mm fires. ATCAS is primarily employed in the close fight and also contributes to counterfire. ***FUE: USMC FY02, Army FY05***

Paladin (Howitzer, 155mm, M109A6). Funding for procurement ends after FY96. The M109A6 Paladin extends the range of the M109 series howitzer to 30 km (using the M203 propelling charge and rocket-assisted projectiles) and enables units to adopt shoot and scoot tactics that increase survivability and responsiveness. Fiscal constraints currently preclude fielding to the entire force. Like most cannon systems, close support and counterfire are the primary roles of the Paladin. ***FUE: FY93***



Multiple Launch Rocket System (MLRS). Funding for procurement of the MLRS launcher ended in FY95. This combat proven system is the backbone for long-range fires in the Army. The M270 launcher will undergo its first major upgrade beginning in FY99. The upgrades will maintain the viability of the launcher into the next century. MLRS is the heart of the Army's counterfire and interdiction capability.

MLRS Improved Fire Control System (IFCS) and Improved Launcher Mechanical System (ILMS). IFCS and ILMS are major upgrades to the M270 launcher. The upgraded launcher has been designated the M270A1. The IFCS incorporates a new fire control panel with greater memory and data storage capabilities. The new panel can accommodate growth in the MLRS family of munitions. The new navigation system reduces reliance on survey control points by embedding a GPS chip into the system. The new navigation system reduces initialization times and improves crew survivability. The M270A1 has a low level wind measuring device to improve both conventional and extended range rocket accuracy and lethality. The fire control system enhancements are mirrored by improvements in the launcher mechanical systems. Upgrades to the launcher interface unit, azimuth and elevation hydraulic motors, and other assemblies result in an 83% reduction in time to aim and fire the weapon. ***FUE: FY00***

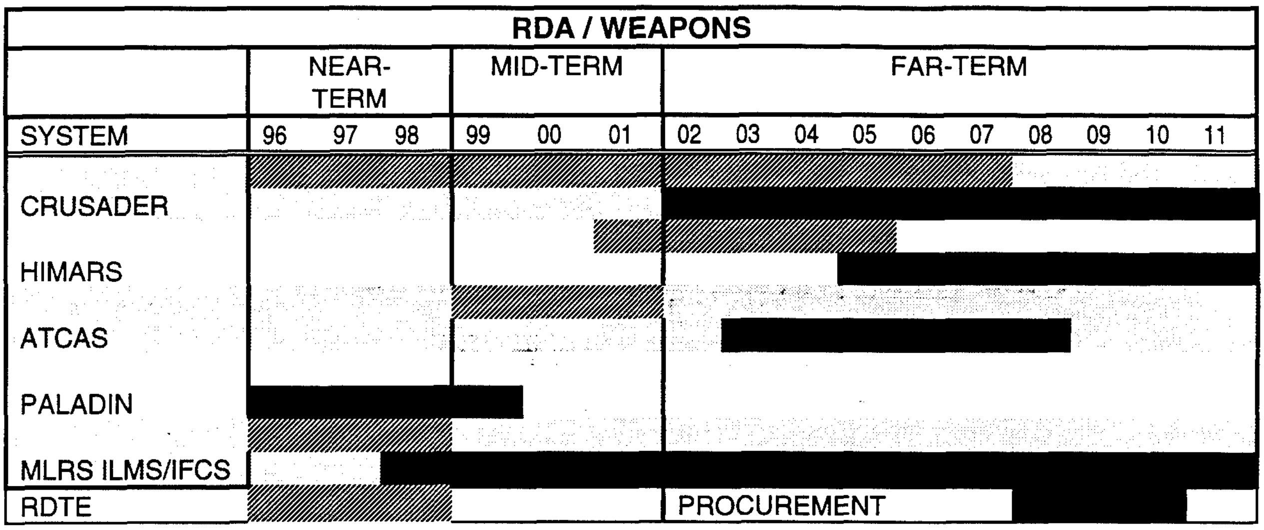
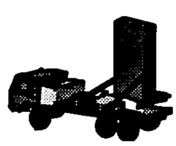


Figure E-7

Target Acquisition

AN/TPQ-36 Version 8 Upgrade. The Q-36 Version 8 provides a major electronics upgrade to our mortar locating radars (Q-36 Version 5 and Version 7). Version 5 is the system currently fielded in reserve component units. The Version 7 is fielded in the active component. It downsizes the radar to a HMMWV-only configuration and adds the Modular Azimuth and Positioning System (MAPS). Version 8 increases the range by 50% and increases target throughput from 4 to 20 targets per minute. This improvement prevents electronics obsolescence by updating Firefinder processing technology from the 1970s to the 1990s. In addition to the performance improvements, the computer signal processor specifications allow growth to the AN/TPQ-37, Firefinder P3I. ***FUE: FY96***

AN/TPQ-37 Version 8 Upgrade (formerly Firefinder Block I). Q-37 Version 8 provides several upgrades: loading on C-130/C-141 aircraft without special loading equipment, greater mobility through the modified track suspension system, longer target detection range, incorporation of a self-survey capability, reduced false alarms, and improved maintenance from cooler and dehydrator upgrades. ***FUE: FY96***



Firefinder P3I. The primary requirement for Firefinder P3I is improved range. The objective is to locate heavy artillery to 60 km and Tactical Ballistic Missiles (TBM) to 300 km. The increase in range against cannons is necessary to keep pace with the proliferation of long-range artillery. Additionally, the radar will prioritize and classify targets by type (mortar, artillery, rocket, etc.). Firefinder P3I will be a major contributor to theater missile defense attack operations. Targets located by the radar can be attacked by ATACMS with Anti-Personnel/Anti-Materiel or BAT P3I warheads. Firefinder P3I will function as an early warning/cueing sensor for active defense systems such as PATRIOT or THAAD. ***FUE: FY02***

Firefinder Digital Upgrade. This program provides position analysis and threat decision aid software to allow optimum employment of Q-36 and Q-37 Firefinder radars. The software will determine the effects of terrain and threat weapon type on the probability of location. This information allows the targeting warrant officer to advise the intelligence officer of proper Firefinder emplacement. The Digital Upgrade will also equip Q-37 and Q-36 radars with computers providing improved data processing speed and communications connectivity. ***FUE: FY99***

All radar modernization efforts contribute directly to the counterfire role.

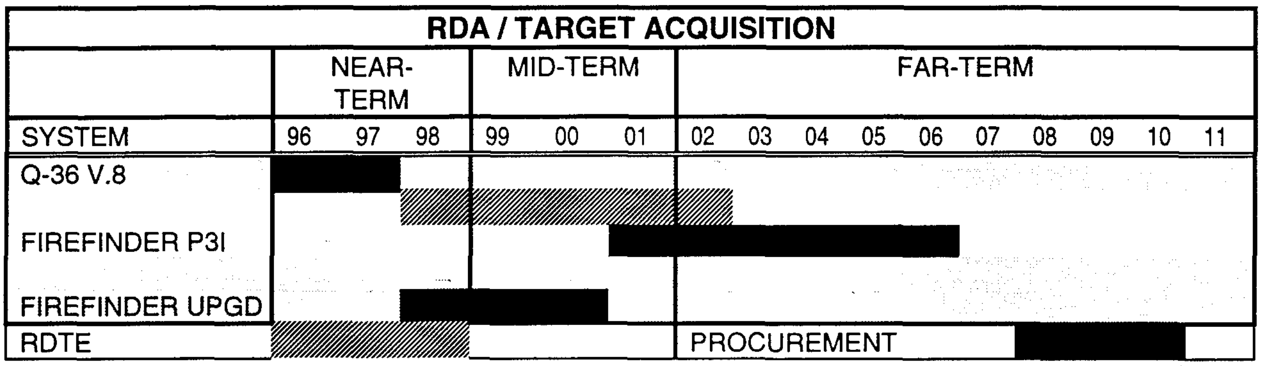
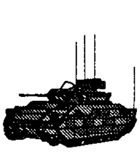


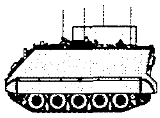
Figure E-8

Command and Control

Advanced Field Artillery Tactical Data System (AFATDS). AFATDS is an integrated battlefield management and decision support system functioning at battery through corps as the fire support node of the Army Battle Command System (ABCS). AFATDS will enhance responsiveness, survivability, and continuity of fire support operations via dispersed processing centers, intelligent remote terminals and a distributed database management system. It will interface with all existing and future fire support systems, other ABCS battlefield functional area systems, other services, and allied forces. AFATDS establishes targeting priorities based on value analysis and selects attack systems from mortars, artillery, naval gunfire, attack helicopters, and fixed wing aircraft. ***FUE: FY95***



Bradley Fire Support Team Vehicle (BFIST). The BFIST is a Bradley Fighting Vehicle converted to a fire support configuration. It replaces the M981 Fire Support Team Vehicle for company fire supporters and Combat Observation/Laser Teams in Force Package 1 and most of Force Package 2. The BFIST provides the mobility required to keep pace with our Bradley/Abrams mounted forces. It incorporates a navigation and direction system; an integrated sight system that provides day/night all weather visibility, range finding and designation; and an improved automatic target hand-off system. BFIST maximizes effectiveness of digital communications among maneuver and fire support elements and directly contributes to the close fight. ***FUE: FY00***



M981 Fire Support Team Vehicle (FIST-V). Although being replaced by BFIST in part of the force, the M981 remains with approximately 65% of the total Army. Modifications to improve both capability and readiness potentially include a low profile turret, a 275HP power train, and an inertial/Global Positioning System navigation and direction finding system. The goal is to keep the Fire Support Team mission equipment on the M981 compatible with that on the BFIST. ***FUE: Powertrain FY96***

Lightweight Forward Entry Device (LFED). The LFED will be used by platoon forward observers in light infantry, airborne, and air assault units to compose, edit, transmit, receive, store, and display messages, and to process data used in the conduct of fire support operations. The LFED is approximately half the size of the FED fielded to our heavy divisions. ***FUE: Unfunded***

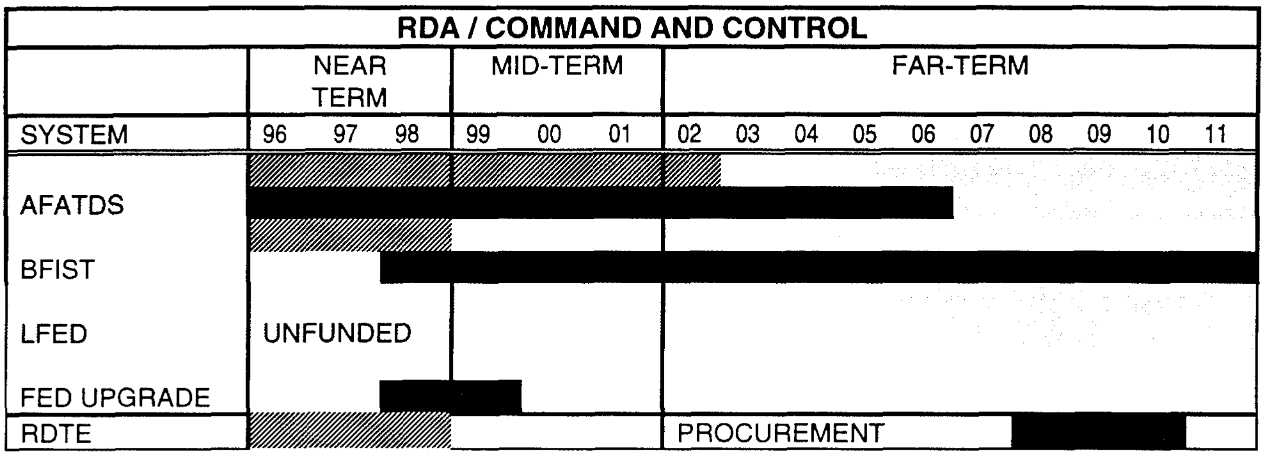
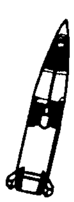
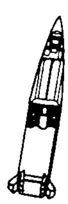


Figure E-9

Ammunition

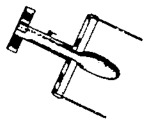


ATACMS Block IA (BLK IA). ATACMS BLK IA, is a modification of the current basic missile. The payload has been reduced to approximately 300 bomblets, allowing the missile to fly over twice its present range. Global Positioning System (GPS) capability improves missile accuracy. ***FUE: FY98***

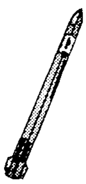


ATACMS Block II. The ATACMS BLK II carries 13 BAT Brilliant Anti-armor Submunitions. The BAT engages moving armored formations out to 140 km using combined acoustic and infrared sensors. The acoustic sensors search an extremely large area, thus facilitating detection and increasing lethality. The BAT P3I will be incorporated into ATACMS BLK II after it is developed. ***FUE: FY01***

ATACMS Block IIA. The ATACMS BLK IIA carries six BAT P3I to approximately twice the range of the BLK II. The BAT P3I engages moving and stationary, soft and hard targets using combined acoustic, millimeter wave, and infrared sensors. ***FUE: FY03***



Brilliant Anti-armor Submunition Preplanned Product Improvement (BAT P3I). BAT P3I increases the effectiveness of the basic BAT. It incorporates improved seeker technology, software and warhead enhancements to attack additional targets, adds robustness against countermeasures, and improves capabilities during degraded weather. Funded to be carried in ATACMS Block IIA, it adds versatility and flexibility to the deep fires program. ***FUE: FY03***



Extended Range MLRS Rocket (ER MLRS). The ER MLRS offers greater range, improved accuracy, and reduced grenade dud rates. The warhead payload is reduced, but accuracy is maintained by incorporating a low-level wind measuring device and "soft launch" technology. The addition of a low cost guidance package to enhance accuracy is being considered. ***FUE: FY99***

MLRS Smart Tactical Rocket (MSTAR). MSTAR will be a robust smart munitions rocket employed against a variety of moving and stationary, hard and soft, hot and cold targets. The munitions will be delivered by the extended range MLRS rocket. Various smart submunition candidates are currently being studied. The program has research and development funds beginning in FY02. The MSTAR cost and operational effectiveness analysis is due in late FY97 or early FY98. ***FUE: TBD***

All of the above munitions are primarily designed for interdiction fires with the added capability of significantly enhancing the deep counterfire role.

155 Sense and Destroy Armor (SADARM). The 155mm SADARM projectile contains two SADARM submunitions in a base ejection carrier and is delivered in the same manner as other 155mm munitions. The field artillery's first smart munition, SADARM possesses infrared and active/passive millimeter wave multi-mode sensors. The lethal mechanism is an explosively formed penetrator that fires through the top of the target. The 155mm SADARM exceeded Operational Requirements Document (ORD) requirements in testing. The MLRS SADARM P3I is currently one of the competing technologies for the MLRS Smart Tactical Rocket (MSTAR) program. Because SADARM is more lethal than current munitions, fewer projectiles are

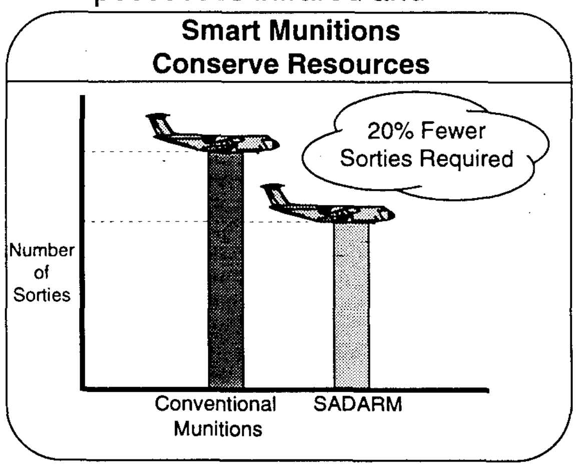


Figure E-10

required to accomplish the same mission. The resultant savings in logistical support is significant. SADARM is designed primarily as a counterfire munition. ***FUE: FY99***

XM982 Extended Range Artillery Projectile. The XM982 projectile will provide the capability to deliver cargo submunitions to ranges up to approximating 50 kilometers. The projectile will use a hybrid propulsion concept combining rocket assist and base burning to achieve extended range without a reduction in cargo capacity. Designed to carry Dual Purpose Improved Conventional Munitions, the projectile will serve as the baseline for future extended range projectiles to carry other cargo such as SADARM. ***FUE: Unfunded***

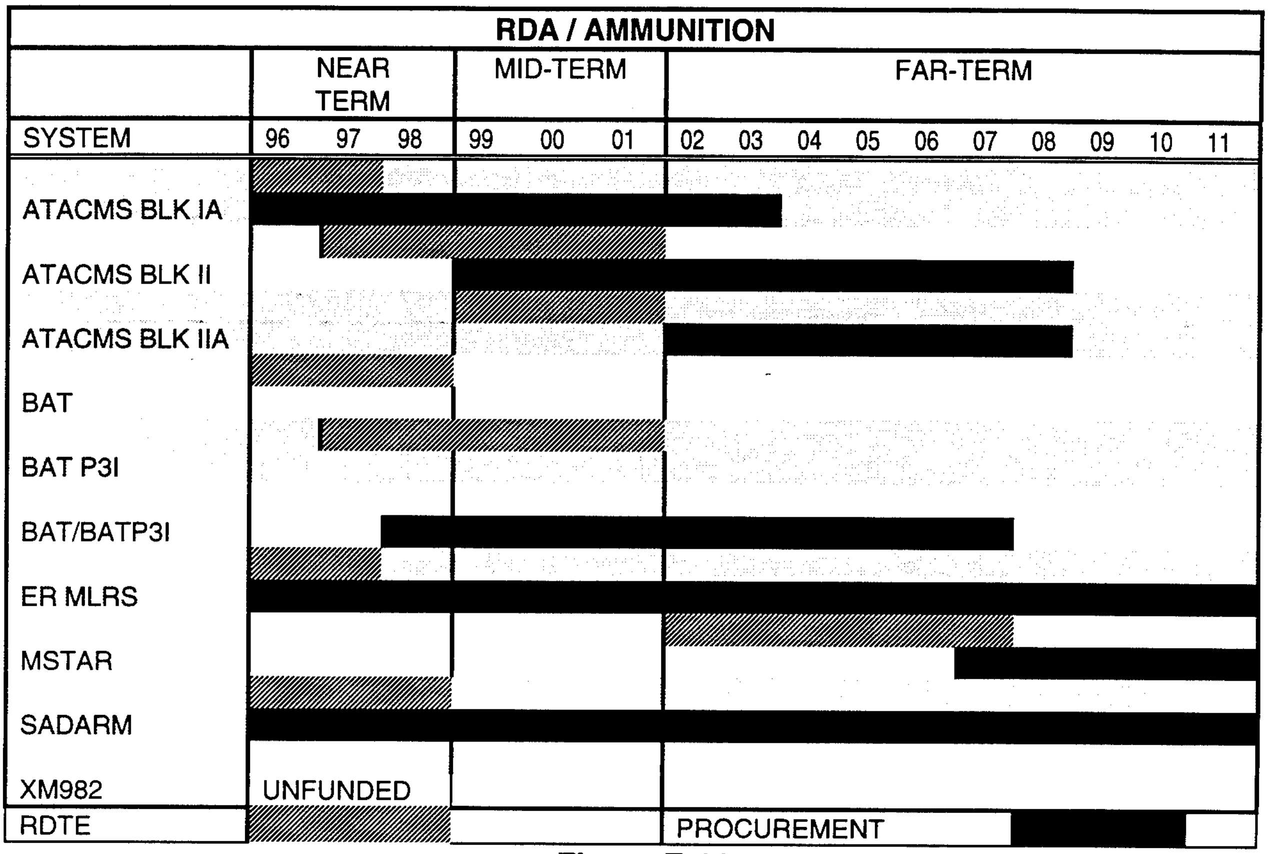
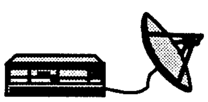


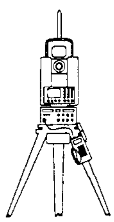
Figure E-11

Supporting Accuracy Equipment

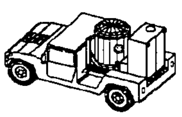


Muzzle Velocity System (MVS). MVS replaces the aging M90 chronograph currently in use. The MVS provides a lightweight, modular, manportable system capable of measuring the muzzle velocity of all types of field artillery rounds. It processes muzzle velocities, provides data to correct for nonstandard tube conditions, and communicates with the Paladin onboard fire control computer. In non-Paladin units the Battery Computer System and follow on systems use the data provided by MVS to achieve required accuracy. ***FUE: FY96***

Lightweight Laser Designator Rangefinder (LLDR). LLDR is a combined laser range finder, thermal sight, and laser designator for the light forces. The currently fielded system, Ground/Vehicular Laser Locator Designator (G/VLLD), is outdated, costly to maintain, and too heavy for practical transport by dismounted troops. The need to designate for Copperhead artillery rounds or Air Force delivered smart munitions remains. ***FUE: Unfunded***



Gun Laying and Positioning System (GLPS). GLPS is a combined Global Positioning System and azimuth gyro for positioning non-Paladin Howitzers. GLPS also has a laser range finder to accurately locate each Howitzer position. The GLPS allows reductions in required survey personnel and equipment. The savings in personnel and maintenance cost, compared to the current survey system Position and Azimuth Determining System (PADS), means GLPS reduces cost while it increases capability. ***FUE: FY00***



Meteorological Hydrogen Generator (MHG). The MHG provides additional capability to units equipped with the Meteorological Measuring System, AN/TMQ-41, and earlier Met equipment. With the MHG, sufficient hydrogen gas is available for flying enough meteorological balloons contributing to maintaining accuracy standards required for accurate predicted fires. MHG along with CAAMS, TAMSS, and MVS are essential accuracy equipment for Paladin and in the future will support the improved accuracy of Crusader. ***FUE: FY96***

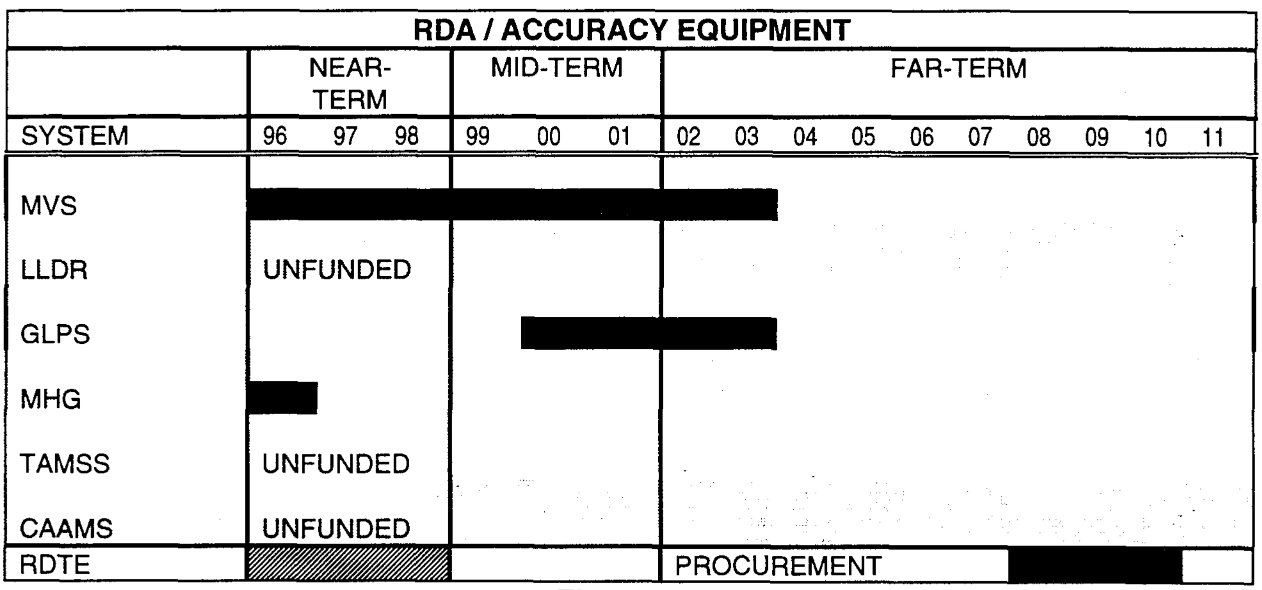


Figure E-12

SECTION 4

CONCLUSION

The fire support modernization program is on line with the Army's modernization objectives. The programs and systems being developed provide the force with modern, state of the art products to equip Force XXI.

The fire support system is the only truly joint warfighting system on the battlefield at maneuver battalion level. Capable of employing air and naval gunfire as well as cannon, rocket, and missile artillery to the supported commander, it has enormous potential to quickly develop maneuver opportunities and reduce friendly casualties as demonstrated in Desert Storm. Shortfalls in program funds jeopardize some effectiveness in the employment of laser guided weapons, fielding of longer range weapons and munitions, and the fielding of systems with greater accuracy and responsiveness.

There is no slack in this modernization program. Reductions in any element of the program **weaken the entire chain of systems**. Below is a summary of the highlights contained in the POM.

POM FY 97-01

DOES:	DOES NOT:
Crusader	Field MLRS to all required units
BAT and BAT P3I, ATACMS Block IA, II and IIA	Fund AFATDS objective version software
Firefinder P3I	Field M109A6 to all required units
AFATDS hardware	Field FAASV to all required units
155mm SADARM	Field ATCAS to all required units
MLRS IFCS and ILMS	Field HIMARS until FY06
MSTAR	Fund LLDR
ER MLRS	Fund XM982 projectile

Figure E-13

ANNEX F

AIR DEFENSE ARTILLERY

SECTION 1

INTRODUCTION

The smaller, more versatile Army of the 21st Century will be supported by an even smaller, more versatile Air Defense Artillery (ADA) force. In supporting the National Military Strategy this force will be rapidly deployable from CONUS bases while maintaining a forward presence. **The mission of ADA is to protect the force and selected geopolitical assets from aerial attack, missile attack, and surveillance.** This mission spans the spectrum of conflict -- from "battle between complex, adaptive forces" to operations other than war -- and encompasses theaters of operations, the nation, and space. Mission objectives also include controlling the third dimension battlespace, enhancing the ground commanders' freedom to maneuver, contributing to winning the information war, and reducing threat combat power.

The Air Defense Modernization Strategy (Figure F-1) focuses on the following objectives:

•*Achieve Near Leak Proof Theater Missile Defense this Decade;*
•*Address the Full Threat Spectrum;*
•*Respond to Warfighting Doctrine;*
•*Maintain a Technological Advantage.*

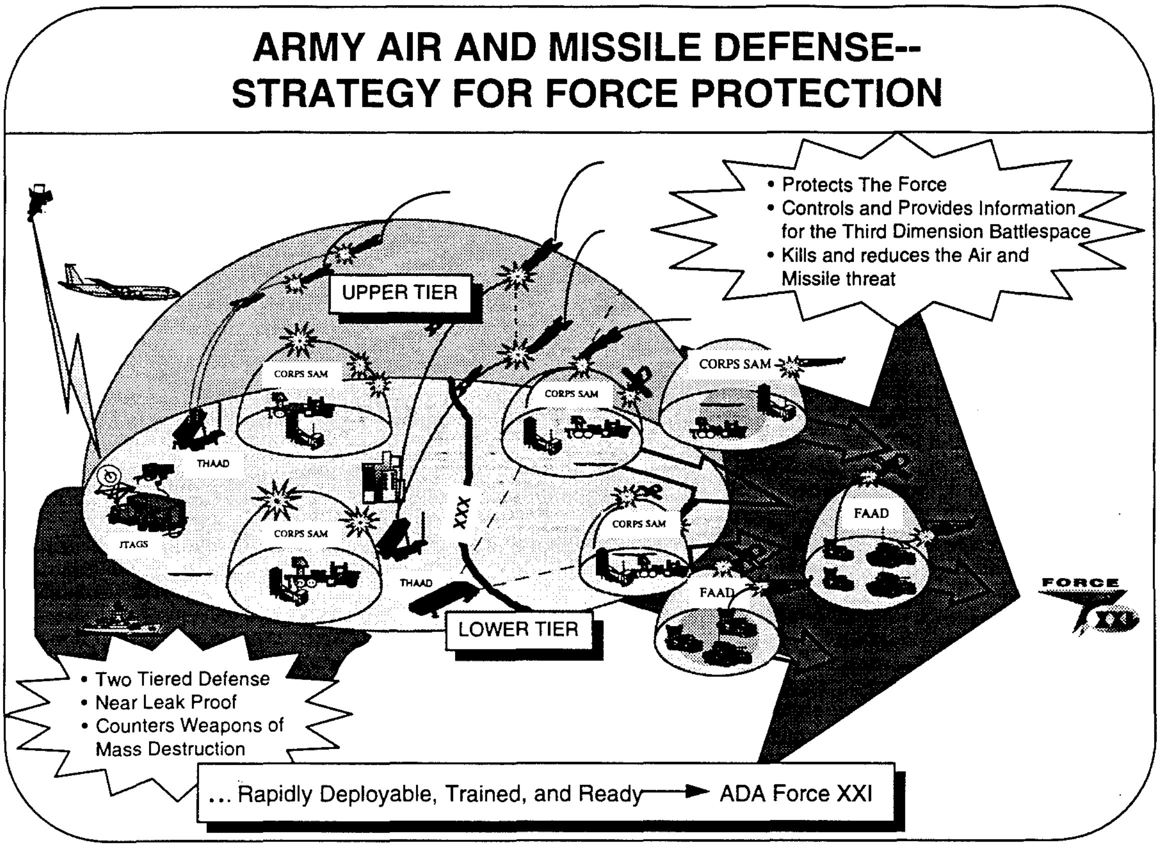


Figure F-1

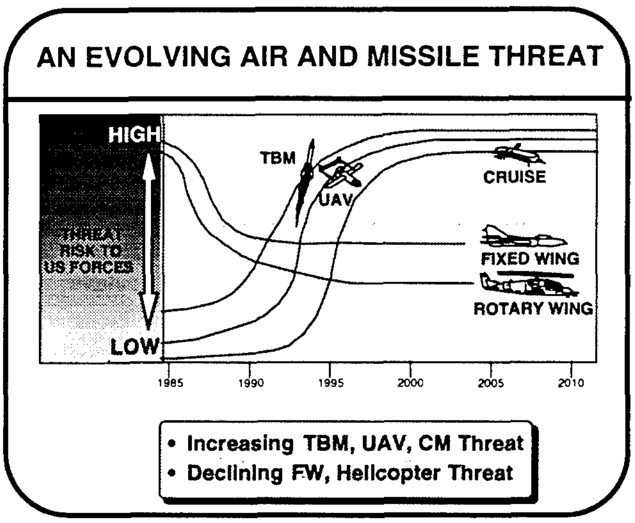


Figure F-2

The ADA force must be able to execute its mission, in support of operational commanders, against increasingly more advanced aerial platforms. Air and missile threat capabilities beyond the year 2000 will be increasingly stressing for U.S. forces to counter, particularly with respect to Tactical Ballistic Missiles (TBM), Cruise Missiles (CM), Unmanned Aerial Vehicles (UAV) and helicopters in clutter (Figure F-2). The air and missile threat is often the single greatest risk to the successful conduct of force projection operations, particularly during early entry and decisive operations.

TBMs will continue to proliferate in numbers, and incremental technological upgrades will focus on greater range and accuracy. Increased proliferation raises the probability of TBM usage, possibly with weapons of mass destruction.

" Our missiles cannot reach Washington. If they could reach Washington, we would strike it if the need arose."........Saddam Hussein

CMs are readily available at low costs. They are capable of low altitude, long range flight profiles with high lethality. They may be used against a variety of targets, from land attack of individual tanks to military complexes and geopolitical centers. UAVs have emerged as a new, multi-faceted threat on the battlefield. Their ability to conduct reconnaissance, surveillance, ground attack, and deception/electronic attack operations can significantly disrupt the ground force commander's operational plan. Defeat of the UAV threat is paramount to successful Army information operations. With increased precision guided munitions and evolving stealth technology, fixed wing aircraft remain a potential threat. Low-flying helicopters in clutter -- terrain masked attack helicopters -- also continue to be a major threat to maneuver forces.

To meet its mission requirements and counter threat capabilities, ADA Force XXI must be a strategically deployable, highly mobile, and versatile force trained and equipped to go to war anywhere in the world on short notice. Units will be modular and tailorable with capabilities responsive to mission needs; fully synchronized in knowledge and capabilities with other members of the combined arms, joint, multinational and interagency forces; survivable; capable of high operational tempo; and highly lethal against multiple threats.

Modernization efforts span the total Army. A credible, capable Air Defense force will be maintained in the division. There will be a standardized ADA brigade in each corps, and a theater ADA brigade and theater air and missile defense command for each major regional contingency. The Army National Guard will continue to be a key contributor to ADA's execution of the NMS. For example, National Guard elements are critical components of corps ADA brigades, and will operate the National Missile Defense (NMD) site. The approved Total Army Analysis-03 (TAA-03) organizational structures provide the baseline for the evolving ADA Force XXI that enhances the maneuver forces/land component capabilities to *dominate the extended battlespace* (Figure F-3).

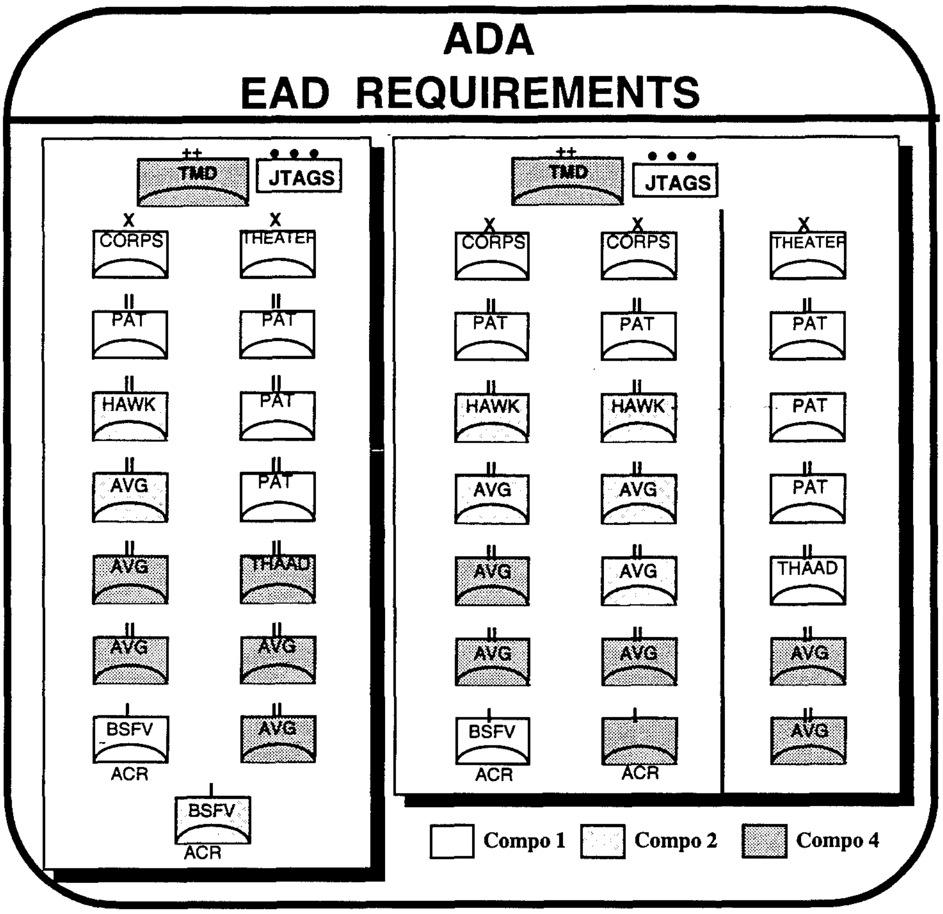


Figure F-3

ADA Force XXI will contain low altitude air defense systems and theater missile defense systems, vertically integrated with each other and with joint air defense elements, and horizontally integrated with the maneuver force. The low altitude air defense systems, normally at brigade, division, and corps levels, focus on protecting the maneuver forces and designated critical assets against observation and attacks by UAVs, CMs, helicopters, and fixed wing threats. The theater missile defense systems, at corps and echelons above corps, protect the maneuver force and priority military/geopolitical assets against short and medium range TBMs, CMs, and air breathing threats that fly above or beyond the low altitude system capabilities. These systems, particularly at echelons above corps, will provide a two-tiered defense of designated critical assets. The upper tier system provides extended range and altitude coverage against medium range TBMs. The lower tier system focuses on short range and very short range TBMs. Additionally, it can engage UAVs, CMs, fixed wing aircraft, and those TBMs that penetrate the upper tier defense. Command, control, and communications systems enhance weapons systems effectiveness by providing for the exchange of engagement and other operational information. Organic ADA sensors, complemented with data from remote information sensors (e.g., airborne platforms and satellites), allow the development of robust air pictures (see Annex G, Missile Defense).

Future operations require increased emphasis on planning and conducting joint and multinational operations. The capabilities of many weapons and forces must be integrated to achieve the operational commander's air defense objectives. Navy ships, Air Force, Navy, and Marine fighters, Army and Marine ground based air defense systems, and space based and aerial early warning platforms -- synchronized through joint command, control, communications and computer systems -- will provide for the optimization of air defense (Figure F-4). Notwithstanding, the Army must provide protection of land forces when no other capability is available.

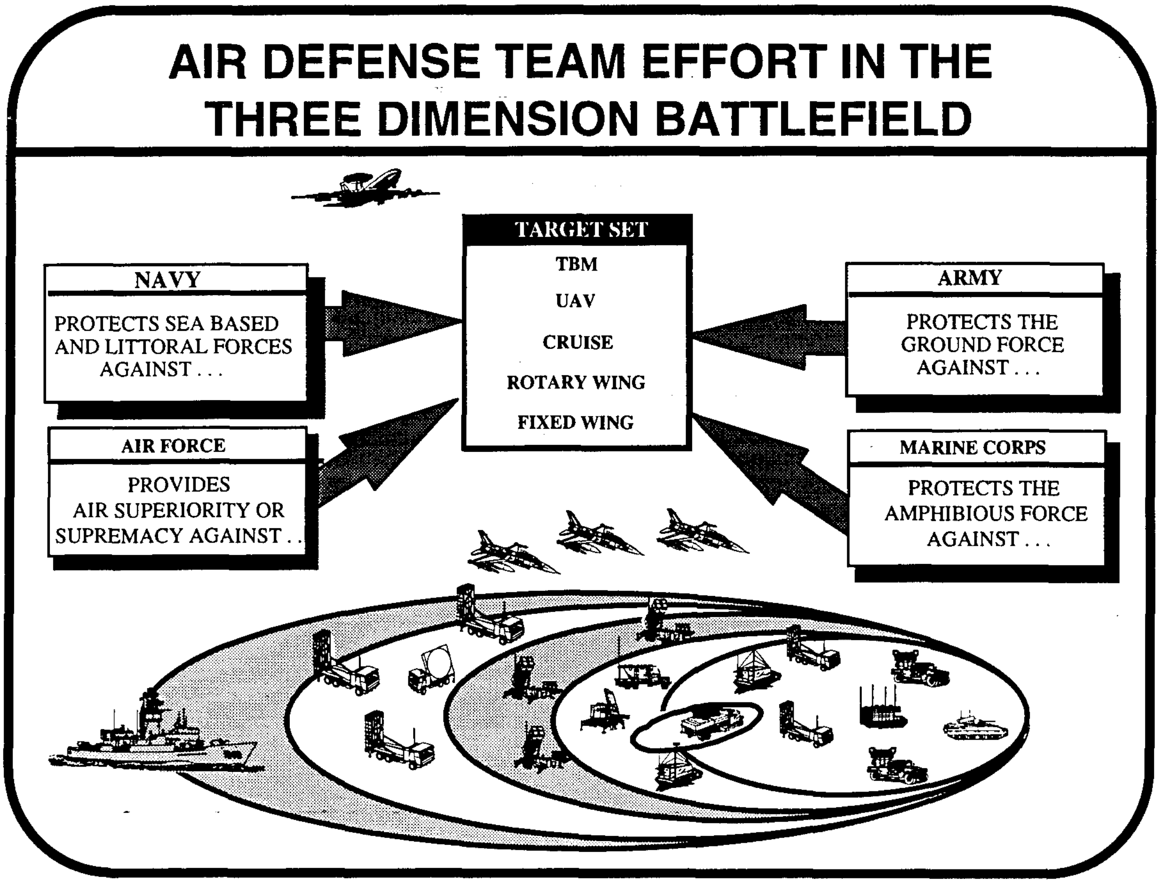


Figure F-4

In summary, with the requisite equipment, personnel, and force structure, ADA Force XXI meets the future challenges to support force projection operations in two major regional contingencies, protect the United States in coordination/cooperation with joint air defense systems, and execute MOOTW missions.

SECTION 2

CURRENT PROGRAM ASSESSMENT

The continued modernization of the ADA Force XXI is paramount to its ability to meet mission requirements and defeat full threat capabilities. Air and missile defense modernization includes:

- The total ADA force -- the individual systems, the vertical integration of ADA systems/forces with each other and with joint/multinational air control and air defense elements, and the horizontal integration of ADA forces with maneuver forces and other Army elements;

- All mission demands -- from the two major regional contingencies (MRC) to operations other than war; and

- All levels of war -- strategic, operational, and tactical.

Assessments of the ADA force's ability to satisfy its missions are presented below.

Figure F-5 provides the **near-term** assessment of the ADA force. As presented, the Forward Area Air Defense (FAAD) and Theater Missile Defense (TMD) capabilities are rated as AMBER in meeting the missions inherent in contingency operations, and the CONUS operations is rated **RED**, as there are no currently developed/fielded systems to meet mission requirements.

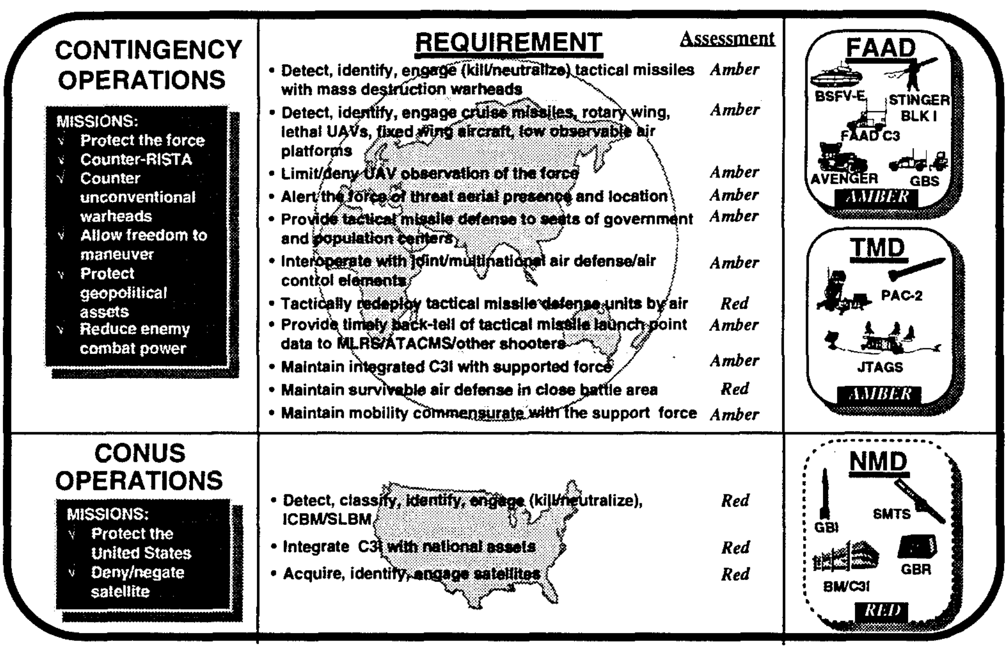


Figure F-5 Near-Term

FAAD Systems - - AMBER

In contingency operations, a limited number of Stinger Block I missiles (in Stinger teams, Avengers, and Bradley Stinger Fighting Vehicles (BSFV)) provides increased lethality and accuracy against UAVs, CMs, FW, and helicopters (though range limited). Avenger capabilities are limited by its ability to accept and use precise targeting data (a slew-to-cue capability is required) and to survive in the forward areas. BSFV teams must dismount to engage aerial targets, thereby falling behind the maneuvering force. The Ground Based Sensor (GBS) and the FAAD Command, Control, and Communications (FAADC3) system are capable of detecting low altitude aerial threats and digitally transmitting this data to ADA units, but the FAAD requirement for visual identification prior to firing limits engagement ranges.

TMD Systems - - AMBER

PATRIOT Anti-Tactical Missile Capability-2 (PAC-2) has some capability against short range ballistic missiles, UAVs and high altitude cruise missiles, and full capability against FWs. Beginning in FY97, the THAAD User Operational Evaluation System (UOES) provides early warfighter testing and a limited deployment capability in case of national emergency to complement PAC-2 in TMD. THAAD UOES has the capability to kill TBMs beyond the PAC-2 target capability. However, UOES system does not have sufficient missiles/sensors to defend the multitude of high priority assets. The Joint Tactical Ground Station (JTAGS) provides a capability to receive, process, and disseminate space based sensor information on TBM launches. ADA Tactical Operations Centers (TOC) are, for the most part, system unique. While they are capable of digitally generating/disseminating engagement operations information, these centers cannot develop and digitally exchange engagement, threat warning, logistics, and other operational data with the maneuver force.

In the **mid-term**, the FAAD and TMD capabilities remain **AMBER**, and CONUS operations continue as **RED** (still no fielded capability).

CONTINGENCY OPERATIONS	REQUIREMENT	Assessment	
MISSIONS: √ Protect the force √ Counter-RISTA √ Counter unconventional warheads √ Allow freedom to maneuver √ Protect geopolitical assets √ Reduce enemy combat power	• Detect, identify, engage (kill/neutralize) tactical missiles with mass destruction warheads	*Green*	FAAD BSFV-E STINGER BLK I FAAD C3 AVENGER GBS *AMBER*
	• Detect, identify, engage cruise missiles, rotary wing, lethal UAVs, fixed wing aircraft, low observable air platforms	*Amber*	
	• Limit/deny UAV observation of the force	*Amber*	
	• Alert the force of threat aerial presence and location	*Amber*	
	• Provide tactical missile defense to seats of government and population centers	*Green*	TMD PAC-3 THAAD UOES JTAGS *AMBER*
	• Interoperate with joint/multinational air defense/air control elements	*Amber*	
	• Tactically redeploy tactical missile defense units by air	*Red*	
	• Provide timely back-tell of tactical missile launch point data to MLRS/ATACMS/other shooters	*Amber*	
	• Maintain integrated C3I with supported force	*Amber*	
	• Maintain survivable air defense in close battle area	*Red*	
	• Maintain mobility commensurate with the support force	*Amber*	
CONUS OPERATIONS MISSIONS: √ Protect the United States √ Deny/negate satellite	• Detect, classify, identify, engage (kill/neutralize), ICBM/SLBM	*Red*	NMD GBI SMTS GBR BM/C3I *RED*
	• Integrate C3I with national assets	*Red*	
	• Acquire, identify, engage satellites	*Red*	

Figure F-6 Mid-Term

FAAD Systems - - AMBER

FAAD capabilities are slightly improved while threat capabilities are projected to significantly increase. The Stinger inventory continues to dwindle due to shelf life considerations, therefore eroding the capability of the FAAD force to execute the NMS of two MRCs. Stinger Block I missile is the most capable fielded missile for the FAAD force. However, it has marginal capability against the evolving cruise missile threat and helicopters in clutter at stand-off ranges. Although a Block II focal plane array seeker prototype was successfully tested, a four year break between this development and initiation of EMD further exacerbates the inventory problem and delays an adequate capability against advanced threat platforms. There are no funded improvements to BSFV and Avenger, including slew-to-cue capability required to fully exploit the capability of these systems. FAAD C3 software improvements continue, but the capability to achieve full digitized integration with the ADA force, other Army systems, and the joint force is not yet realized.

TMD Systems - - AMBER

The fielding of Ballistic Missile Defense Organization (BMDO) funded PATRIOT Advanced Capability-3 (PAC-3) significantly improves protection of the force and key military/geopolitical assets against short range ballistic missile threats. However, an insufficient quantity of PAC-3 missiles is programmed for procurement to support a two MRC scenario. THAAD UOES capabilities continue to be limited by the amount of available missiles and sensors. Three ARNG HAWK battalions, which contribute to low-to-medium altitude protection, are scheduled to leave the Army inventory due to age and cost to maintain. Maneuver forces are still at risk to CMs, ballistic missiles, and rockets as they conduct expansion and decisive operations.

In the **far-term**, the FAAD and TMD capabilities remain **AMBER**, and CONUS operations becomes **AMBER**. Contingent upon BMDO commitment, Corps SAM will be fielded.

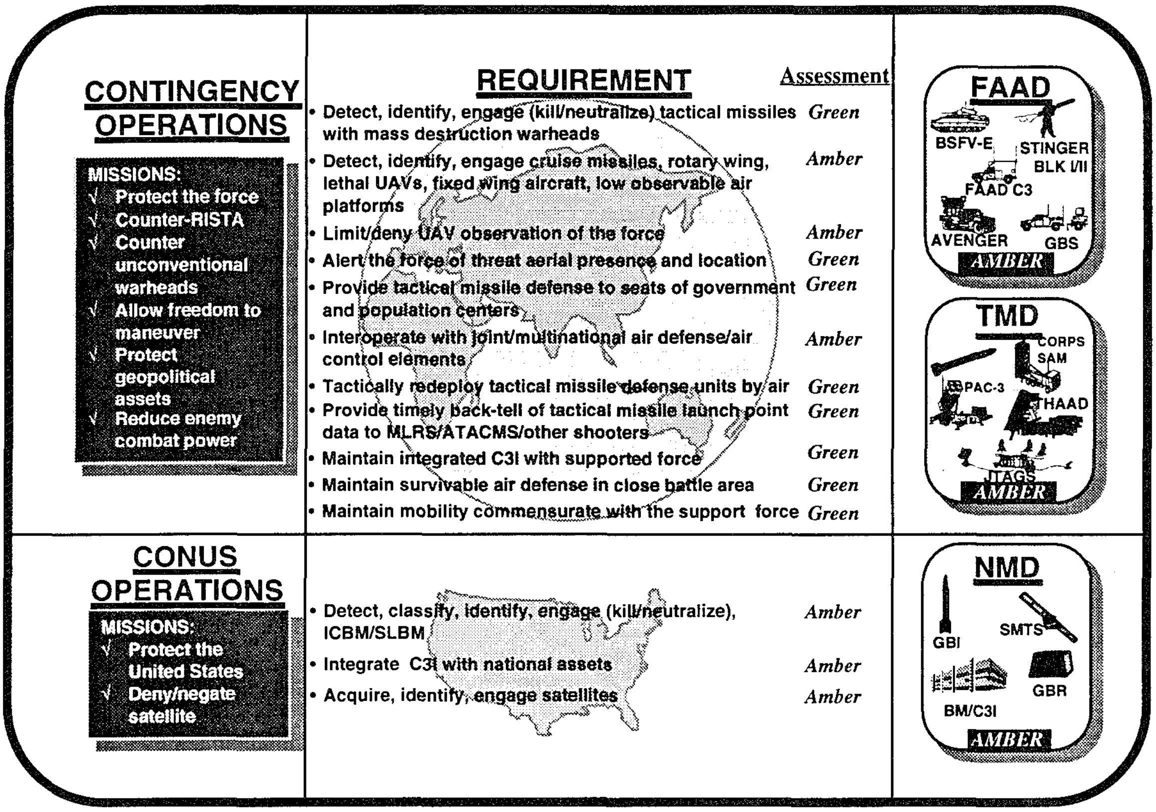


Figure F-7 Far-Term

- **FAAD Systems - - AMBER**

The Stinger missile inventory is still too low to support the two MRC requirement. By 2004, the inventory is insufficient to meet the needs of Force Package 1 units. A limited quantity of Stinger Block II missiles provide a capability to engage the helicopter in clutter threat. Stinger Block II also provides a significant day/night capability against CMs and UAVs. During this period the BSFV-Enhanced (BSFV-E) is funded to provide survivability in the maneuver area. FAAD C3 and GBS will be fully fielded to all active component and one ARNG FAAD battalion.

TMD Systems - - AMBER

The objective THAAD system provides the robust technical and tactical operational capabilities lacking in the UOES system. Corps SAM/PAC-3 (lower tier) with THAAD (upper tier) provides a two tiered near leak proof defense of theater/geopolitical assets and maneuvering units against attack by TBMs and CMs. Corps SAM will also have extended range capabilities against other aerial threats, such as stand-off helicopters, UAVs, and fixed wing aircraft. However, use of Corps SAM and Patriot against such targets will deplete missile inventories and result in their non-availability against higher priority, more stressing targets.

A summation of the near-, mid-, and far-term assessments are reflected in Figure F-8. While improvements have been made in the TMD and FAAD arenas, shortfalls remain in protection of the maneuver force.

AIR DEFENSE PROGRAM ASSESSMENT

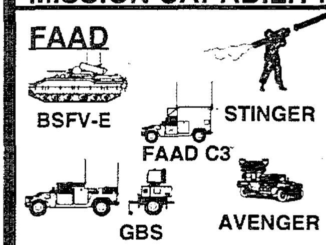
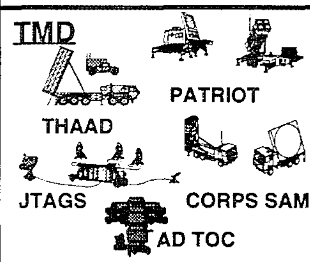
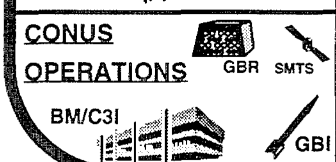
MISSION CAPABILITY	SYSTEMS	NEAR-TERM FY 96-98	MID-TERM FY 99-01	FAR-TERM FY 02-11
FAAD  BSFV-E, STINGER, FAAD C3, GBS, AVENGER	STINGER BLK I	AMBER	AMBER	AMBER
	STINGER BLK II	RED	RED	AMBER
	BSFV-E	RED	RED	GREEN
	AVENGER	AMBER	AMBER	AMBER
	GBS	AMBER	AMBER	GREEN
	FAAD C3	AMBER	AMBER	GREEN
TMD  PATRIOT, THAAD, JTAGS, CORPS SAM, AD TOC	PATRIOT PAC-2	AMBER	AMBER	AMBER
	PATRIOT PAC-3	RED	AMBER	AMBER
	THAAD	AMBER	AMBER	GREEN
	CORPS SAM	RED	RED	GREEN
	JTAGS	AMBER	AMBER	GREEN
	AD TOC	AMBER	AMBER	AMBER
CONUS OPERATIONS  GBR, SMTS, BM/C3I, GBI	NMD	RED	RED	AMBER

Figure F-8

Based on the above assessments, the air and missile defense priorities shown in Figure F-9 have been established.

AIR DEFENSE PRIORITIES

- Sufficient Stinger inventory to execute National Military Strategy (2 MRCs)
- Continuous air and missile defense of the maneuver force from deployment through redeployment operations
- Missile defense of the United States
- Seamless, horizontal/vertical, joint/multinational Command and Control
- Integration with and the transmittal of third dimensional situational awareness to the force
- Positive identification
- Detection and defeat of low signature, low altitude CM, standoff helicopters, and fixed wing threats
- Denial of UAV counter-reconnaissance
- Defeat of aerial threats at night
- Defeat of short range ballistic missiles and rockets
- Space-based Command, Control, Communications, and Computers/Reconnaissance and Surveillance; and ground-based space defense capability

Figure F-9

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

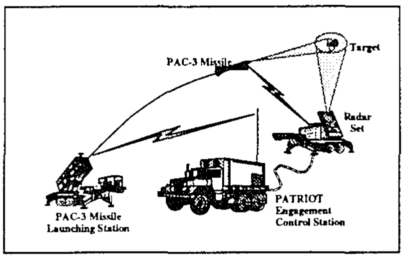
Air Defense Artillery Strategy. The Research, Development, and Acquisition (RDA) strategy involves ***four*** elements. The ***first*** is development and procurement of a robust capability to defeat the spectrum of tactical ballistic missile threats to the theater force. This requires fielding of a two-tiered capability beginning with a major product improvement to PATRIOT (PAC-3) and the development and procurement of THAAD. This capability is further enhanced by the development, procurement, and fielding of a more deployable, lethal, and mobile lower tier Corps SAM system, which eventually replaces PAC-3. The ***second*** element is the development and procurement of a series of Preplanned Product Improvements (P3I) to Stinger based FAAD weapons to counter the emergence of UAV, cruise missile, and standoff helicopter threats--which jeopardize the ability of maneuver forces to conduct decisive operations in a two MRC scenario. Fielding of Corps SAM expands the battlespace against these growing threats to the maneuver force while providing the lower tier TMD capability for both Corps and theater forces. The ***third*** element of the strategy is the enhancement of command, control, communications, and intelligence system through continued fielding of FAADC3 and GBS, production and fielding of JTAGS, and development, procurement and fielding of a common, digitized Air Defense TOC (ADTOC) for each Corps and Theater air defense brigade. The ***final*** element of the strategy funds a structural technology readiness program for National Missile Defense. This provides a hedge against the emergence of ballistic missile threats to the Continental United States. Funding for these four elements is provided by a combination of BMDO and Army sources.

AIR DEFENSE ARTILLERY PROGRAMS. Air Defense Artillery encompasses all air and missile defense systems. These systems will be modularly deployed as integrated air defenses and provide defense against air breathing and missile threats around the globe. Also included is a ballistic missile defense capability for the United States--National Missile Defense (NMD) (for details, see Annex G, Missile Defense). The following paragraphs provide system descriptions and near-, mid-, and far-term strategies to support air and missile defense requirements.

TMD SYSTEMS

PATRIOT. PATRIOT is the centerpiece of the Army's air and missile defense force. The basic combat element of the system is the firing battery which consists of a multifunction phased array Radar Set, an Engagement Control Station, a power plant, requisite communications, eight launchers, and 64 missiles. PATRIOT is normally deployed as a six firing battery battalion. The PAC-2 missile system, with improvements in emplacement time, radar performance, and remote launcher capabilities, is essentially the system that served in Operation Desert Storm. PAC-3 will increase system battle space and lethality capabilities through a series of upgrades to the PATRIOT radar and use of a new missile (ERINT). Planned enhancements increase detection range; improve target classification, discrimination, and identification; improve the engagement of targets with reduced radar signatures; increase target handling capability; increase firepower; and enhance survivability. PAC-3 will counter both tactical ballistic missiles and cruise missiles. **The primary POM shortfall is lack of funding to ensure development and fielding of objective capability. At issue is development of a fully capable system, achievement of a fully modernized Patriot force, and procurement of sufficient missiles and modifications to support the two MRCs.**

PATRIOT (PAC-3)

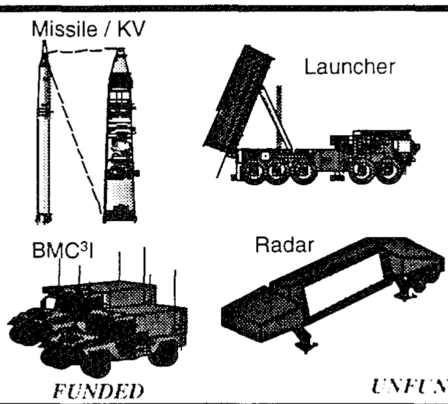


- FUE FY98
- Required Missiles: 1900
- Resourced Missiles:1200

FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• BMDO funds PAC-3 • 1200 Missiles	• **Shortfall in PAC-3 development/ fielding** • **Shortfall in Army funding fully operational capability** • **Part of PATRIOT force not modernized** • **AAO missile quantity not procured**	• Defeat of SRBM/rockets • Detection and defeat of low signature, low altitude CM, standoff helos, and fixed-wing threats • Positive ID • Denial of UAV counter-recon

Figure F-10

THEATER HIGH ALTITUDE AREA DEFENSE (THAAD) SYSTEM



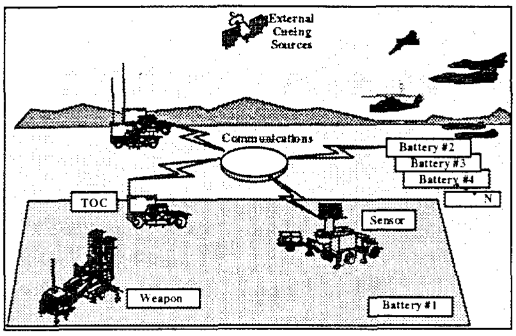
- EMD Decision FY97
- UOES FY97
- LRIP FY99
- FUE FY02
- Required: 2 BNS
- Resourced: 2 BNS (EPP)

FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• UOES Bn (2 radars, 4 Lchrs, 40 msls) • 2 Bns funded in EPP	• **Common Equipment shortfall (i.e. trucks)**	• Continuous air and missile defense of the maneuver force from deployment through redeployment operations

Figure F-11

THEATER HIGH ALTITUDE AREA DEFENSE (THAAD). The THAAD System comprises the upper tier of a two-tiered, ground-based defense against TBMs. Its long range and high altitude intercept capability makes possible the protection of widely dispersed assets over larger areas. The THAAD system includes missiles, launchers, Battle Management/Command, Control, Communication Intelligence (BM/C3I) units, a radar, and support equipment. THAAD will be compatible with the Air Defense Tactical Operations Center to enable communications with higher and lower echelons. In FY97, a User Operational Evaluation System (UOES) provides early warfighter testing and limited deployment capability in case of national emergency. **A POM issue is a funding shortfall for common equipment to be utilized by the THAAD System.**

CORPS SAM / MEADS



- BMDO Funding Decision FY98
- FUE FY05
- Required: 8 BNS

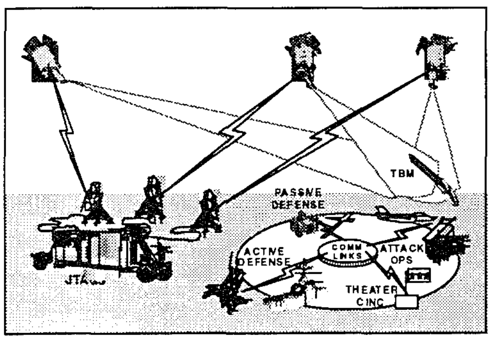
FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• FY96-97 study • Project definition validation (PVD) through FY97	• **BMDO funding in FY98 and beyond**	• Continuous air and missile defense of the maneuver force from deployment through redeployment operations • Detection and defeat of low signature, low altitude CM, standoff RW, and FW threats • Denial of UAV counter-recon • Defeat of SRBM/rockets • Integration with and the transmittal of third dimensional situational awareness to the force

Figure F-12

CORPS SURFACE-TO-AIR MISSILE (Corps SAM). Corps SAM is planned to consist of a 360 degree sensor, a Tactical Operations Center (TOC), a hit-to-kill vehicle, and associated BM/C3. It will be designed to defend vital corps and division assets associated with Army and Marine Corps maneuver forces. It is designed to provide: defense against multiple and simultaneous attacks by short range TBMs, low radar cross-section CMs, UAVs, and other air breathing threats to the force; immediate deployment for early entry operations with as few as six C-141 sorties; mobility to move rapidly and protect maneuver forces during offensive operations; a distributed architecture and modular components to increase survivability and flexibility in a number of operational configurations; and a significant increase in firepower with greatly reduced manpower and logistic requirements compared to current missile defense systems. Given these characteristics, Corps SAM can rapidly respond to a variety of crisis situations and satisfy the needs of joint operational and tactical commanders. Corps SAM is competing with BMDO programs from other Services for advanced capability programs to proceed to the next acquisition phase. Corps SAM will be developed as a multi-national cooperative effort, known as Medium Extended Air Defense System (MEADS). **Primary POM issue is funding beyond FY97.**

JOINT TACTICAL GROUND STATION (JTAGS). JTAGS is a jointly manned Army/Navy theater level ground station that provides a strategically and tactically deployable capability in-theater to receive, process, and disseminate space-based sensor information about TBM launches. To provide near real-time warning, alerting, and cueing data, JTAGS receives multiple sensor data from Defense Support Program (DSP) satellites. It then processes the data, and disseminates warning and alerting information via direct and indirect communications to in-theater tactical forces and population centers. JTAGS provides target updates to active missile defense units, cueing them to the correct location for target search and detection with organic radars. JTAGS also interfaces with the Force Projection TOC to distribute attack and defense data for joint force and ground defense systems. Prototype JTAGS elements are supporting contingency operations in Northeast Asia and Europe. They provide theater commanders a limited contingency capability and serve as a test bed to provide the project office necessary feedback for continued development.

JOINT TACTICAL GROUND STATION (JTAGS)



- FUE FY97
- Required: 5 Systems
- Procured: 5 Systems

FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• Procures 3 JTAGS • Refurbishes 2 JTAGS • P3I: Phase I: JTIDS, Fusion, Beacon	**• Phase II Space Based Infrared System (SBIRS) Integration and communication / computer upgrades**	• Integration with and the transmittal of third dimensional situational awareness to the force • Continuous air and missile defense of the maneuver force from deployment through redeployment operations

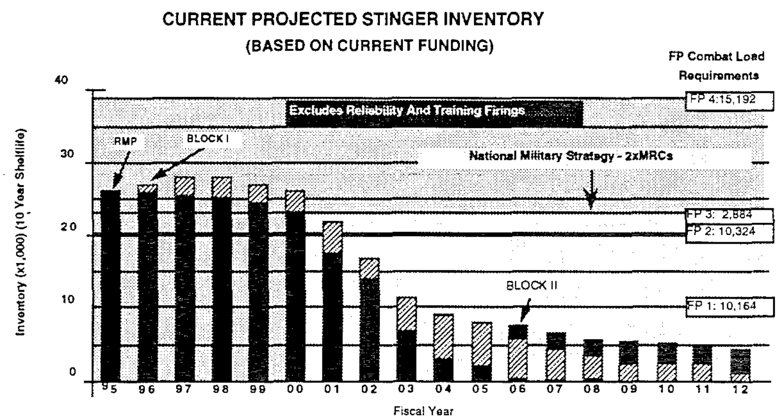
Figure F-13

FAAD SYSTEMS

STINGER. Stinger is the current centerpiece of air defense for maneuver forces. It provides defense against low-altitude air attack by UAVs, CMs, helicopters, and fixed wing. The missile has evolved from its original MANPADS (manportable) use to proliferation on several low altitude air defense platforms, including AVENGER, BSFV, helicopters, and the US Marine Corps LAV-AD. The Stinger RDA modernization strategy focuses on incorporating advanced capabilities into existing inventories through planned product improvements, thus preserving the Army's $4B investment in

Stinger. Block I, the current version in production, improves lethality and accuracy in a countermeasures and reduced target signatures environment, enhances night engagements, simplifies air-to-air engagements by eliminating superelevation requirements, and extends the shelf life of existing missiles by ten years. Block II, the follow-on improvement to Stinger, provides an advanced focal plane array seeker which counters the stand-off helicopter-in-clutter threat, improves range capabilities against advanced UAVs and CMs, provides full night capability, and optimizes air-to-air engagements in an advanced infrared countermeasure environment. **A major Stinger issue is an insufficient quantity of either Block I or II missiles procured to meet the National Military Strategy to support two MRCs. Additionally, a four year funding gap between demonstrated capability and EMD (FY 97-00) prevents Block II fielding until FY04.**

STINGER BLOCK I/ BLOCK II

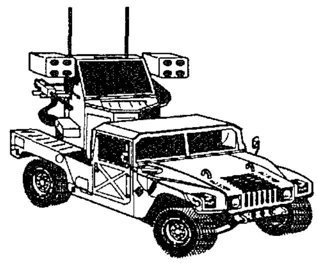


FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• POM buys 5400 Block 1 retrofit missiles • Block II RDTE begins FY00	• **Does not support FP1 requirements** • **Break in Block II program between Tech base and EMD (FY97-00)** • **Platform Modifications**	• Detection and defeat of low signature, low altitude CM, standoff helos, and fixed-wing threats • Continuous air and missile defense of the maneuver force from deployment through redeployment operations • Denial of UAV counter-recon

Figure F-14

AVENGER. AVENGER is operated by a two-man crew for stationary or shoot-on-the-move defense against fixed wing, helicopters, UAVs, and CMs in all weather conditions, providing protection from brigade to the corps rear. The system consists of eight Stinger missiles and a .50 caliber machine gun, mounted on a heavy HMMWV platform. AVENGER is fielded in divisional and corps FAAD battalions and USMC units. **The primary POM shortfall is lack of a P3I program which allows the system to receive and use precise targeting data provided by FAAD C3I (called slew-to-cue), and process and fuse data to take advantage of improved Stinger missile capabilities. Additionally, a funding shortfall for 378 additional systems halts the conversion of seven ARNG Chaparral battalions.**

AVENGER



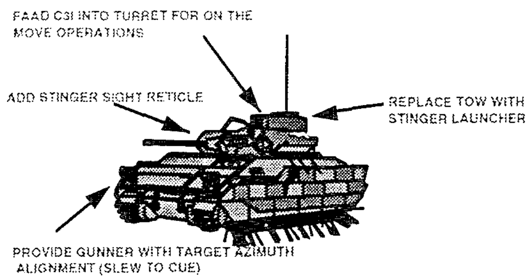
- FUE: Fielded
- Required: 1052
- Resourced: 674

FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• Procures 674 Avengers (All FP1-3 AC units and 1 ARNG Bn)	**• 7 Bns** **• No P3I beyond FY97 (Slew-to-cue)**	• Detection and defeat of low signature, low altitude CM, standoff helos, and fixed-wing threats • Continuous air and missile defense of the maneuver force from deployment through redeployment operations • Denial of UAV counter-recon

Figure F-15

BRADLEY STINGER FIGHTING VEHICLE (BSFV). BSFV is an interim solution to the Line-of-Sight-Forward-Heavy requirement. It consists of a five man crew: one driver, Bradley commander, gunner, and a two man Stinger team, in a Bradley Fighting Vehicle. The BSFV provides protection for the crew from direct and indirect fire; however, the Stinger team must dismount in order to engage threat targets. As part of the Task Force XXI initiative and Warfighting Rapid Acquisition Program (WRAP), the BSFV will convert to the *BSFV-Enhanced* (BSFV-E). BSFV-E includes the M2A2 (ODS) Bradley with an integrated externally mounted launcher which can fire four Stinger missiles, keeping the crew protected under armor. An integrated position, navigation and north seeker capability allows for on the move cueing. Targeting information to assist in acquisition is obtained through FAAD C3I. These materiel solutions correct major deficiencies in survivability, fire control, target acquisition, and identification. If funding is provided, BSFV-E will be integrated with the M2A3, beginning in FY00. M2A3 provides a second generation forward looking infrared radar (FLIR), C2 software, and a commander's independent FLIR. **A primary POM issue is a five year gap which exists between the initial prototype demonstration in the TF XXI AWE in FY97 and funding to field the capability in FY02.**

BRADLEY STINGER FIGHTING VEHICLE - ENHANCED (BSFV-E)



- Test: FY97
- FUE: FY02
- Requirement: 334
- Resourced: POM - 0
  EPP - 334

FUNDED	**UNFUNDED**	*ADA PRIORITIES ADDRESSED*
• RDTE • Initial 8 Systems For TF XXI	• **No Funding for Production (FP1 units) until FY02**	• Detection and defeat of low signature, low altitude CM, standoff helos, and fixed-wing threats • Continuous air and missile defense of the maneuver force from deployment through redeployment operations • Denial of UAV counter-recon

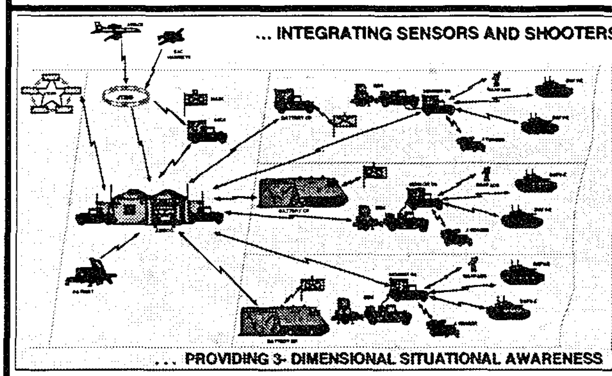
Figure F-16

ADVANCED SHORT RANGE AIR DEFENSE (ASRAD). ASRAD is the next generation of low-altitude air defense weapons. It will take advantage of "leap ahead" technologies. Increased range, fight on the move, fast reaction time, and short time to intercept are conceptualized as key system requirements. ASRAD RDTE funding begins in FY04.

C3I SYSTEMS

FORWARD AREA AIR DEFENSE COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE (FAAD C3I). FAAD C3I is the automated component of FAADS and supports forward deployed forces by providing: battle command information throughout the FAAD battalion and the supported force; time sensitive situational awareness (air and ground); targeting information to FAAD gunners (Stinger MANPADS, Avenger, BSFV); an automated division and below interface to the Army Battle Command System (ABCS); and information to support Army Airspace Command and Control (A2C2). FAAD C3I will interface with joint information service, via JTIDS, and with TMD for ADA data.

FORWARD AREA AIR DEFENSE C3I



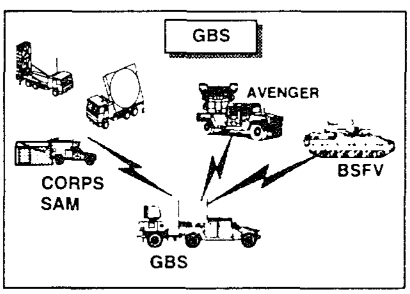
- Block III (Objective) FUE - FY99
- Required: 31 Bn sets (+16 Btry sets)
- Resourced: 19 sets

FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• **Procures 19 unit sets (All AC units and 1 ARNG Bn)** • **Procures 20 JTIDS**	• **ARNG FP 3 & 4 units** • **JTIDS spares** • **CHS II processors for fielded units** • **P3I**	• Seamless, horizontal/vertical, joint/multinational command and control • Integration with and the transmittal of third dimensional situational awareness to the force

FIGURE F-17

FAAD GROUND BASED SENSOR (GBS). GBS is an advanced, electronics-countermeasure resistant, three dimensional radar which provides early warning for divisional and Corps FAAD units. Associated with FAAD C3, the GBS alerts and cues FAAD weapons systems to threat UAVs, CMs, helicopters, and fixed wing aircraft up to 40 KM. It also helps protect friendly aircraft from fratricide and provides air situation data to tactical operations centers.

GROUND BASED SENSOR

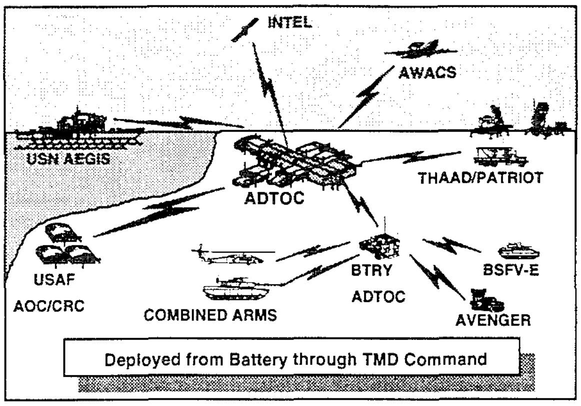


- FUE: FY97
- Required: 248
- Resourced: 115
  (POM - 95)
  (EPP - 20)

FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• 115 Radars systems (All AC units & 1 ARNG Bn)	• **Split fielding costs** • **P3I** • **ARNG FP3 & 4 units**	• Integration with and the transmittal of third dimensional situational awareness to the force • Detection and defeat of low signature, low altitude CM, stand-off helicopters, and fixed wing threats • Continuous air and missile defense of the maneuver force from deployment through redeployment operations • Positive ID

FIGURE F-18

AIR DEFENSE TACTICAL OPERATIONS CENTER



- FUE: Fielded
- Required: 7
- Resourced: 3

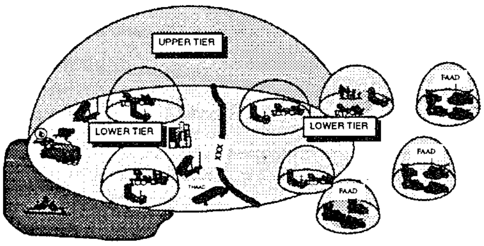
FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
• 3 Bde ADTOCs	• **4 Bde ADTOCs**	• Seamless, horizontal/vertical, joint/multinational command and control • Integration with and the transmittal of third dimensional situational awareness to the force

Figure F-19

AIR DEFENSE TACTICAL OPERATIONS CENTER (ADTOC). Current ADA C3 employs non-standard, manual, semi-automated systems which are, for the most part, unique to each supported weapons system. The technology included in these partially automated systems is generally obsolete, incompatible among systems, and limits the ability of the FAAD/TMD force to integrate and coordinate mission essential information effectively and in a timely manner. Currently, there is a prototype Brigade TOC in the field which automates many current manual functions, such as intelligence preparation of the battlefield and defense planning. The ADA C3 objective is a standardized, modular, and interoperable system that integrates engagement operations, intelligence, logistics, and other operational data at all echelons. The ADTOC consists of a set of modular, reconfigurable hardware and software. It serves as the ADA battlefield automated system in the Army Battle Command System (ABCS); is based on the Army Modular Command Post System; conforms to the Army's Common Operating Environment (COE); and uses a standard approach to soldier-machine interface. The ADTOC must exchange data with, accept, and act upon commands from joint and multinational C3 facilities. This ensures a coordinated contribution by ADA to protection of corps and theater military and geopolitical assets.

INTEGRATION. Effective air and missile defense depends on integrated air defense systems. Integration must occur at all levels, within individual systems and among active defense systems, other Army systems, other Services, and coalition forces. TMD integration uses a series of models, simulations, emulations, hardware/software in the loop (HWIL/SWIL), and planned flight tests to provide data necessary to continue refinement of the integration plan. Where possible, tests and demonstrations will piggy-back on other tests to gather data. Data is entered into models and simulations such as the Extended Air Defense Simulation (EADSIM) family and FAAD Virtual Prototype System to facilitate incremental identification and resolution of integration issues within ADA.

INTEGRATION



- TMD AWE ends 1QFY96
- SIT (Systems Integration Test) 96 begins 3QFY96
- SIT 97 begins 2QFY97
- SIT 98 begins 1QFY98

FUNDED	*UNFUNDED*	*ADA PRIORITIES ADDRESSED*
	• **Funding line does not exist, PM funds internally**	• Seamless, horizontal/vertical, joint/multinational command and control • Integration with and transmittal of third dimensional situational awareness to the force

Figure F-20

TECHNOLOGY. In order to meet the Army's goal of decisive victory with minimal casualties, ADA must continue to exploit new technologies.

Horizontal Technology Integration (HTI). The Army has formalized a technology innovation known as HTI to further focus and integrate the technology base. HTI characterizes the new modernization strategy and is defined as the application of common technologies across multiple systems to improve the warfighting capability of the force. The underlying principle of HTI is the simultaneous integration and fielding of technology into different types of weapon systems that fight together as units or task forces, providing exponential improvement to the force.

Advanced Technology Demonstrations. The Army continues to place increased emphasis on Advanced Technology Demonstrations (ATD) and requirements, enabling the Materiel Developer to reduce risk prior to initiation of full scale system development. Capabilities developed in these ATDs provide a sound baseline from which to build future joint efforts. ATDs of specific benefit to ADA include Multi-sensor Aided Targeting-Air, Bi-static Radar for Weapons Location, Combined Arms Command and Control, Battlefield Combat Identification, The Army Combined Arms Weapon System (TACAWS), Rapid Force Projection Initiative (RFPI), and the Army Mountain Top Experiment.

Advanced Warfighting Experiments. Advanced Warfighting Experiments (AWE) are conducted to enable the Combat Development communities test evolving operational concepts and examine and refine system requirements. Theater Missile Defense Advanced Warfighting Experiments (TMD-AWE) are designed to determine the holistic operational concept for integrated Army TMD supporting JCS doctrine. AWE determine the interrelationships, interdependence, and synergy among TMD operational elements by identifying the capabilities and shortfalls of Army TMD. They also examine potential doctrine, training, organizational, or materiel solutions available now, or by 2001, that can provide significant improvements in TMD capability and availability, if additional resources are provided in the POM years. They also recommend a strategy for investment in **technology and equipment** that will provide the greatest payoff in improved TMD.. Concepts explored encompass all four pillars of TMD (Active Defense, Passive Defense, Attack Operations, and C4I). For example, Exercise Roving Sands '95 provided key insight into cruise missile engagement with GBS detection and early warning passed to both PATRIOT and AVENGER via Mobile Subscriber Equipment (MSE), and TBM engagement with theater warning by JTAGS and subsequent alerting of PATRIOT via the TIBS/TRAP network.

SECTION 4

CONCLUSION

Key to ADA Force XXI success is the establishment of deficiency priorities based on the evolving threat, assessments of ADA capabilities to counter them, and a modernization strategy to address those deficiencies. Figure F-21 summarizes air and missile defense program resourcing, and reflects ADA funding priorities required to support the modernization strategy.

System	POM	EPP	Funded/Underfunded/Unfunded	ADA POM Priority
Stinger	Underfunded	Underfunded	• Does not procure sufficient inventory to support 2 MRC's • Four year break in Blk II RDTE	1
PATRIOT	Underfunded	Underfunded	• PAC-3 upgrades - fielding begins FY98 • Inadequate funding for full modernization capability	2
Corps SAM	Underfunded	Unfunded	• BMDO acquisition funding decision in FY98 • FUE for system in FY05	3
BSFV-E	Unfunded	Funded	• Fielding does not begin until FY02 • Maneuver force at risk	4
TOCS	Underfunded	Unfunded	• 4 BDE TOC's not funded • Not able to achieve vertical and horizontal seamless integration	5
Avenger	Underfunded	Unfunded	• Procures 674 Avengers • Does not fund P3I (Slew-to-cue) • 7 Bns	6
GBS	Funded	Underfunded	• Procures 115 units • Does not fund upgrades	7
FAAD C^3	Funded	Underfunded	• Procures 19 units • Does not fund upgrades	8
THAAD	Funded	Funded	• THAAD fielding initiated in FY02 • MRBM threat countered by fielding of new system	9
NMD	Underfunded	Underfunded	• Congressional directed acceleration of program • Protection of CONUS from Ballistic Missiles	10
JTAGS	Underfunded	Underfunded	• Does not fund Phase II P3I Upgrade	11
ASRAD	Unfunded	Underfunded	• Future follow on FAAD system	12

Figure F-21

Funding shortfalls in the POM create significant risk for several programs. The *most* critical shortcomings within the ADA BOS, in priority, are: (1) Stinger - insufficient missile inventory to support two MRCs if retrofit quantities are not increased **and** a four year funding gap (FY97-00) which exists in Block II RDTE; (2) PATRIOT PAC-3 - a shortfall in BMDO funding required to complete development/fielding; (3) Corps SAM - lack of a commitment to develop a mobile, lower tier capability which can provide continuous air and missile defense of maneuver forces; (4) BSFV-E - lack of funding to field BSFV-E in FY97 in order to provide survivable air defense in the close battle; and (5) Brigade TOC: insufficient funding of 4 Brigade TOCs which will automate command and control at each Corps/ EAC ADA brigade.

The FAAD strategy is to progress from a visual only, non-survivable, limited range ADA force to a beyond visual range, robust, survivable, highly lethal force capable of defeating all air and missile threats. With Stinger as the centerpiece for FAAD, the evolving threat requires growth of Stinger to a more capable system by the far term. Stinger Block I and Block II missiles are necessary not only to increase capability, but also to ensure adequate inventory for support of two MRCs. Planned development and fielding of BSFV-E provides greater crew survivability and allows the system to keep pace with the supported maneuver force. In addition, a slew-to-cue capability for BSFV-E and AVENGER are needed to keep pace with the growing UAV and CM threat. Fielding of FAADC3 and GBS throughout the force, by the far term, will enable FAAD units to be fully digitized, synchronized, and integrated. Combined with improvements to the weapon platforms and Stinger, full protection of the close combat maneuver forces can be achieved.

ADA systems continue to grow in the active TMD role. TMD systems evolve from limited PAC-2 coverage to a fully integrated, nearly leak proof upper and lower tier missile defense capability. Fielding of PAC-3 in the mid-term will increase the battlespace ten-fold. An upper tier defense capability is initially available in FY97 (THAAD UOES) and is fully realized in FY02 with fielding of the first of two objective THAAD battalions. Corps SAM, programmed to begin fielding in FY05, provides the final piece of the active TMD strategy. It will contribute significantly to defeating cruise missiles and UAVs, as well as providing vital mobile missile defense to maneuver forces. During and beyond the far term, Corps SAM will eventually replace PATRIOT.

Air Defense Artillery continues to support all five objectives of the Army Modernization Vision -- **LAND FORCE DOMINANCE.** Through contributions to ***Protect the Force*** and ***Win the Information War***, air defense artillery permits the achievement of the remaining Army modernization objectives.

ANNEX G

MISSILE DEFENSE

SECTION 1

INTRODUCTION

"Protecting our nation's security -our people, our territory, and our way of life - is my Administration's foremost mission and constitutional duty."

President William J. Clinton, A National Security Strategy of Engagement and Enlargement, Feb 1995.

General

The US National Security Strategy recognizes that economic, environmental, and humanitarian issues affect the nation. But, protecting the people and territory of the United States is still the primary security responsibility of the U.S. Government. Indeed, the National Military Strategy states "the highest priority of our military strategy is to deter a nuclear attack against our nation and allies." The National Security Strategy recognizes that missiles pose a major threat to the United States as well as our allies and other friendly nations, because they are potential carriers of nuclear, chemical, or biological weapons of mass destruction (WMD). Accordingly, "we must improve our capabilities to deter and prevent the use of such weapons and protect ourselves from their effects."

The Army has led missile defense development from initiation of the NIKE-ZEUS program in 1957, through the 1960s and 70s with NIKE-X, SENTINEL, and SAFEGUARD and into the 90s with PATRIOT. In 1991, when the United States needed to protect population centers, key military assets, and maneuver forces from Iraqi theater ballistic missiles (TBMs), PATRIOT was the only available active defense system with an effective, although limited, anti- ballistic missile capability. Despite the lessons learned in the Gulf War, when the United States needed to deploy an anti-ballistic missile system to demonstrate willingness to protect South Korea from the North Korean missile threat, the Army's Patriot was still the only available anti-TBM, active

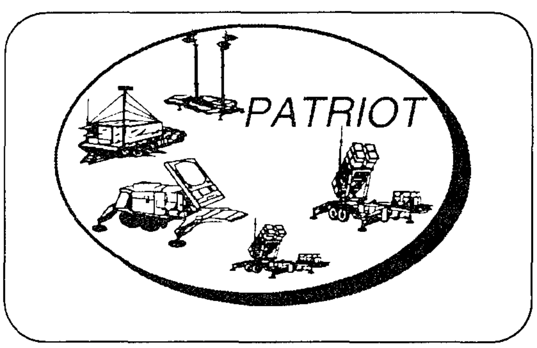


Figure G-1

defense capability. PATRIOT remains the Nation's only anti-TBM capability today and through the near-term.

This annex describes both aspects of the Army's approach to missile defense: National Missile Defense (NMD), which is concerned with defending the United States from attack by long range ballistic missiles, and Theater Missile Defense (TMD), which is concerned with protecting U.S. forces, allied forces, critical assets, and key areas from attack by theater missiles.

Threat

> *...the proliferation of weapons of mass destruction-nuclear, chemical, and biological,- is one of the most troubling dangers we face. The on-going efforts to obtain such weapons by a number of countries present great and growing risks for the United States and its allies.*
>
> National Military Strategy (A Strategy of Flexible and Selective Engagement), Feb 1995.

One of the most significant military developments of the 1990s is the speed in which missile and WMD technology is spreading around the world. The initial research and development efforts that lead to an effective missile and WMD capability are enormously expensive and beyond the economic reach of most Third World countries. However, a number of nations are taking advantage of existing technology by purchasing weapons, producing copied weapon designs, or by developing and producing "improved" models. Both Iraq and North Korea currently produce operational theater ballistic missiles based upon the Soviet designed SCUD. China started its missile program in the same manner and is now capable of developing, producing, and exporting missiles of its own design. North Korea, with its reported No Dong Missile Program, is following suit.

Space technology also is rapidly proliferating, because it allows vast areas of the world to leap into the information age without building an expensive, ground-based C4 infrastructure. Japan, China, India, and the European Community are developing space launch capabilities, both as a matter of national or regional pride and as insurance against becoming dependent on the United States or Russia. This technology is directly transferable to Intercontinental Ballistic Missile (ICBM) development. The intelligence community consensus is that in the next 8-10 years the countries listed in Figure G-2 will be able to procure ICBMs capable of attacking the Continental United States. This proliferation of missile technology creates uncertainty as to the type,

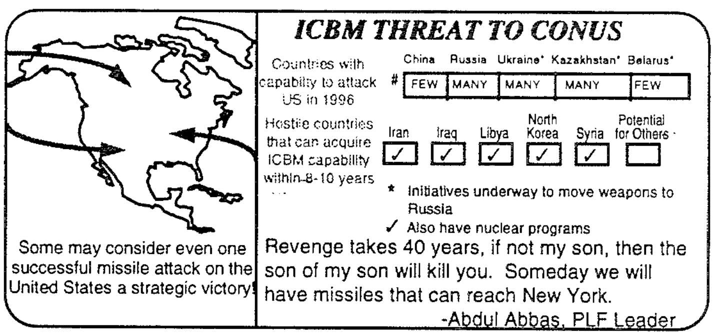


Figure G-2

performance, and time frame of future missile threats. However, it is clear a determined adversary will have the capability to attack U.S. territory with little or no advanced warning.

At the present time, no single country has the capability to destroy the United States by launching a major strategic attack with nuclear-tipped ICBM. However, as illustrated in figure G-2, China, Russia, Ukraine, Kazakhstan, and Belarus have varying numbers of ICBMs, which may be launched against the United States accidentally or without authorization. As the Ballistic Missile Defense Organization (BMDO) points out in drafts to its 1995 User Operational Evaluation System (UOES) and NMD Architecture Options reports to Congress, even such limited launches can be devastating. For instance, an accidental launch of two SS-18s could involve as many as 20 independently targetable warheads and an unauthorized launch by a Russian submarine commander may involve as many as 200 warheads. These threats roughly equate to the potential threat posed in 8-10 years by countries such as those shown in Figure G-2. If diplomacy fails as a deterrent, an effective NMD will provide the National Command Authorities (NCA) an option other than pre-emptive strikes and assured destruction to meet potential threats.

Executing the engagement aspect of the National Security Strategy requires Armed Forces capable of projecting combat power from bases in the Continental United States or selected overseas areas. Operations DESERT SHIELD and DESERT STORM demonstrated a capability to overwhelm a major regional power on the other side of the earth. Operations VIGILANT WARRIOR and RESTORE DEMOCRACY indicate that lessons learned from the Persian Gulf War are being applied to improve our power projection capabilities. But, these recent force projection operations also highlight a number of vulnerabilities to U.S. force projection, such as the requirement for:

- Ports, airfields, and other critical transportation facilities;
- Multi-national support, if only to the extent of providing landing, overflight, and transit rights;
- Substantial domestic political and public support.

Without superpower sponsorship in the form of inexpensive weapons, there is little likelihood that a regional foe will have the money to develop traditional armed forces capable of meeting and defeating a U.S. joint task force (JTF). Nevertheless, theater missiles - defined as those TBMs, cruise missiles, and air-to-surface missiles whose targets are within a given theater - and Unmanned Aerial Vehicles (UAVs) present a grave and rapidly growing threat to combatant commanders' capability to conduct force projection operations. The widespread proliferation of these technologies provides potential foes an affordable means to defeat the United States by preventing Joint Force Commanders (JFCs) from achieving their objectives. As shown in Figure G-3,

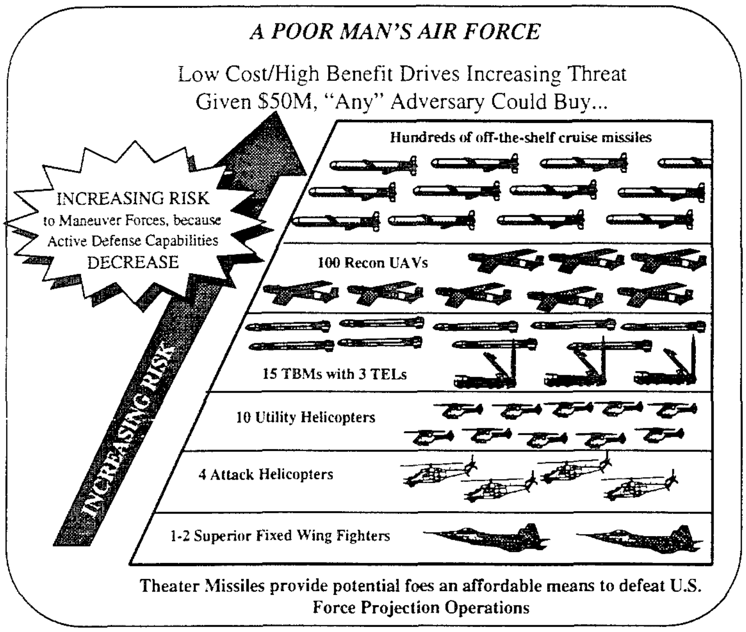


Figure G-3

even sub-national groups, such as terrorist organizations, can easily afford cruise missiles, UAVs, or other remotely piloted vehicles to conduct a surprise attack on U.S. forces engaged in humanitarian efforts or other non-combat operations. Clearly, theater missiles, particularly when mated to a WMD capability, allow a potential enemy to drive the costs of military intervention to a level where the United States may not be able to afford the political, diplomatic, and human price.

Armed with theater missiles, an enemy can attack at a number of weak points:

- During the planning or early execution phase of an operation, the use or threatened use of theater missiles as area weapons against population centers in the JFC's Area of Responsibility, or even on US territory, may prevent the United States from garnering sufficient diplomatic and public support to deploy a JTF or take other appropriate military action;

- During deployment, the use of theater missiles may damage ports and airfields and inflict enough casualties to prevent the JFC from establishing a lodgment;

- Should a lodgment be established, the use of theater missiles against ports, airfields, assembly areas, and logistics facilities may prevent the JFC from marshaling enough combat power to initiate and sustain decisive operations. If casualties are high, public support may wane and questions arise as to whether the operation is worth the cost and should be continued;

- During combat, the use of theater missiles against maneuver forces (at choke points, assembly areas, command posts, and logistics sites) may restrict the JFC's freedom to maneuver and preclude his massing forces at the decisive time and point on the battlefield.

Clearly, the theater missile threat is both complex and extensive. The mere presence of hostile theater missile and UAV capabilities in an operational area, especially if they pose a WMD threat, creates significant political and diplomatic stress. This, in turn, could impose equally significant constraints on military forces. The threat of a theater missile attack against U.S. troops by a hostile force - even a terrorist group

- may create political and diplomatic pressures sufficient to force withdrawal of U.S. forces before they accomplish their mission. Such potential exists even during humanitarian missions.

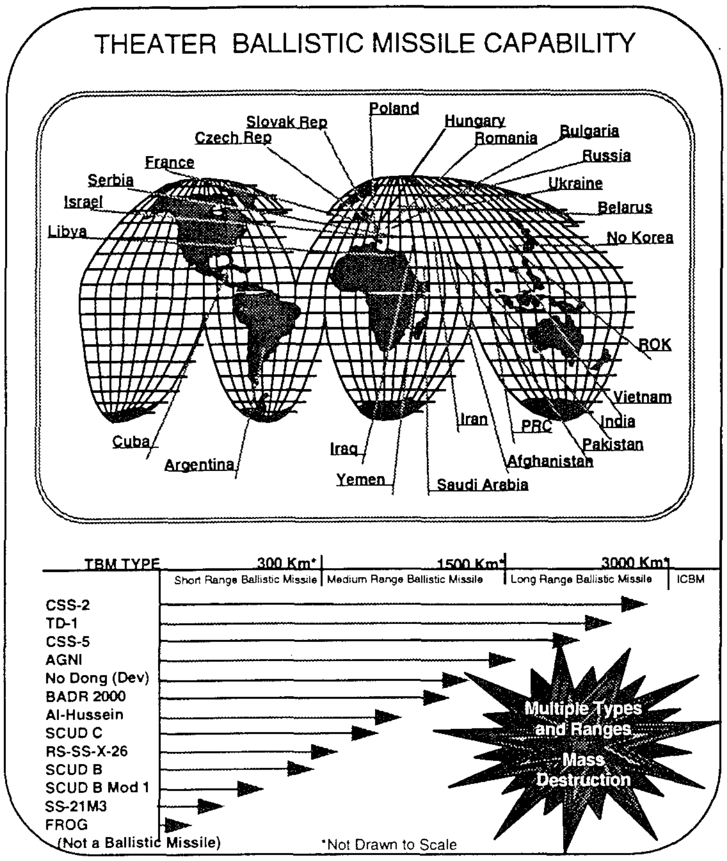


Figure G-4

Approximately 26 countries possess TBMs. Approximately 100 countries possess some form of TBM, cruise missile, or UAV capability. Although the number of countries with theater missile capability is likely to remain constant, both improved technology and a large increase in the number of deployed systems will pose significantly increased risks to deployed U.S. forces by the year 2000.

The theater missile threat includes TBM, cruise missiles, air to surface missiles, and UAVs (including drones and other remotely piloted vehicles). In addition to being relatively low technology and relatively inexpensive, these systems pose particular problems for a defender:

- TBM and cruise missile warheads are capable of delivering a variety of payloads--high explosive, chemical, biological, and nuclear;

- TBMs are difficult to destroy because they can be launched covertly and have long ranges and short flight times. In flight, TBMs can use various deliberate or inadvertent countermeasures, such as maneuver, break-up, or debris, that complicate active defense operations. Furthermore, theater missile launchers are mobile and easily concealed, increasing their survivability;

- Cruise and air to surface missiles are difficult to destroy because they can be launched from a variety of platforms at long ranges, and can enter friendly airspace from any direction at low altitude. In addition, they present a relatively small radar cross section to sensors, reducing acquisition range and shrinking engagement battle space;

- UAVs are small and may be constructed of a variety of materials, making them very difficult to detect. Hostile forces may use UAVs to deliver weapons. But they are typically intelligence collection and target acquisition platforms that use a variety of sensors to provide near real time information on the location, composition, and activities of U.S. forces.

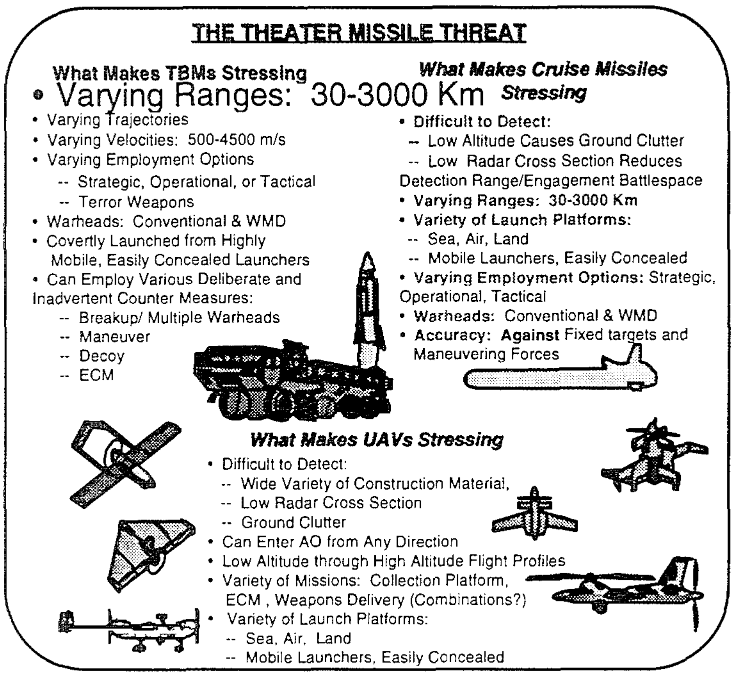


Figure G-5

The theater missile and UAV threat is not limited to critical assets and other strategic or operational targets. Maneuver forces are particularly vulnerable to precision guided UAVs and cruise missiles. Consider, for example, if Iraq had discovered VII Corps or XVIIIth Airborne Corps assembly areas through near real time UAV collection and attacked them with short-range ballistic missiles and cruise missiles armed with chemical munitions.

National Missile Defense Warfighting Concept

As the National Security Strategy and National Military Strategy detail, the United States prefers to address strategic threats posed by WMD and their delivery means through arms control negotiations. However, NMD systems research and development is proceeding, so a limited defense can be emplaced within a few years after a national decision to do so. BMDO is the lead DoD agency. However, the Army is leading efforts to develop and test the NMD interceptor, radar, and associated BM/C4 elements.

The objective of the NMD program is to provide a cost and operationally effective defense of the U.S. against limited ballistic missile attacks. Governed by the Anti-Ballistic Missile (ABM) Treaty and guided by Congressional mandate, its objective is to demonstrate an interim defensive capability as soon as possible and then to incrementally evolve toward more robust capabilities during the mid- and far-terms to address the evolving, growing, and ever more sophisticated ballistic missile threat.

An Initial Operational Capability (IOC), based on an NMD User Operational Evaluation System (UOES), is possible during FY00, depending on Congressional authorizations and appropriations, NCA guidance, and DoD NMD resource allocations. After IOC, the schedule to develop additional NMD capability would vary according to resource allocation and willingness to pursue research, development, test, evaluation, and deployment as parallel actions. A single-site capability to protect the United States could be deployed by FY03.

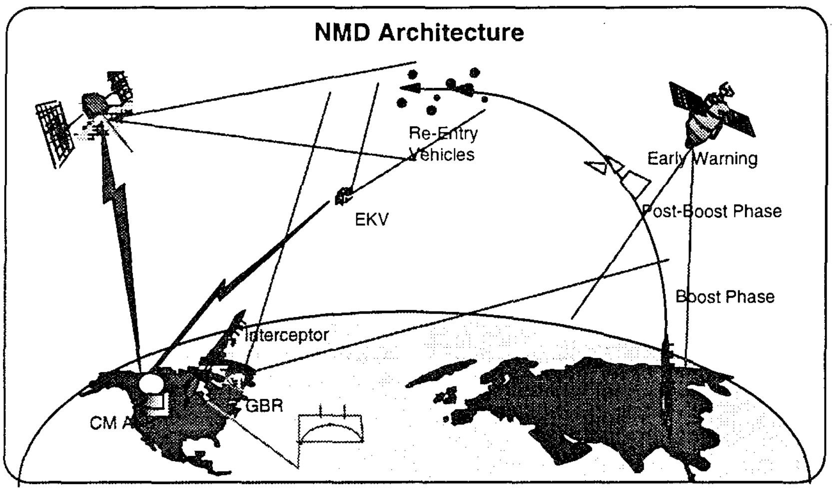


Figure G-6

As illustrated in Figure G-6, the NMD Architecture includes Ground-based Exoatmospheric Interceptors (GBI); a Ground-based Radar (GBR); a Battle Management/Command, Control, Communications, Computers, and Intelligence (BM/C4I) capability; and a constellation of Surveillance and Missile Tracking Satellites (SMTS) emplaced as satellites become available. The Army will activate a ground-based NMD battalion, equipped with GBI, GBR, and BM/C4I that will interoperate with the rest of the NMD system.

The NMD objective is to provide a near leakproof defense of the United States against a limited number of re-entry vehicles containing either conventional or WMD munitions. The Army NMD battalion will engage targets as directed by the Commander-in Chief, U.S. Space Command, based on launch warning and confirmation provided by early warning satellites and radars. The Army's warfighting concept is to intercept incoming missiles with GBI at maximum range and altitude during mid-phase flight. Engaging a missile above the atmosphere maximizes available battlespace, the size of the protected area, and confidence that all lethal targets can be destroyed. In addition, contamination from WMD will not affect the United States.

Because reaction timelines are so short, the NMD mission requires a high readiness state, 24 hours a day, 7 days a week; highly automated engagements with human oversight and control; and a commander and staff capable of properly using available automated support to make the correct tactical decisions in seconds. To establish and sustain the required readiness state, the automated NMD systems will make maximum use of embedded and computer-assisted simulation training to enable NMD battalion personnel to participate in virtual-reality U.S. Space Command exercises during peacetime.

Theater Missile Defense Warfighting Concept

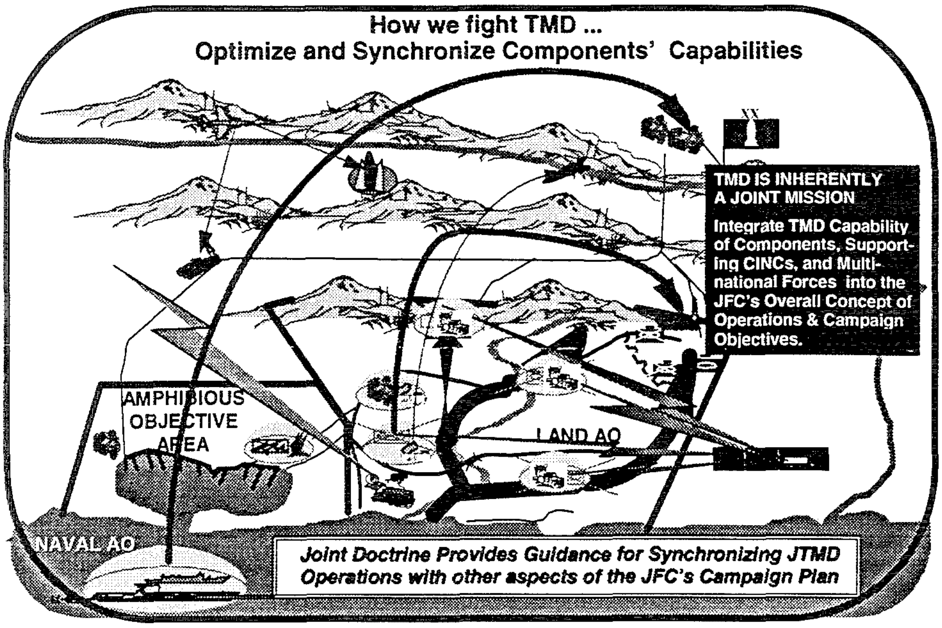


Figure G-7

TMD is an extraordinarily difficult and complex task and inherently a joint operation. It requires the commitment of automated, complementary, and interoperable Service, joint, and national intelligence resources and capabilities; BM/C4I; precision deep attack capabilities; and passive and active defense systems. This provides the JFC an effective TMD capability to **Protect the Force** and **Conduct Precision Strike** throughout all phases of a contingency. By synchronizing TMD capabilities with other aspects of his campaign plan, the JFC will be able to **Project and Sustain the Force** and **Dominate the Maneuver Battle.**

The Army's TMD program includes the four operational elements described in Joint Pub 3-01.5:

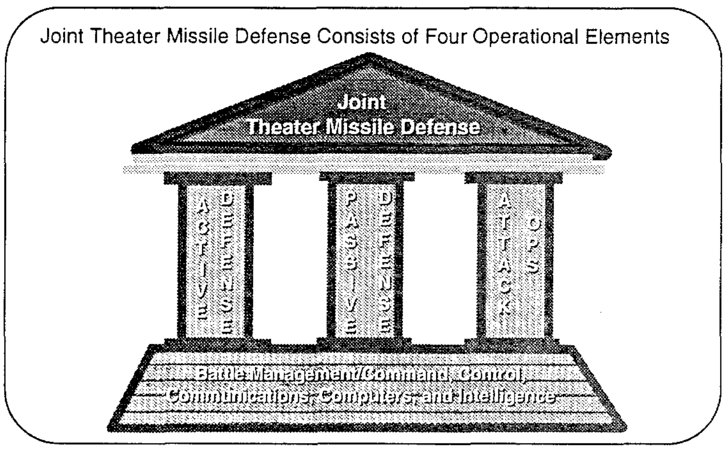


Figure G-8

Passive Defense. The Army uses passive defense measures before, during, and after an attack to provide individual and collective protection for friendly forces, population centers, and critical assets. Because of the extensive theater missile threat, some measure of passive defense is required in all force projection contingency operations. As depicted in Figure G-9, the principal components of passive defense are:

- **Tactical Warning.** General warning that a hostile missile launch is imminent, or has occurred, and specific warning that units or locations are actually threatened. Warning requires effective, interoperable sensors and intelligence processors plus automated, interoperable, redundant C4I systems to ensure rapid dissemination of critical, time-sensitive intelligence. Warning effectiveness is also a function of standing operating procedures and training throughout the joint task force. Finally, the use of space plays an important role in Tactical Warning. Annex N, Space, examines this in detail.

- **Reducing Targeting Effectiveness.** Deployed U.S. forces degrade the targeting capability of hostile forces through OPSEC measures, deception, and mobility.

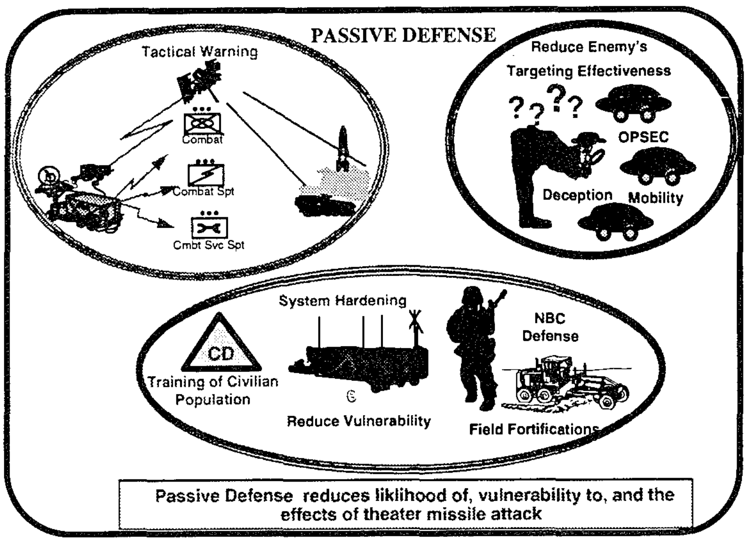


Figure G-9

OPSEC degrades the ability of hostile sensors, reconnaissance elements, and intelligence analysts to locate and identify friendly forces and locations.

Deception misleads and confuses hostile decision-makers by providing false or misleading information to their intelligence and target acquisition assets.

Mobility reduces the likelihood of being targeted because locations change faster than hostile intelligence agencies process information.

- **Reducing Vulnerability.** During materiel acquisition, critical systems are "militarized", "ruggedized", or hardened to operate effectively in environments subject to theater missile attacks. Military forces take additional steps to decrease vulnerability to, or reduce the effectiveness of, a theater missile attack. Examples include site reconnaissance and selection, field fortifications, dispersal, camouflage and concealment, the use of back-up or alternate systems and post attack recovery and reconstitution procedures. Additionally, the Army's Force XXI concept of operations allows large numbers of Combat Support (CS) and Combat Service Support (CSS) forces to remain outside theaters of operation or within the U.S. This split-based structure reduces forward deployed infrastructure and troops, reducing their vulnerability. The use of theater missiles to deliver WMD is an implicit aspect of the threat. The key to preserving deployed U.S. forces is to ensure the troops are trained and equipped with means to rapidly and accurately detect contamination; possess individual and collective NBC protective equipment; and have the capability to decontaminate personnel, equipment, and facilities quickly and completely. U.S. forces also may provide timely warning to reduce the vulnerability of civilian populations to attack and may train local civil authorities to take appropriate civil defense measures. These are key elements in reducing the risk, and may decrease the political and diplomatic impact of a hostile force's theater missile capability.

Attack Operations. TMD attack operations are offensive actions taken to prevent the launch of enemy theater missiles, or destroy/disrupt enemy TM capability. Joint doctrine prefers the use of attack operations as a TMD measure, because they decrease the enemy's capability. Attack operations include: destroying launch platforms, sensor assets, missile inventories, and other critical logistics facilities; and destroying or disrupting C3I nodes and other infrastructure.

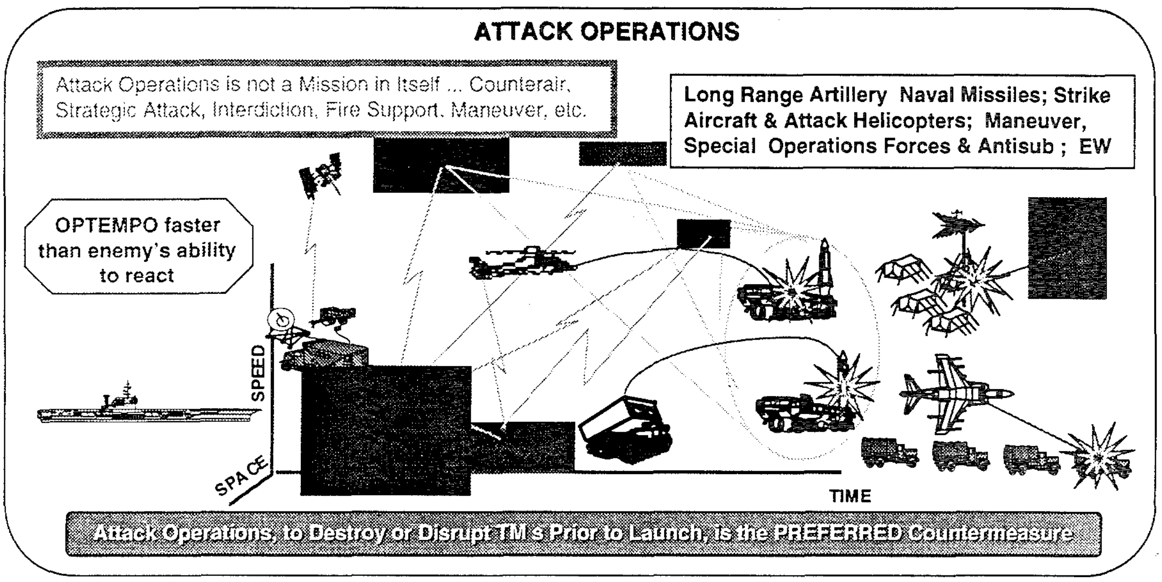


Figure G-10

- The JFC normally designates surface component commanders as the supported commanders for TMD attack operations within their area of operations (AO) and the Joint Force Air Component Commander (JFACC) as the supported commander for attack operations beyond surface AOs. The JFC synchronizes his components' attack operations capabilities by issuing mission type orders, establishing clear targeting priorities, and providing guidance on coordination required to facilitate and deconflict operations.

- Army commanders execute TMD attack operations in accordance with the DECIDE, DETECT, DELIVER targeting methodology, as critical elements of their deep battle. Attacking difficult to detect and fleeting theater missile targets via long-range fire support assets, fixed and rotary wing aircraft, and maneuver or special operations forces requires timely, accurate, and relevant all-source intelligence support plus rapid targeting capabilities. The automated interfaces and common view of the battlefield provided by the Army Battle Command System (ABCS) are key to successfully planning and executing TMD attack operations.

Active Defense. Active Defense is a critical TMD operational element. Even with highly successful attack operations, some theater missiles and UAVs will likely be launched against deployed forces and critical assets. An Active Defense capability is essential for force projection because units are most vulnerable while entering the area of operations, when the organization and forces required for passive TMD defense and TMD attack operations may not be established. Active defense destroys missiles, airborne launch platforms, and UAVs in flight. Due to the WMD threat, the defense must be near leak-proof. Thus, the Army's warfighting concept is to employ, as part of a joint force, a family of complementary and interoperable weapons and BM/C4I systems that provide a multi-tiered defense in depth and the tactical mobility and operational agility to protect maneuver forces and JFC-designated critical assets.

- Active Defense upper tier missiles operate at long ranges, in and above the atmosphere. They are very lethal against TBMs and re-entry vehicles. Lower tier, aerodynamic missiles depend on the atmosphere's resistance to steer themselves. They defend maneuvering forces to altitudes of 25-30 km against short and medium range TBM, low altitude cruise missiles, UAVs, and other aircraft. They are also capable of defeating longer range TBMs that have leaked through the upper tier.

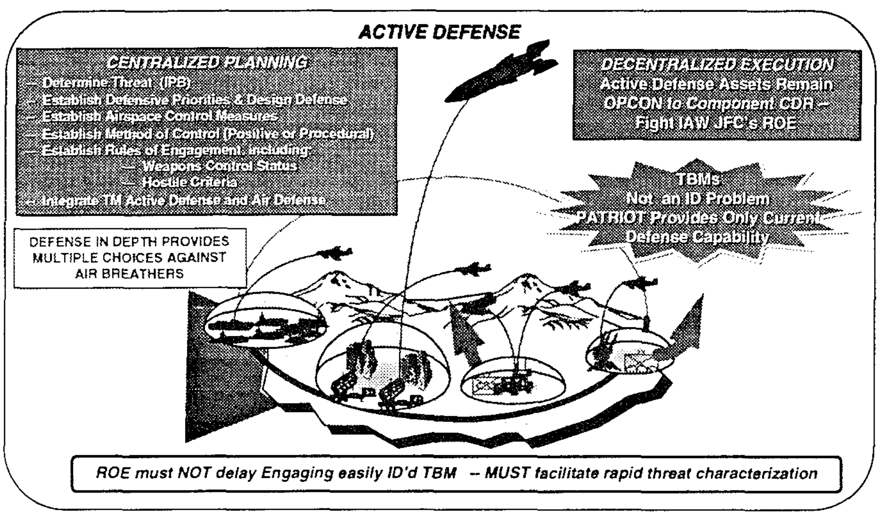


Figure G-11

- The sole use of upper-tier missiles ignores a large portion of the theater missile threat, and leaves maneuver forces without any means to defend themselves. Employing only lower tier missiles is high risk because it engages multiple, high velocity, maneuverable targets at relatively short range. This leaves only a limited opportunity to re-engage missed targets. The Army's two-tier system employs the Theater High Altitude Area Defense (THAAD) system with either the PATRIOT Advanced Capability-3 (PAC-3) or Corps SAM as complementary, lower-tier, missile systems. This ensures a capability to engage all threat systems at maximum ranges, using all the battle space available to obtain multiple engagements against incoming missiles.

- Army Air Defense units at division, corps, and Echelons Above Corps (EAC) execute TMD active defense in accordance with rules of engagement, weapons control measures, and priorities established by the Area Air Defense Commander (AADC) and approved by the JFC. Corps and divisional systems, such as Corps

SAM provide support to maneuver forces. EAC THAAD units, complemented by a lower-tier system, support the JFC by establishing active TMD enclaves to protect critical assets. The Army coordinates active defense through its integrated Air Defense C4I system at each echelon of command, assisted by automated interfaces with ABCS, joint, sister Service, and multinational C4I systems.

BM/C4I. TMD is a stressing command problem because of the short timelines involved. Incoming theater missiles may be moving at supersonic speeds and their launchers are so mobile that only minutes are available to attack them. Successful TMD requires an automated, interoperable BM/C4I architecture that allows the JFC to synchronize all elements of the joint force so that he or she can conduct active defense, passive defense, and attack operations faster than the enemy's theater missile OPTEMPO. The Army is constructing an effective BM/C4I system to fuse disparate, geographically separated TMD passive, active, and attack capabilities into a focused effort. This allows U.S. forces to detect theater missile targets and react fast enough to neutralize or destroy the enemy's theater missile capability.

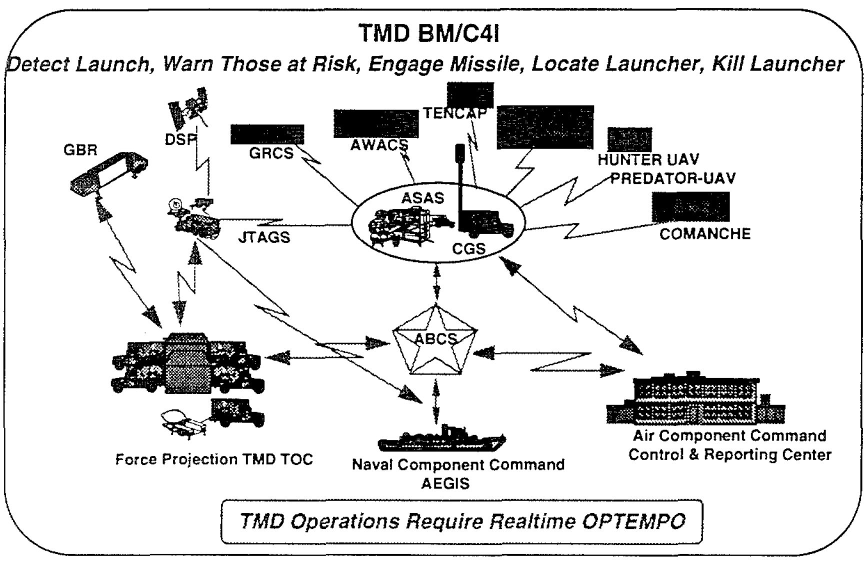


Figure G-12

- ABCS complements the Joint Global Command and Control System (GCCS). It is a critical BM/C4I element in TMD warfighting, as it provides automated interfaces among deployed Army units and national, joint, sister Service, and multinational C4I systems. This rapid exchange of critical, accurate information is key to successful TMD, because commanders and battle staffs at each echelon can form a common picture of the battlefield, quickly make necessary decisions, and rapidly issue clear orders.

- Additional BM/C4I elements in the Army's TMD warfighting concept include: using broadcast communications and direct satellite downlinks to provide recipients information simultaneously rather than sequentially; satellite communications for reliable, high capacity, long distance communications; high capacity, reliable, digital communications, such as the Joint Tactical Information Distribution System (JTIDS), within tactical units. The combined effect is that units can be widely dispersed, yet electronically collocated. Electronic collocation speeds information dissemination for TMD tactical warning, active defense, and attack operations and allows split-based operations, which is an effective passive defense measure in its own right. The

Joint Tactical Ground Station (JTAGS) illustrates this concept. JTAGS is an early warning ground processor, with a direct satellite downlink, that provides Defense Support Program (DSP) data to active defense units. However, an interoperable BM/C4I system allows JTAGS operators to disseminate tactical warning information throughout the force and estimated launch points to intelligence and targeting analysts for attack operations.

- The U.S. Army Space Command's (ARSPACE) Force Projection TMD TOC provides deployed Army Force (ARFOR) commanders, or Joint Force Land Component Commanders, a central location to plan, coordinate, deconflict, and monitor the execution of all TMD operational elements. Staffed with ARSPACE Army TMD Element personnel and unit augmentees, it deploys with the initial ARFOR command and control sections. This provides an experienced TMD plans and operations cell to complement the ARFOR staff during pre-deployment preparations, the critical lodgment effort, and throughout the operation.

- The Force Projection TMD TOC provides redundant, secure operations and intelligence communications with Army units, other components, the joint force staff, and supporting organizations within theater and in the United States. One of these supporting agencies is the U.S. Army Space and Strategic Defense Command's (SSDC) Battlefield Integration Center (BIC). Electronically co-locating the BIC with the TMD Force Projection TOC provides a capability to conduct realistic, stressful training for leaders and soldiers in a TMD environment and to conduct sophisticated mission planning and rehearsal simulations in support of "real world" plans and operations. The BIC allows the ARFOR to produce "virtual" combat veterans before deploying to the theater of war. It also allows analysis of on-going operations to determine how variables can be changed to improve TMD effectiveness. This is truly a powerful tool that allows commanders to conduct effective TMD operations well within the enemy's theater missile decision-making cycle.

SECTION 2

CURRENT PROGRAM ASSESSMENT

National Missile Defense

Army assesses NMD capability as **RED** in the near- and mid-terms and **AMBER** in the far term. The near and mid-term **RED** assessment is because current POM funding is only for research, development, and testing. No operational capability is programmed for this period. However, with adequate procurement and operations and maintenance funding, a UOES-type IOC can be deployed to protect the United States from a limited attack. As fielding a limited, ABM Treaty compliant, NMD system programmed in the FY06-10 time frame, NMD is **AMBER** in the far-term.

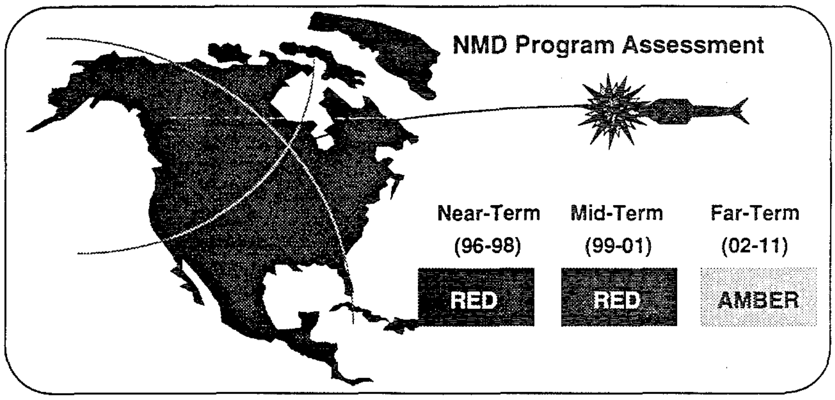


Figure G-13

As mentioned in Section 1, an NMD UOES capability is possible in FY00 with deployment of a system consisting of approximately 10-20 GBI, associated radars, and BM/C4I at a single site. The option accelerates BMDO's baseline program. This includes a FY98 demonstration of an early GBI capability by Exoatmospheric Kill Vehicle (EKV) flights with an optimized booster using commercial motors. Supplemental evaluations of GBR, Upgraded Early Warning Radars (UEWR), and BM/C4I elements also will take place in FY98. The Army would then conduct a fully integrated GBI, GBR, UEWR, and BM/C4I demonstration in FY99. In FY 00-03, the Army would deploy more interceptors and upgrade radar and BM/C4I capabilities, culminating in a configuration of 100 GBI and fully operational radars and BM/C4I capabilities at a single site. The configuration is ABM Treaty compliant and upgrades the mid-term assessment to **AMBER.** The far-term assessment stays **AMBER.**

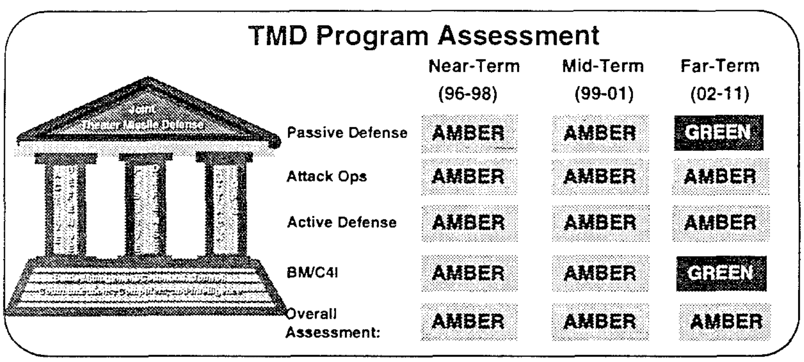


Figure G-14

Theater Missile Defense

TMD capabilities, illustrated in Figure G-14, are **AMBER** through the far-term. The deficiencies in these areas are discussed below. Viewing TMD as mutually supportive, complementary operational elements, it is apparent that deployed Army forces will possess an improved TMD capability in the far-term.

Passive Defense. The Passive Defense assessment from a TMD perspective is shown in Figure G-15. The near-term assessment is **AMBER** because of the fielding of biological agent detection capabilities and JTAGS to disseminate DSP warning messages directly to Theaters. The assessment remains **AMBER** through the mid-term because theater forces and facilities remain at risk due to limited mobile stand-off, multi-agent, chemical and biological agent detection capability; limited quantities of reconnaissance, unit detection, automated warning equipment; and deficiencies in individual and collective NBC protective equipment. The assessment becomes **GREEN** during the far-term, primarily due to improved protective equipment. However, in some operations the avoidance and decontamination aspects of NBC defense also may have a significant bearing on TMD Passive Defense. As detailed in Annex K (Nuclear, Biological, and Chemical), these areas remain **AMBER** in the far-term. Other programs contributing to passive defense are described and assessed in Annex F (Air Defense), Annex M (Training) and Annex N (Space).

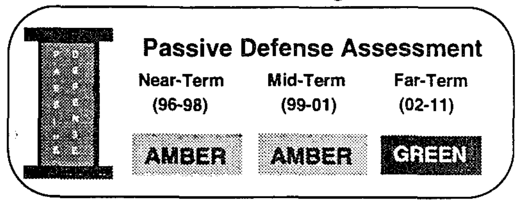


Figure G-15

Attack Operations. The Army assesses its Attack Operations capability as shown in Figure G-16. The near- and mid-term assessment of **AMBER** is based on the ability to detect, identify, locate and attack hostile theater missile capability provided by current tactical UAVs, Mobile Integrated Tactical Terminal (MITT), the JSTARS E-8C and Common Ground Station (CGS), JTAGS, Army Tactical Missile System (ATACMS), the AH-64 Apache, the improved AN/TPQ-37 FIREFINDER Block I, and special operations forces. In the mid-term, Predator UAV will detect, classify, and identify TM elements at operational depths, FIREFINDER radar improvements will permit the detection and accurate location of missile launches, and increasing numbers of ATACMS Block IA and Apache Longbow will extend the ranges at which the Army strikes hostile theater missile forces.

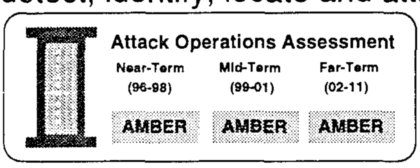


Figure G-16

In the far-term, the objective FIREFINDER product improvement extends its range to 300 km and the RAH-66 Comanche will be introduced into the force. As a result, ARFOR commanders will have an excellent capability to support the JFC's TMD efforts by detecting, locating, identifying and attacking mobile theater missile targets within his AO. But, attack operations remain **AMBER** because the growing threat requires a timely, all weather, day/night anti-theater missile strike capability at ranges up to 500 km. Currently programmed fire support and IEW systems provide only limited numbers and limited capability to meet this requirement through the far-term. Attack Operations programs are discussed and assessed in Annex D (IEW), Annex E (Fire Support), Annex J (Aviation), and Annex N (Space).

Active Defense. Army assesses its Active Defense capabilities as shown at Figure G-17. Near-term capabilities are **AMBER** because existing PATRIOT PAC 2 and forward area air defense assets provide limited capabilities against the current theater missile threat. The assessment remains **AMBER** over the mid-term, despite the availability of PAC-3 and the THAAD UOES, which provide an effective two-tier defense against TBMs. This is because of significant shortfalls in the ability to counter cruise missiles and UAVs, to protect maneuver forces, and to interoperate with joint and multinational forces. In the far-term Corps SAM fielding permits truly effective two-tier active defense of both maneuver forces and the JFC's critical assets. In addition, complete fielding of FAADC2 , other ABCS battlefield functional area systems, and GCCS provides automated, integrated, and interoperable joint active defense C4I. However, the far-term assessment remains AMBER because there are insufficient PAC 3/Corps Sam missiles to support two MRCs. Annex F (Air Defense) thoroughly discusses and assesses Active Defense programs.

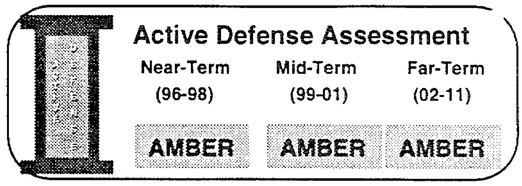


Figure G-17

BM/C4I. Each TMD operational element requires an effective BM/C4I capability. It is the nervous system that connects and directs the eyes, ears, sword-hand, and shield-arm of the TMD warrior. The Army assesses its TMD BM/C4I capability as shown in Figure G-18. During the near- and mid-terms and into the far-term, the Army will greatly improve its C4I capability and its ability to interoperate with all elements of a joint force. The ARSPACE prototype Force Projection TMD TOC, demonstrated during ROVING SANDS/OPTIC COBRA 95 is an excellent example of the Army's progress. The TOC consists of four HMMWVs Standard Integrated Command Post Systems and a TROJAN SPIRIT mounted on a HMMWV. It provided ARFOR an automated BM/C4I facility to plan, coordinate, deconflict, and monitor TMD active defense, passive defense, and attack operations. Not only were automated ABCS systems integrated into the TOC; but, since TMD is inherently a joint mission, the TOC also provided automated interfaces to the joint force (U.S. Central Command) and component C3I systems. To leverage the lessons learned and provide the Army an operational TMD command and control capability, ARSPACE activated an Army TMD Element (ATMDE) consisting of the TMD TOC and a cadre of operations, intelligence, fire support, air defense, and nuclear, biological, and chemical warfare personnel. As required, ARSPACE will deploy the ATMDE to support ARFOR or JFCs during operations and exercises.

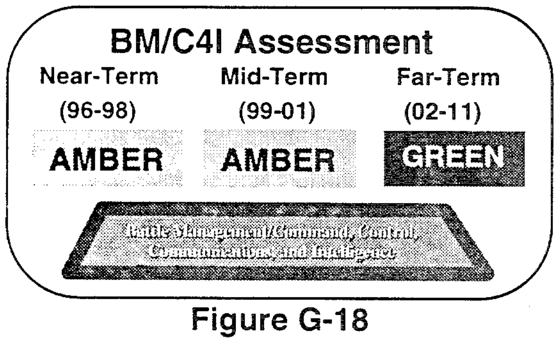


Figure G-18

During the near- and mid-terms, the Services will field JSTARS CGS and E-8C aircraft, Predator UAVs, five JTAGS, ABCS systems such as the All Source Analysis

System (ASAS) Block II and the Forward Area Air Defense Command, Control, Communications, and Intelligence (FAADC3I) system, and communications capabilities as TROJAN SPIRIT and broadcast communications. Not only do these systems provide the Army a significant BM/C4I TMD capability, they were developed with joint interoperability as a major requirement.

Nevertheless, BM/C4I remains assessed as **AMBER** until the far-term. This assessment reflects the continuing struggle throughout DoD to define TMD BM/C4I requirements in relation to the growing threat and rapid technological advances. As part of the on-going TMD Cost and Operational Effectiveness Analysis (COEA), BMDO and the Air Force, as Executive Agent for Theater Air Defense BM/C4I, are developing an Active Defense Command and Control Plan they anticipate can be expanded to encompass all TMD operational elements. At the same time, several Joint Warfighting Capability Assessment (JWCA) teams (Intelligence, Surveillance and Reconnaissance; Air Superiority; and Strike) established by the Joint Requirements Oversight Council (JROC) are analyzing various aspects of TMD attack operations, active defense, and BM/C4I. Additionally, the Services continue to experience difficulty in melding their separate capabilities and operating methods into an accepted body of joint tactics, techniques, and procedures that can be codified in a joint publication. The Army anticipates the results of these efforts and difficulties will have programmatic impacts through the mid-term. Specific details on programs related to TMD BM/C4I are in Annex C (C4), Annex D (IEW), Annex F (Air Defense), and Annex N (Space).

Summary

The 1996 Army Modernization Plan reports continuing TMD progress. This is typified by greater than anticipated successes with the Force Projection TMD TOC and Predator UAV, continuing progress with important systems associated with TMD -- such as ASAS, JSTARS, ATACMS, PAC-3, Corps SAM and THAAD, and imminent Hunter UAV, JSTARS CGS, and JTAGS fieldings. However, as shown in Figure G-19, there are specific modernization efforts that must continue for this assessment to remain valid.

REQUIRED TMD MODERNIZATION

Passive Defense
- JTAGS
- Biological Agent Detection
- Improved Biological Agent Immunization

BM/C4I
- ABCS Fielding to the Force
- Global Command & Control System
- JSTARS CGS and E-8C
- Hunter and Predator UAVs
- JTAGS
- Force Projection TMD TOC
- COMANCHE

Active Defense
- PATRIOT PAC-3
- THAAD
- Corps SAM
- JTAGS

Attack Operations
- ATACMS Block IA
- APACHE LONGBOW
- JTAGS
- COMANCHE

Figure G-19

Section 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

General

NMD research and development is proceeding so that a limited defense can be fielded within a short period of time after a national decision to do so. The Army's role is to develop and incrementally test the GBI, GBR, and associated BM/C4I.

The Army's TMD Research, Development, and Acquisition (RDA) strategy is to match TMD requirements with capabilities provided through on-going materiel development in each of the battlefield functional areas by revising existing Operational Requirements Documents as needed to provide or enhance a required TMD capability. The intent is to build flexibility into the acquisition process to shape a rapid and effective response to an evolving threat.

National Missile Defense RDA

Ground Based Interceptor (GBI)

GBI consists of the Exoatmospheric Kill Vehicle (EKV) and an optimized booster as illustrated in Figure G-20. EKV is the smart, non-nuclear, hit-to-kill payload portion of the GBI. It contains the on-board optical seeker, data processing, guidance, and divert propulsion capabilities required to intercept long-range ballistic missile re-entry vehicles above the atmosphere. In 1996, the Army will begin GBI development, based on existing commercial/military motors optimized to provide higher burnout velocities and better defensive coverage. EKV test hardware is traceable to the deployable GBI kill vehicle and will be used to incrementally demonstrate the effectiveness of an integrated NMD system. Progressive GBI simulation, ground testing, and flight testing will occur at U.S. Army Kwajalein Atoll (USAKA) over the next three to five years.

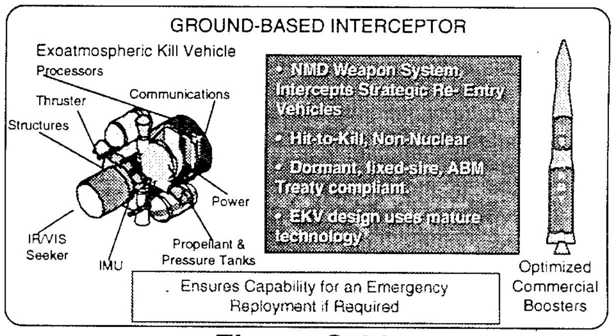


Figure G-20

EKV development effort hinges on integrating existing kill vehicle component technologies developed under previous BMDO programs. The focus is to demonstrate an optimized NMD kill vehicle with an on-board seeker that provides long-range target acquisition, tracking, and target selection capability. The initial GBI fabrication and test program will ensure the availability of proven, flight-qualified hardware designs for future acquisition and emergency deployment when needed. Test hardware designs will be modular and flexible to allow future enhancements to respond to increases in threat sophistication over time.

NMD Ground Based Radar-Prototype (GBR-P)

The NMD GBR-P is a wide bandwidth, solid-state X-Band phased array radar capable of long-range detection, acquisition, tracking, and classification of ballistic missile threats to allow intercept in the midcourse portion of their flight. Figure G-24 shows the Demonstration/ Validation version of THAAD GBR and the NMD GBR-P to be built, tested, and integrated at USAKA.

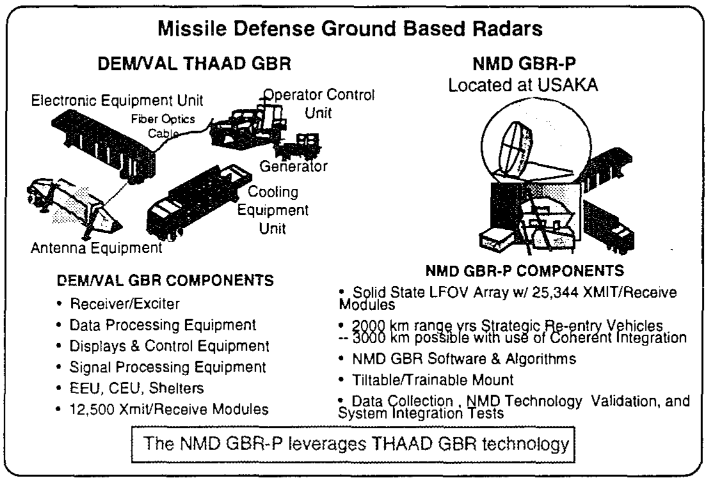


Figure G-21

GBR-P development leverages the substantial investment in the THAAD GBR Development Program. It will use the same solid state transmit and receive modules, and will use other THAAD GBR hardware as much as possible in conjunction with the new antenna design needed to meet NMD requirements. The GBR-P effort demonstrates unique NMD radar functions that allow high-confidence intercept at closing velocities twice those of TMD engagements. GBR-P will be used with the GBI over a three to five year period at USAKA to incrementally demonstrate an integrated NMD system's effectiveness against the likely threat through progressive simulation, ground testing, and realistic flight testing.

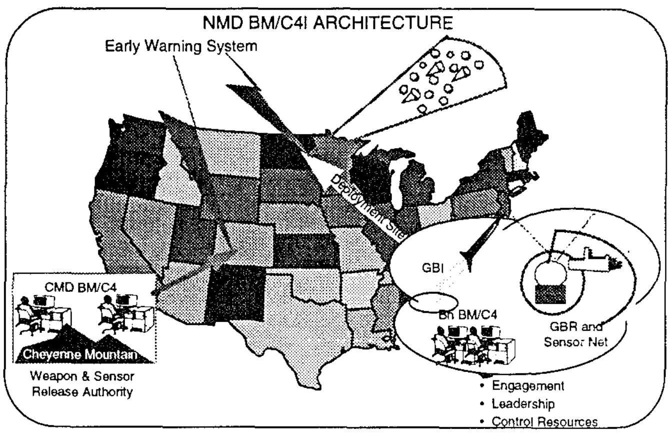


Figure G-22

Site BM/C3

The Site BM/C3 assists operators at the NMD Battalion's interceptor and radar sites with engagement planning and decision aids. It interfaces with the rest of the NMD system as illustrated in Figure G-22. Like GBR-P, Site BM/C3 leverages THAAD technology. However, the Site BM/C3 effort is developing software to meet the battalion's unique requirements to employ its GBI and GBR and to plan high-confidence intercepts in various threat scenarios. It will be used over the next three to five years at USAKA to incrementally demonstrate integrated threat effectiveness against the most likely threat, through progressive simulation, ground-testing, and realistic flight testing.

Theater Missile Defense RDA

The Army's **Passive Defense** RD&A strategy is to improve the force's capability to protect itself against WMD; to modify the combat service support (CSS) system to present fewer lucrative, vulnerable targets and to improve C4I to ensure timely warning and permit greater dispersion.

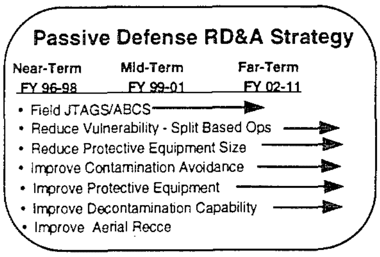


Figure G-23

To increase the force's capability to protect itself against WMD, the Army will combine procurement of various non-developmental items with military developed systems to improve individual and collective protection, contamination avoidance, and decontamination capabilities.

Through the near- and mid-terms the Army will reduce collective protective equipment size, weight, and power requirements and field improvements to individual protective equipment and equipment for integrated command posts. The Advanced Integrated Collective Protection System (AICPS) for vans, shelters, and vehicles begins fielding in the near-term. In addition, the Joint Service Lightweight Integrated Suit Technology (JSLIST) is a three-phased program spanning the near- to far-terms to meld state of the art protective clothing technologies into one suit to meet the next generation of the Services' chemical and biological protection requirements.

- Contamination avoidance capability improvements over the near- and mid-terms include Biological Integrated Detection System fielding and development of an aerial reconnaissance capability for nuclear contamination. Far-term plans call for developing improved aerial and stand-off chemical and biological detection systems.

- Decontamination improvements include Modular Decontamination System fielding in the near- and mid-terms and developing advanced, non-corrosive decontaminants for electronics and avionics and self-decontaminating coatings. Army procurement of a decontamination system that does not require water begins in FY08.

Implementation of split-based operations to decrease the combat support and combat service support infrastructure deployed during force projection operations will decrease the number of soft targets vulnerable to theater missile attack. Accomplishing this objective requires continuing improvements over the mid- to far-terms in airlift (C-17) and sealift (Fast Sealift Ships, Large Medium Speed Roll on/Roll off); C4I improvements such as the ABCS CSS Control System (CSSCS) and use of broadcast information technologies; and wheeled-fleet modernization to ensure rapid materiel distribution from ports of debarkation to tactical units.

C4 improvements over the near- and mid-terms also significantly improve passive defense. Chief among these are the fielding of JTAGS and ABCS and GCCS development. In addition, new radars, such as the MPQ-53 and THAAD GBR, can determine missile launch and impact points. This will improve the timely and accurate dissemination of TMD warning within the deployed joint force.

Specific RD&A strategies to accomplish these objectives are detailed in Annex C (Information Dominance), Annex H (Tactical Wheeled Vehicles), Annex I (Logistics), Annex K (Nuclear, Biological, and Chemical), and Annex N (Space).

The Army accomplishes the JFC's **Attack Operations** objectives with long-range surface to surface fires, attack aviation, special operations forces, and maneuver forces. Therefore, the attack operations modernization strategy includes improving sensors, weapons systems, munitions, and C4I.

Attack Operations RD&A Strategy

Near-Term FY 96-98	Mid-Term FY 99-01	Far-Term FY 02-11
• Field JTAGS →		
• Field ATACMS Blk 1A →		
• IEW Sensor & Processor Fieldings →		
• ABCS Fieldings & GCCS RD&A →		
• Field Apache Longbow →		
• Improved Firefinder →		Firefinder P3I
		• Field ATACMS Blk II w/BAT →
		• Comanche →

Figure G-24

Intelligence & Electronic Warfare (IEW) system fieldings into the far-term will have significant impact on TMD attack operations. Sensor fieldings include Hunter and Predator UAVs, JSTARS E-8C, and Guardrail Common Sensor. Collateral information from all these sensors will be received, processed, analyzed, and disseminated for immediate targeting by JSTARS CGS operators throughout the Active Army by the end of FY99. ASAS Block I and ASAS-Extended will be distributed to the Active Army by the end of FY96. ASAS focuses the national, joint, and tactical intelligence communities on TMD requirements and provides timely, accurate, and relevant intelligence support to attack operations.

In FY96 the AN/TPQ-37 FIREFINDER Radar Improvement Program begins upgrading Block I systems to detect and locate tactical ballistic missiles at ranges up to 100 km. P3I FIREFINDER, with a range of up to 300 km, starts fielding in FY02.

A number of additional C4I initiatives through the mid-term also significantly improve attack operations. Chief among these are continued development and initial fielding of JTAGS, the Advanced Field Artillery Tactical Data System (AFATDS)--the ABCS fire support system, and GCCS. This improves the capacity, accuracy, processing, and interoperability of Army fire support command and control and ensures enhanced interoperability with joint and sister Service units. In addition, attack operations will benefit from the fieldings of the intelligence communications systems TROJAN SPIRIT and Commanders' Tactical Terminal-Hybrid (CTT-H). These allow tactical units to pull required intelligence and intelligence products from any echelon and to receive timely broadcast intelligence.

Fire support improvements are primarily centered around ATACMS and munitions. ATACMS Block IA effectively doubles the missile's range and fields in the near- and mid-terms. Block II ATACMS with Brilliant Antiarmor Technology (BAT) submunitions begins fielding in the far-term. Aviation TMD modernization in the mid- to far-terms consists of upgrading APACHE attack helicopters to the AH-64D APACHE LONGBOW models with enhanced deep operations and precision strike capabilities due to their increased lethality and survivability. RAH-66 COMANCHE development over the mid- to far-terms, and its initial fieldings in the far-term, will improve heavy division target acquisition capability and light force attack operations.

Specific strategies for accomplishing these attack operations RDA objectives are contained in Annex C (C4), Annex D (Intelligence and Electronic Warfare), Annex E (Fire Support), Annex J (Aviation), and Annex N (Space).

The Army is pursuing a three phased TMD **Active Defense** RD&A strategy to procure a family of complementary, interoperable systems. At the end of the near-term, Army will begin fielding PATRIOT PAC-3 with Extended Range Intercept Technology (ERINT). This significantly increases PATRIOT's lethality against theater missiles by providing a "hit-to-kill" capability at extended ranges and 16 agile guided missiles per ERINT-equipped PATRIOT launcher. The THAAD UOES also reaches the field in the near-term. Although the UOES is deployable in response to a national emergency, mid-term THAAD procurement gives a truly effective upper-tier defense against tactical ballistic missiles. THAAD provides a long-range, high altitude missile with "hit-to-kill" capability and operates with lower-tier units as an EAC TMD Task Force (TF) to protect the JFC's critical assets.

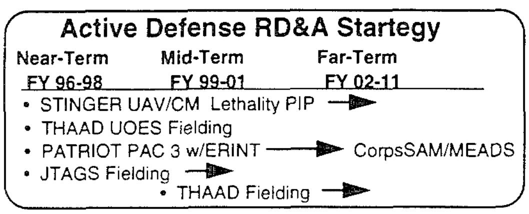


Figure G-25

A THAAD-PATRIOT EAC TMD TF provides a near leak-proof active defense against ballistic missiles. However, the TF can not protect maneuvering forces and has only limited capabilities against cruise missiles. In the far-term, in cooperation with NATO Allies (France, Germany, and Italy), the Army plans to begin replacing PATRIOT with a strategically mobile, tactically deployable active defense weapon to protect maneuver forces and provide a lower-tier complement to THAAD and Naval TMD Active Defense systems. The Corps SAM/Medium Extended Air Defense System (MEADS) is leap-ahead technology that will protect mobile Army and USMC forces and enhance and extend the joint force's two-tier active defense system.

Annex F (Air Defense) provides a detailed explanation and discussion of the specific RD&A strategies that contribute to TMD Active Defense.

TMD BM/C4I. Numerous C4I initiatives through the mid-term significantly improve Army TMD capabilities and increase joint interoperability. Chief among these is the Force Projection TMD TOC. In FY96, on-going coordination and cooperation between Army and AF materiel and combat developers will result in assured interoperability between the Force Projection TMD TOC and the AF's Combat Information Center. The TMD TOC and the SSDC BIC will become capable of electronic co-location, which will provide operational commanders a valuable TMD training, course of action analysis, and planning capability. In addition, continued fieldings of ABCS systems, and initial implementation of GCCS improves command and control and interoperability within the ARFOR and ensures enhanced interoperability with joint and sister Service units. TROJAN SPIRIT and Commanders Tactical Terminal-Hybrid (CTT-H) fieldings to Army, joint, and sister Service units allow tactical units to receive broadcast intelligence and to "pull" required intelligence and intelligence products from all echelons.

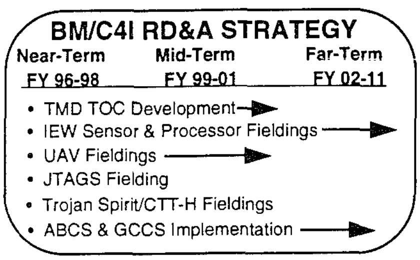


Figure G-26

Through the mid-term, IEW system fieldings will have a significant impact on TMD capabilities. Hunter UAV fielding began in FY95 and continues into the mid-term, and some Predator UAV capability also will field in the near-term. Near-term JTAGS fielding provides theater commanders and deployed JFC commanders near real time missile warning, trajectory, launch point, and impact point data by processing stereo DSP sensor data. The JSTARS E-8C initial operating capability is in FY97 and fielding continues through the mid-term. Guardrail Common Sensor, with its ability to provide targetable SIGINT, will complete fielding to all Corps. JSTARS CGS fielding begins in FY96 and by FY99 all active component units will have received a limited number of systems. ASAS will be continuously upgraded through the application of capability packages based on Block II development and rapid prototyping. By the middle of the far-term, Block II will be fielded throughout the active and reserve components.

Specific RD&A strategies contributing to TMD BM/C4I are detailed in Annex C (C4), Annex D (Intelligence and Electronic Warfare), and Annex N (Space).

SECTION 4

CONCLUSION

Missile defense is a critical component of the Army's modernization effort, because the threat to U.S. forces is real and growing. It is apparent also that the rapid spread of missile technology, particularly when coupled with the even more rapid proliferation of WMD capabilities, presents a potential threat to the United States during the mid- to far-terms.

As detailed above, the Army is making progress in many TMD areas, despite the difficulties imposed by severely constrained RDA budgets. One reason for this is the strategy of piggy-backing TMD RDA on the materiel development programs of the battlefield functional areas. This has proven to be an effective method of rapidly developing capabilities. The second reason for TMD progress is that the Persian Gulf War demonstrated the severity of the TMD threat. As a result, the Nation's political, military, and diplomatic leaders are unified in their resolve that the U.S. military must develop a TMD capability to protect U.S. and allied forces, critical assets, and politically sensitive areas -- such as an ally's political, cultural, religious, or population centers.

TMD technology is being leveraged to accelerate NMD research and development, much like earlier ballistic missile defense efforts gave impetus to Service TMD Active Defense efforts. If an NMD consensus develops -- similar to the one spurring TMD RDA -- the Army is prepared for and capable of making a significant contribution to the joint effort to protect the Nation against the strategic missile threat, just as we have done for the past 50 years.

ANNEX H

TACTICAL WHEELED VEHICLES

SECTION 1

INTRODUCTION

> ***"Trucks aren't sexy, but you've got to have them"***
> Dr. John White, DEPSECDEF, Sep. 1995.

Funding support for Tactical Wheeled Vehicles (TWV) has improved since the 1995 Army Modernization Plan. Congress has indicated they will plus up truck programs by approximately $330M for FY96. However, the Army was directed to fix funding in FY97 and beyond.

FY95 was memorable for truck programs. The Family of Medium Tactical Vehicles (FMTV) completed testing and was approved for Full Rate Production. FMTV is the final truck modernization program of the 20th Century. The challenge before the Army now is to adequately fund truck programs so that the benefits of modernization can be applied to gain victory on the battlefield.

Funding support for TWV in the current POM is at 60 percent of required levels. Of more significance is the critical near term period FY 96-98. During that period funding is at 24 percent of the required amount. Without an increase in Army Total Obligation Authority (TOA), help from OSD or Congress, no improvement in these critical near term years can be expected. TWV funding, as a percentage of Research, Development, and Acquisition (RDA) funding declines from 6 percent to less than 1 percent. This level of funding is not sufficient to maintain TWV modernization. TWV funding even declines relative to the rest of Combat Service Support (CSS). At currently projected resource levels TWV procurement programs fail to achieve Army goals for TWV modernization, retirements, or production base support.

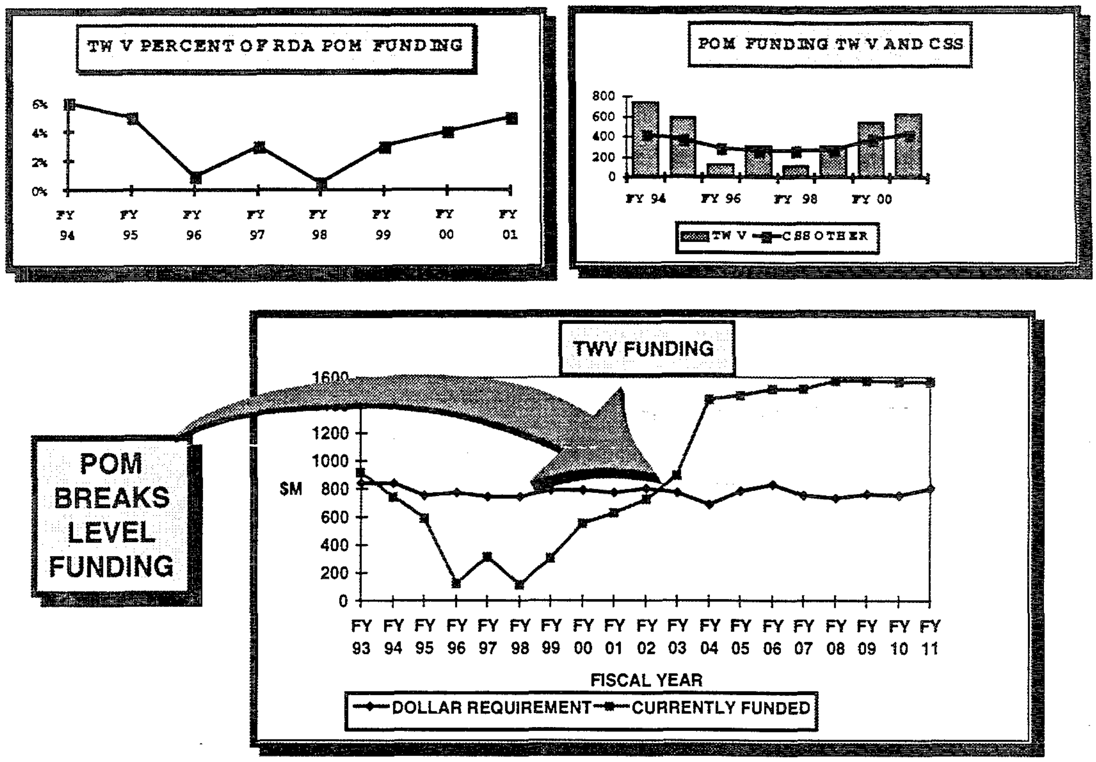


Figure H-1

The shortfall of TWV POM funding creates two major TWV fleet problems. First it delays the long overdue medium fleet modernization, and secondly permits the highly capable light and heavy fleets to become aged before replacements become affordable. The Army is laying the groundwork for a highly mobile, highly digitized, and lethal strike force under the conceptual umbrella of Force XXI. Force XXI will depend on a fleet 47% over age by 2011. However, this over age percentage is an improvement from FY95 wherein, at that funding level, the fleet would have been 60% over age. The light fleet Economic Useful Life (EUL) is 14 years. The medium and heavy fleets EUL is generally 20 years.

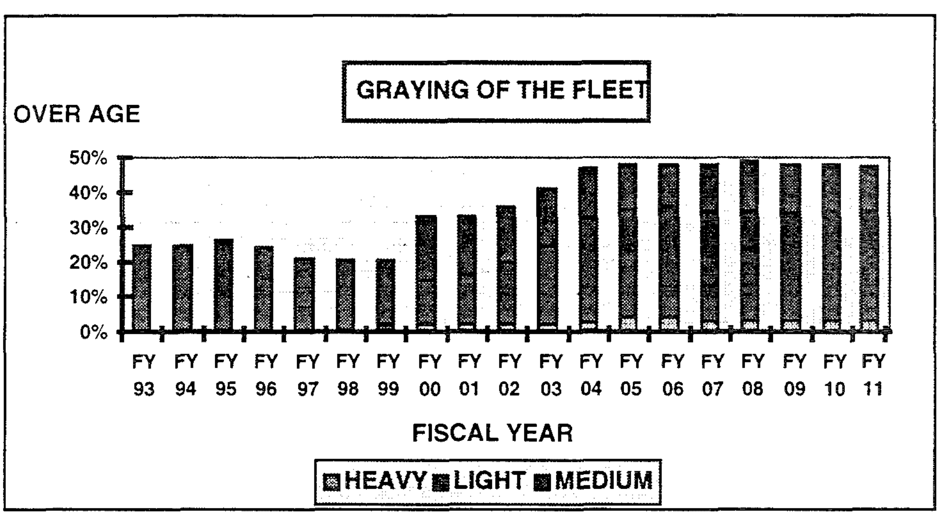


Figure H-2

The US Army, as a land force, is heavily dependent upon TWVs to execute war plans and Military Operations Other Than War (MOOTW). Weapon systems destroy the enemy, but TWVs provide the critical ammunition and fuel for that destruction, make units mobile about the battlefield, and provide unit sustainment. TWV employment is either integral to, or highly supportive of, all five Army modernization objectives. Figure H-3 displays truck missions and the trucks that are key to those missions.

Project and Sustain the Force. Rapid force projection, extended communication lines, and the likelihood of forcible entry into a logistically bare area of operations places unique demands on the Army. When the force is alerted, requirements for trucks begin immediately as CONUS installations move unit equipment to air and sea ports of embarkation. Once in the theater, large numbers of TWVs, in all configurations, rapidly move the force from the debarkation point to reception areas forward. As the maneuver force moves deep into the area of operations, the logistics structure is tailored to meet tactical requirements. TWVs move supplies rapidly into and within the operational area and are inextricably tied to operational success. Additionally, new TWVs have improved reliability, availability, and maintainability (RAM) requiring less infrastructure for their support.

TRUCK MISSIONS

	HMMWV	CUCV	FMTV	HEMTT	PLS	LINE HAUL	ENGR TRAC	HET	TRLR'S
WEAPONS PRIME MOVER	X		X	X					
WEAPONS PLATFORM	X		X		X				X
TANK TRANSPORTER								X	X
COMM SYSTEMS TRANS	X	X	X						
POL/WATER DISTRIBUTION			X	X		X			X
TROOP TRANSPORT	X	X	X						
AMMO DISTRIBUTION			X	X	X	X			X
TACTICAL OPS CENTER	X		X						
MEDICAL EVACUATION	X								
COMMAND & CONTROL	X								
GENERAL CARGO	X	X	X			X			X
RECOVERY			X	X					
ENGINEER EQUIP TRANS							X		X
SHOP EQUIPMENT	X	X	X						X
POWER GEN EQUIP	X		X						X
CONTAINERS					X				X

Figure H-3

Protect the Force. TWVs serve as weapon system platforms, command and control vehicles, weapon prime movers, tank transporters, and Engineer equipment transporters in combat units. TWVs are employed as transporters for Air Defense systems such as Avenger, Patriot, and Theater High Altitude Air Defense (THAAD).

Win the Information War. With the emergence of new generations of automated systems and sophisticated management information systems, field commanders have critical battlefield information at their fingertips. In a world of satellite links, telemetry, "smart" computers, etc., the TWV role is paramount in providing mobility to these systems.

Conduct Precision Strike. Modern weapons systems, such as the Multiple Launch Rocket System (MLRS), Apache, Bradley, Abrams, Armored Gun System (AGS) Patriot and the Paladin Gun System, rely on ammunition resupply by TWV to sustain maximum fire on a target. TWVs deliver the ammunition for these key combat systems making the TWV integral to the success of the firing mission. TWVs are also prime movers for towed artillery and the chassis for the High Mobility Artillery Rocket System (HIMARS).

Dominate the Maneuver Battle. Rapid, decisive victory is the essence of Land Force Dominance which is inextricably dependent upon efficient and effective TWV support. Organic unit TWVs, such as the High Mobility Multipurpose Wheeled Vehicle (HMMWV), provide platforms for command and control capability, battlefield intelligence, and communications capability immediately upon entry into a newly developing theater. Other organic vehicles, such as the Heavy Expanded Mobility Tactical Truck (HEMTT), establish critical rearm and refuel capability for MLRS, main battle tanks, and combat aircraft. Palletized Load System (PLS) vehicles establish corps forward ammunition flows capable of sustaining fighting units for the duration of the conflict. Up Armored HMMWVs are used as scout vehicles for Infantry and Armor battalions and HMMWVs with state-of-the-art weaponry provide battlefield reconnaissance for maneuvering armor forces. The 70-ton Heavy Equipment Transporter System (HETS) transports the Main Battle Tanks directly forward to new maneuver positions, allowing them to arrive fully fueled and armed, and with a fresh crew. TWVs are air transportable, most by C-130, C-17, and C-141 aircraft. TWVs are integral to armor, infantry, field artillery, air defense artillery, signal, air-assault, aviation, medical, and logistics forces alike.

Training Objective. The training objective for TWVs is to have vehicle operators, maintainers, and leaders acquire and retain the skills needed to ensure effective use of TWVs in support of ground forces. This is accomplished though new equipment training and TRADOC training programs.

SECTION 2

CURRENT PROGRAM ASSESSMENT

POM funding below required levels significantly inhibits TWV modernization efforts. In addition, some light TWVs procured are being diverted to provide interim combat arms capability, i.e., Bradley Scout substitution, without remuneration to the TWV procurement account.

Army Acquisition Objective (AAO). The TWV AAO is that quantity of TWVs required for units, Preposition (PREPO) ships, war reserve stocks, operational projects and operational maintenance floats. Army downsizing is reflected in the current AAO projections. Figure H-4 reflects the AAO on which this update is based. The AAO's listed are designed to support the force expected to be in place in 2001.

ACQUISITION OBJECTIVES

FLEET	AAO
LIGHT	
HMMWV	104,895
CUCV	12,987
MEDIUM	
LMTV	41,798
MTV	47,190
HEAVY	
PLS	3,262
HET	2,180
HEMTT	14,936
LINE HAUL	4,896
ENGR TRACTORS	2,623
TOTAL	234,767

Figure H-4

Requirements Determination. Virtually all Army Table of Organization and Equipment (TOE) units require, and are expected to continue to require, some TWVs, as they represent the most flexible and cost effective mode of transport available. The determination of TWV requirements at the unit and at the aggregate levels is vested in the TRADOC Tactical Wheeled Vehicle Requirements Management Office (TWVRMO). The TWVRMO analyzes each TOE unit design, as it is being built, and determines the most cost and operationally effective mix of vehicles to satisfy mission needs.

Assessment Explanation. The Army continually assesses its TWV fleet capabilities and ownership characteristics. The assessment presented here includes a general TWV program assessment, an overall fleet capability assessment, and an assessment by fleet class (light, medium and heavy).

Major Changes Since 1995. Several events have occurred since the 1995 Modernization Plan was published that influence this annual update and the general health of the fleet. They include:

- The FMTV program completed its rigorous technical and operational tests with great success. Most noteworthy is the fact that the demonstrated reliability far exceeded specified requirements;

- Army funding support for TWV improved for POM time frame; and

- Congressional funding support for the light, medium and heavy fleets.

Overall Program Assessment. Any assessment of the relative health of the TWV fleet is a snapshot in time. During the 1980's the Army fielded new trucks such as the HMMWV, HEMTT, and the last versions of the M939 series 5 ton trucks. The 1990's saw fielding of 21st Century vehicles such as PLS and the 70 ton capable HETS. Modern version of Line Haul and Engineer tractors were fielded that brought modern technologies from the commercial market to the Army. However, adequate quantities were not procured to permit full retirement of predecessor systems. Some of the new systems, especially the HMMWV, begin to exceed EUL during the POM period. The biggest shortcoming for modernization remains the 2-1/2 ton (LMTV) version of the medium fleet. During the 1980's medium fleet efforts were focused on filling 5 ton shortages. While shortages no longer exist, the older 5 tons and all 2-1/2 ton trucks lack the mobility to support the pace of modern battle. The challenge is to modernize the medium fleet, fill selected shortages in the light and heavy fleets, while preventing a decline of the highly capable light and heavy truck fleets.

Overall TWV Fleet Capability Assessment. Major changes from 1995 include modest funding increases in the POM and Congressional plus ups. These serve to reduce the problem but fall short of rectifying a major problem with the medium fleet and imminent problems with both the light and heavy fleets.

ASSESSMENT OF THE FLEET - 1995

CATEGORY	ON HAND	ASSESSMENT NEAR 96-97	MID 98-01	FAR 02-11
LIGHT	139,176			
HMMWV	86,563	GREEN	GREEN	AMBER
CUCV	48,782	AMBER	AMBER	RED
SUSV	985	GREEN	GREEN	AMBER
M151	1,030	RED	RETIRED	RETIRED
M880	1,816	RED	RETIRED	RETIRED
ASV	0	RED	GREEN	GREEN
MEDIUM	105,071			
2-1/2 TON	51,573	RED	RED	RED
LMTV	0	RED	AMBER	AMBER
5 TON	53,498	AMBER	AMBER	AMBER
MTV	0	RED	RED	AMBER
HEAVY	22,777			
PLS	1,782	GREEN	GREEN	GREEN
HEMTT	11,982	AMBER	AMBER	AMBER
HETS	1,368	AMBER	AMBER	GREEN
LINE HAUL	4,942	GREEN	GREEN	MBER
LET	1,724	GREEN	GREEN	AMBER
MET	920	AMBER	AMBER	RED
M 123	59	RED	RETIRED	RETIRED

Figure H-5

Light Fleet Assessment. The overall assessment of the light fleet is **GREEN** in near-term and mid-terms and **AMBER** in the far-term.

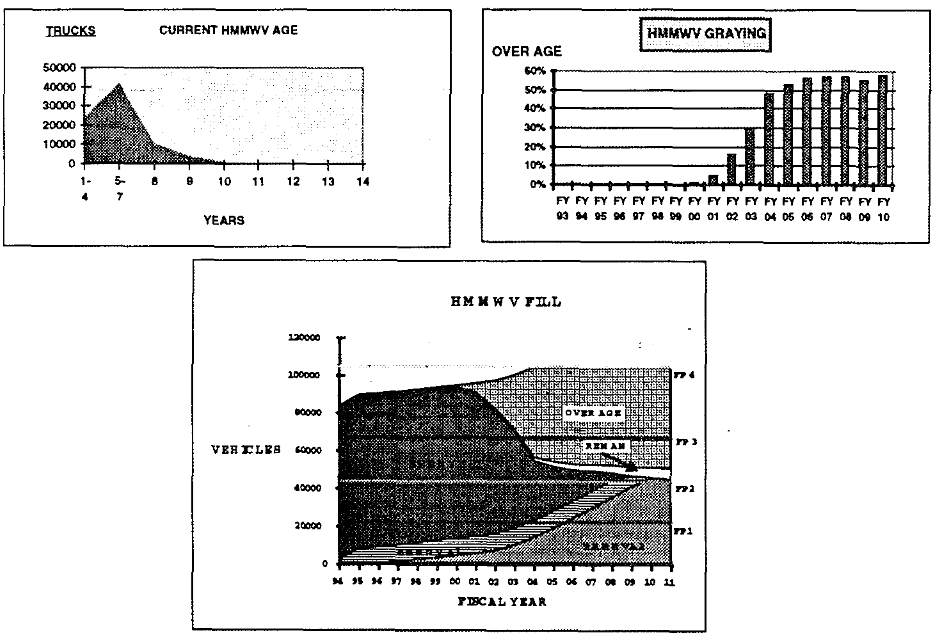


Figure H-6

HMMWV. This fleet is **GREEN** in both near-term and mid-term. The HMMWV supports all five Army modernization objectives. HMMWVs are critical to all warfighting and MOOTW missions. There are three generations of HMMWV, the basic, an A1, and A2 configurations. Successive generations have improved upon braking, power train components, soldier enhancements, and weight carrying capacity. An Up-Armored HMMWV has been added to the available models and has proven successful in protecting soldiers engaged in operations in Somalia, Haiti, and the Balkans. The Up-Armored HMMWV chassis is the basis for the Expanded Capacity Vehicle (ECV) version of the HMMWV which is needed for communications system transport. In Figure H-6, the shaded area reflects the HMMWV age of inventory. The bulk of the assets are in the 5-7 year old range, of a fleet with an EUL of 14 years. As figure H-6 shows, a HMMWV shortage still exists, and beginning in the year 2001 the current good situation of the HMMWV fleet becomes one with a number of overage vehicles. Even the introduction of modest numbers of remanufactured vehicles and new procurements fail to preclude the changing the fleet assessment from **GREEN** to **AMBER.**

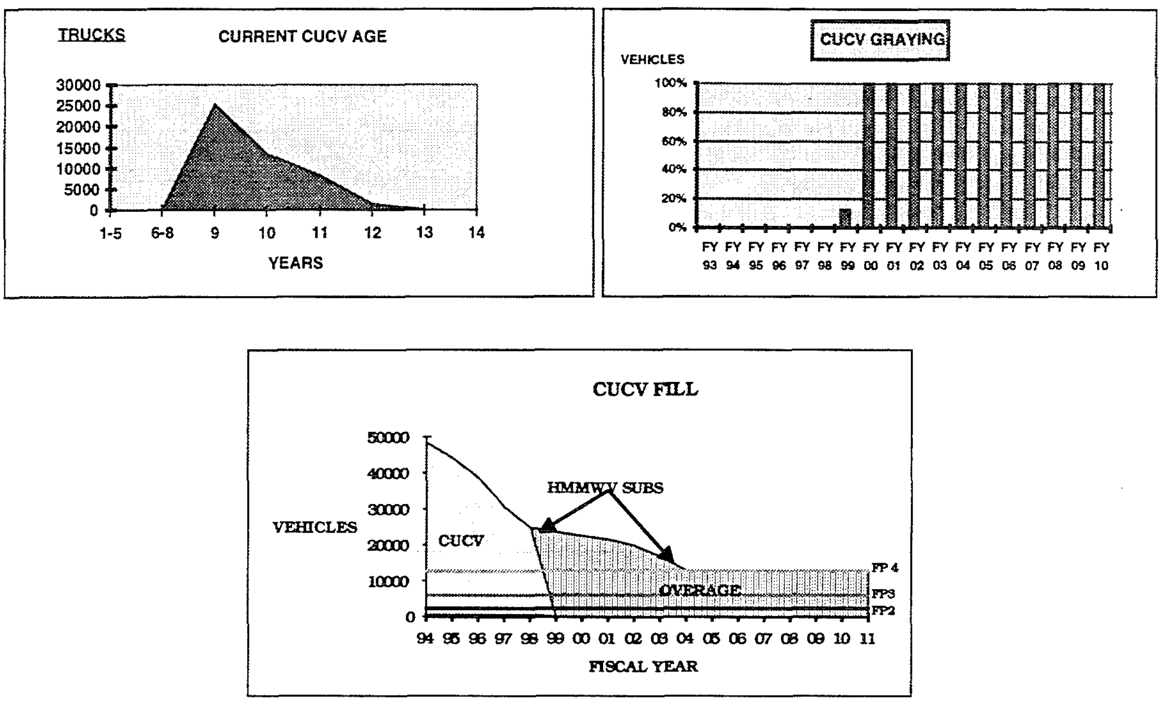


Figure H-7

Commercial Utility Cargo Vehicle (CUCV). The CUCV fleet assessment is **AMBER** and will remain so until they become overage in the far-term where it becomes **RED.** CUCV type vehicles continue to execute light transport roles in Echelon Above Corps (EAC) units. As figure H-7 depicts CUCV assets currently exceed requirements, but are substituting for HMMWVs in many units. The Army may be forced to investigate leasing of commercial pickups as a means to cope with this situation.

Armored Security Vehicle (ASV). The ASV moves from **RED** in the near term to **GREEN** in the mid- and far-terms. These vehicles are for use by Military Police units in support of Military Police operations. A procurement of 95 of these vehicles is planned for support of the Contingency Corps and the training base. The ASV is a complementary vehicle to the Up-Armored HMMWV in Military Police units.

Small Unit Support Vehicle (SUSV). The SUSV assessment is **GREEN** in the near- and mid-terms and is **AMBER** in the far term. The bulk of assets are under ten years old with an EUL of 15 years. Requirements are being reviewed with a goal of reducing them in order to retire excess assets. The objective is to have only the newer six cylinder models remain in the fleet.

Medium Fleet Assessment. The Family of Medium Tactical Vehicles (FMTV) successfully achieved First Unit Equipped (FUE) in FY96. However, the age and condition of older 2-1/2 and 5 ton trucks, and the slow rate at which FMTV will be fielded (resource constrained), will keep the overall medium fleet rated **AMBER** throughout the period.

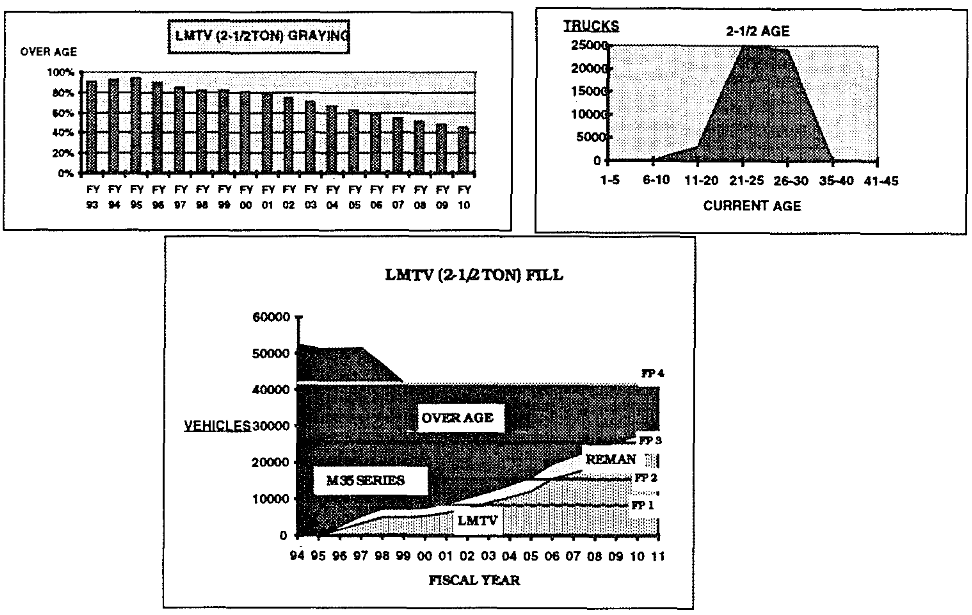
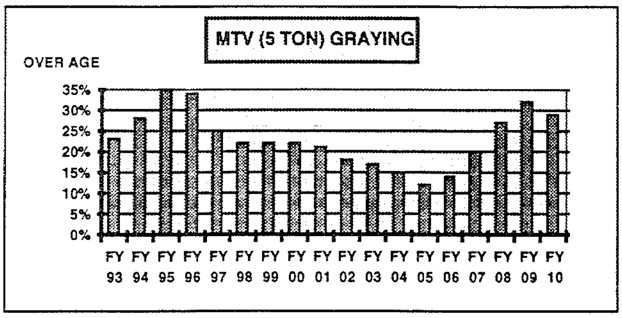
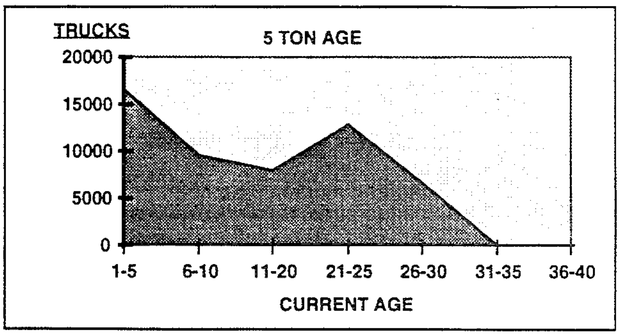


Figure H-8

2-1/2 Ton. This fleet assessment is **RED** for older trucks and **AMBER** for newer trucks. Figure H-8 shows the slow acquisition of LMTV, and a modest remanufacture program combined fail to replace all currently over aged assets. If funding for LMTV does not increase, the 2-1/2 ton fleet will remain **AMBER** well into the 21st Century.





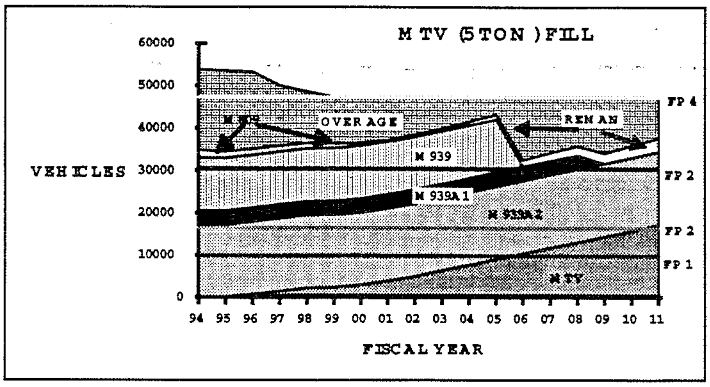


Figure H-9

5 Ton. This fleet assessment is **AMBER** in the near-term because of the newer models introduced in the 1980s. This procurement has, however, resulted in multiple models having little commonality. The funding level for the 5 ton variant of the FMTV is far below the requirement. Even the start of a 5 ton ESP program coupled with MTV procurements fails to prevent the fleet from being rated **AMBER** in the long term as can be seen in figure H-9.

Yard Tractor. This fleet assessment is **RED** throughout the near-, mid- and far-terms. All yard tractors are over age. There is no funding to procure any at this time. The Army has a requirement for 435 and has 195 on hand. Yard tractors are critical force projection vehicles. They are used to off load the PREPO ships.

Heavy Fleet Assessment. This fleet consists of the PLS, HEMTT, Line Haul Tractors (M915), Engineer Tractors (M916 and M920), and HETS. The fleet assessment is **GREEN** overall, and remains so until 2005. However, critical PLS, HEMTT wrecker and tanker, shortages continue to exist because of resource constraints.

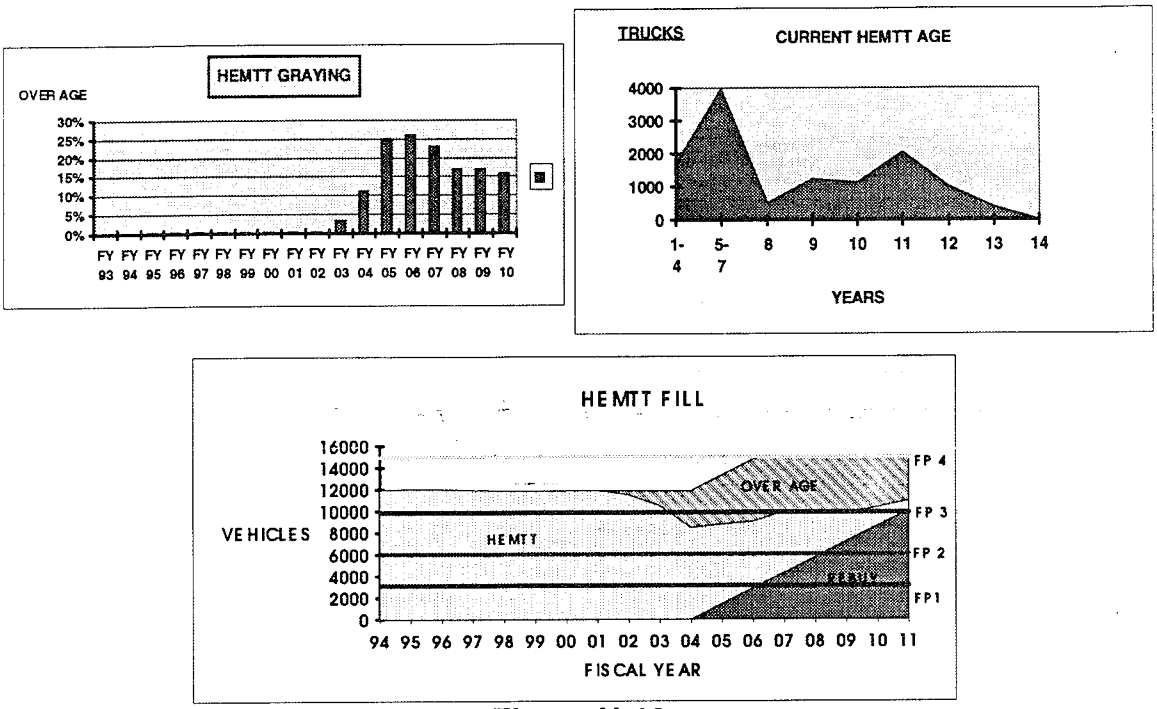
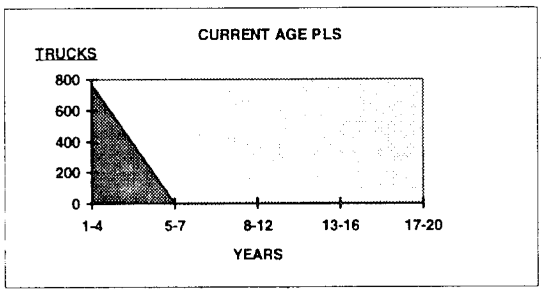


Figure H-10

HEMTT. This fleet assessment is **AMBER** throughout the period because the percentage of fill is 80% and only limited procurements are resourced. This highly mobile family of vehicles provides the bulk of the Army's rearm and refuel capability for major weapon systems such as tanks, MLRS, Bradleys, and Attack Helicopters. Key combat power is closely tied to the capabilities and availability of HEMTTs. The HEMTT is being equipped with a load handling system for transport of Improved Ribbon Bridge. This same load system is currently undergoing tests to determine its utility as part of CASCOM's new Battlefield Distribution System (BDS) doctrine.

NONE OVER AGE IN TIME PERIOD.



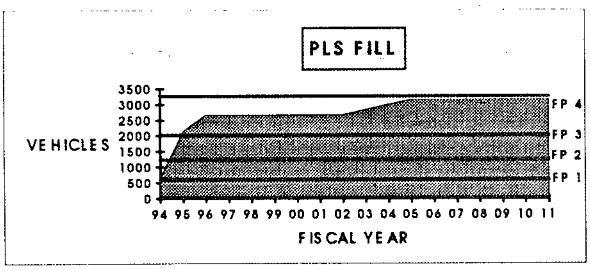


Figure H-11

PLS. This fleet assessment is **GREEN** throughout the period. Production is scheduled to end in FY96. Without additional production these assets will not be available to load on the PREPO ships when they come on line. Other uses of PLS are being tested by CASCOM. In FY97 the Army will procure container handling units for PLS so that it can pick up any 20 foot envelope on the battlefield. The PLS demountable cargo beds called flatracks are rated **RED** because they are short of the two MRC requirement until 2007.

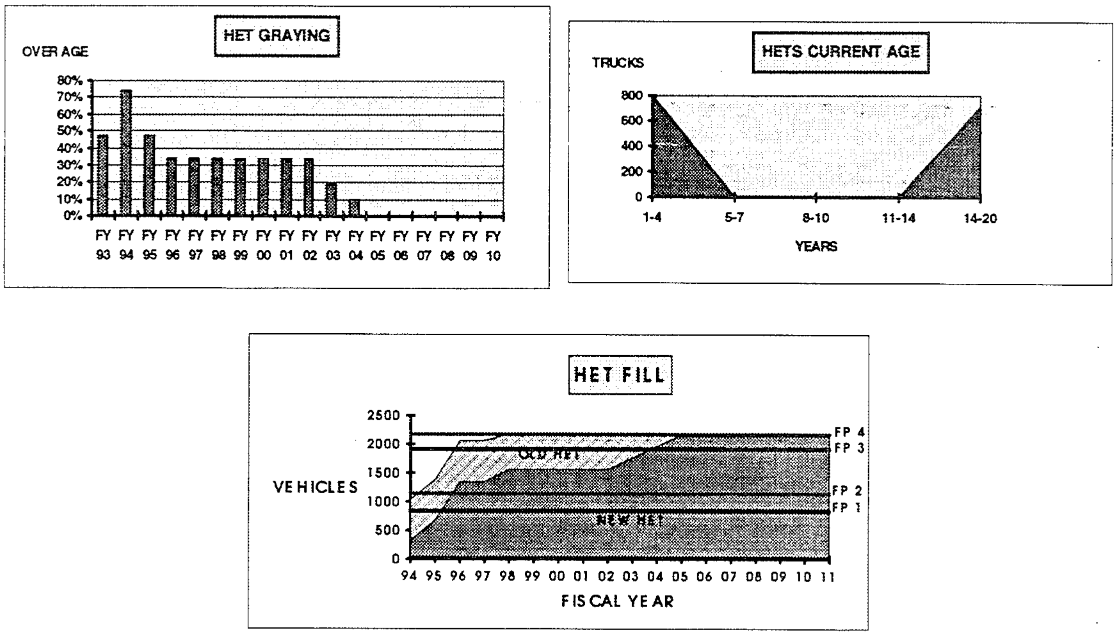


Figure H-12

HETS. HETS are assessed **AMBER** in the near- and mid-terms and assessed **GREEN** the far-term. The new HETS have an EUL of 20 years compared to the old HET EUL of 14 years. Because of procurement shortfall in the POM the Army does not have sufficient HETS to meet PREPO ship requirements and other preposition brigades sets as well.

Heavy Repair Vehicle (HRV). The HRV could provide a capability of fix forward for maintenance units. Although Congress authorized FY 94 funds for HRV R&D, HRV procurement is not currently funded. A prototype was built and soldier tested.

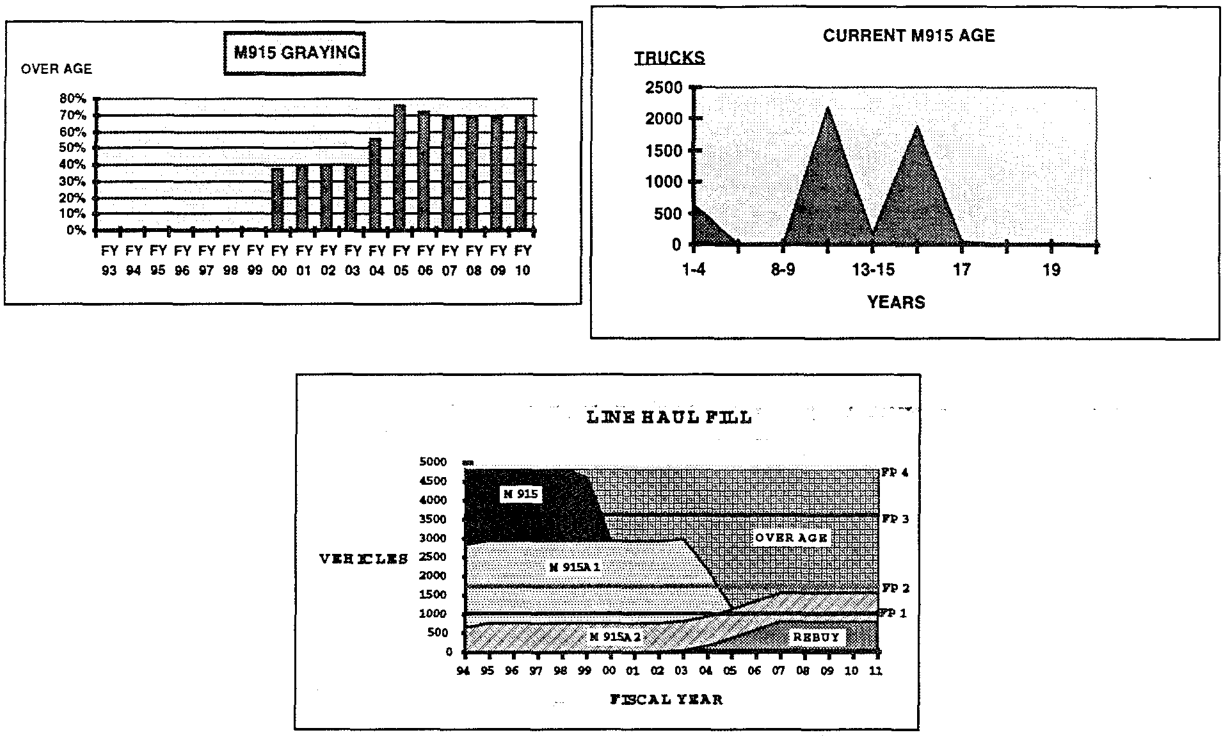


Figure H-13

Line Haul Tractors. The line haul tractor fleet is assessed **GREEN** in the near- and mid-terms. The M915 line haul tractors operate at Echelons Above Corps (EAC). The M915 is in need of an upgrade because of heavy use. Long-term the fleet will become **AMBER** due to age, condition, and lack of sufficient replacements. The use of dedicated procurement funds by the National Guard and U.S. Army Reserve for these vehicles have kept the fleet as healthy as it is.

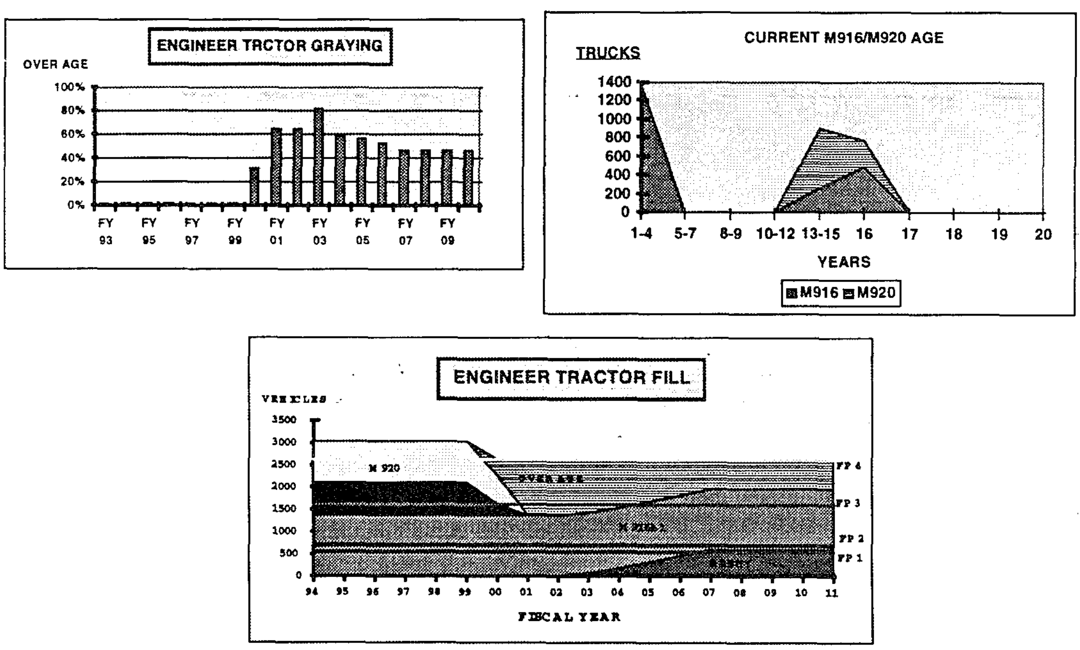


Figure H-14

Engineer Tractors. This fleet is assessed **GREEN** in the near-term but changes to **AMBER** in the mid- and far-terms because the fleet becomes overage. The Engineer tractors were procured as part of the M915 family and share similar aging characteristics. Many of the newest group were acquired via the Reserve Components Dedicated Procurement Program. Procurement scheduled in the EPA help to maintain this fleet in adequate numbers.

Trailer Assessment

Trailers and Dolly Sets. Previously, with the exception of a few specific trailers (e.g., the HET) trailer funding has historically come from Congressional budget marks. The Army has increased its support for these critical, but often overlooked, key items of logistic support. However, overall, the trailer fleet does not meet either quality or quantity requirements, has too many models, and is severely over-age, creating excessive Operation and Support (O&S) burdens. With the increasing use of containers to move both unit equipment and sustainment supplies, the Army is in crucial need of 40 and 20 foot container transport. Additionally, future trailer procurements should focus on reducing trailer proliferation by using the same trailer body for multiple applications. The Army is short trailers for corps and division transport of cargo and fuel.

Retirement Program Update. The 1989 Tactical Wheeled Vehicle Modernization Plan (TWVMP) established a vehicle retirement policy and an execution program. This program eliminates selected vehicles with performance deficiencies, effects a reduction in Operation and Support (O&S) costs, and capitalizes on advantages of reducing the variety of vehicle makes and models. The program benefited the Drug Law Enforcement Assistance Program (DLEA) by transferring excess vehicles to help local civil law enforcement agencies. Many of the vehicles disposed through this program are sold through Foreign Military Sales (FMS). The retirement program is under study. New goals and direction will be published separately in March 1996.

POM Summary

POM funding, and what it does and does not do for each fleet, is shown in Figure H-15.

LIGHT FLEET

DOES	DOES NOT
PROCURE UP ARMORED HMMWV. PROCURE THE ASV. HMMWV ESP	REBUY THE CUCV.

MEDIUM FLEET

DOES	DOES NOT
STRETCH FMTV PROGRAM. 2-1/2 ESP 5 TON ESP	START NEW CONTRACT UNTIL FY 99. FILL FP I UNTIL EPA.

HEAVY FLEET

DOES	DOES NOT
PROCURE SOME HETS FOR PREPO SHIPS. ADDITIONAL FLATRACKS AND CONTAINER LIFT KITS. PROCURE HEMTT	PROCURE PLS FOR ADDITIONAL ARTILLERY BRIGADE CONCEPT OR FOLLOW ON USES. PROCURE HEAVY LINE HAUL AND ENGINEER TRACTORS. PROCURE UPGRADE FOR ANY HEAVY VEHICLES.

TRAILERS

DOES	DOES NOT
PROCURE SUPPLY VAN. PROCURE HMT. PROCURE M871 TRAILERS. PROCURE M1061 TRAILERS. PROCURE M1022A1 DOLLY SETS. PROCURE SOME FMTV TRAILERS.	PROCURE OTHER TRAILERS. 5,000 GALLON FUEL TANKERS. PROCURE CONTAINER/ EQUIPMENT TRANSPORT TRAILERS.

Figure H-15

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

General. The overall strategy of acquiring new TWVs is through Non Developmental Items (NDI) acquisition programs. The NDI approach permits leveraging of commercial technology. The idea is to encourage the use of "dual use" technology.

Science and Technology Strategy. Although the majority of the Army's TWV requirements can be met by technology embedded in the commercial truck industry, there are some unique military applications which have insufficient commercial interest to be pursued by industry. The Military TWV, unlike its commercial counterpart, must be capable of operation under the most extreme environmental conditions, under hostile fire, and be maintained in the most austere conditions. Therefore, the Army must also explore ways to improve vehicle performance.

National Automotive Center (NAC). Many dual use programs in government, industry, and academia can contribute to TWV. The Army is developing state-of-the-art automotive technologies for combat systems that also relate directly to improvements in tactical and commercial wheeled vehicles. Recognizing this, and with assistance from the Congress, the Army established the NAC in FY93. The NAC, located at TARDEC, serves to accelerate the development and integration of dual use automotive technologies, and to encourage collaborative research and development (R&D) among the government, industry, and academia. Its strategic thrusts are to identify and pursue dual use technologies and processes that offer significant performance and cost payoffs. Efforts are focused on advanced propulsion systems; adaptive controls; light weight materials; polymeric composite structures; silicon carbide power electronics; onboard sensors, displays and other automated vehicle systems; virtual prototyping tools; energy storage devices; rapid, flexible manufacturing; and flexible assembly systems. Technologies in any of these areas could be applied to TWV to enhance performance or reduce ownership costs.

Modernization Goals. The Army is in some phase of TWV modernization continuously. Rarely are funds sufficient to modernize in a timely manner or to modernize all of any particular fleet at once. The Army's modernization strategy includes precepts such as:

- Fill essential battlefield requirements with capable TWV;
- Control total fleet cost and reduce operating and support costs;
- Buy as much modernization as available funds will allow, and do so in a balanced way;

- Modernization via Extended Service Program (ESP). ESP can provide for technology insertion and extend the EUL of the vehicle. Ideally these programs occur at vehicle mid-life;

- Committment to complying with National Standards, such as the Federal Motor Vehicle Safety Standards (FMVSS) and the Environmental Protection Agency (EPA), for emission standards;

- Priority to "First to Fight". Prioritize the distribution of modernized vehicles and allocate shortages by Force Packages;

- Standardize. Acquire a fleet of standard vehicles where feasible to do so; and

- Industrial Base. Strive to retain an essential base of production.

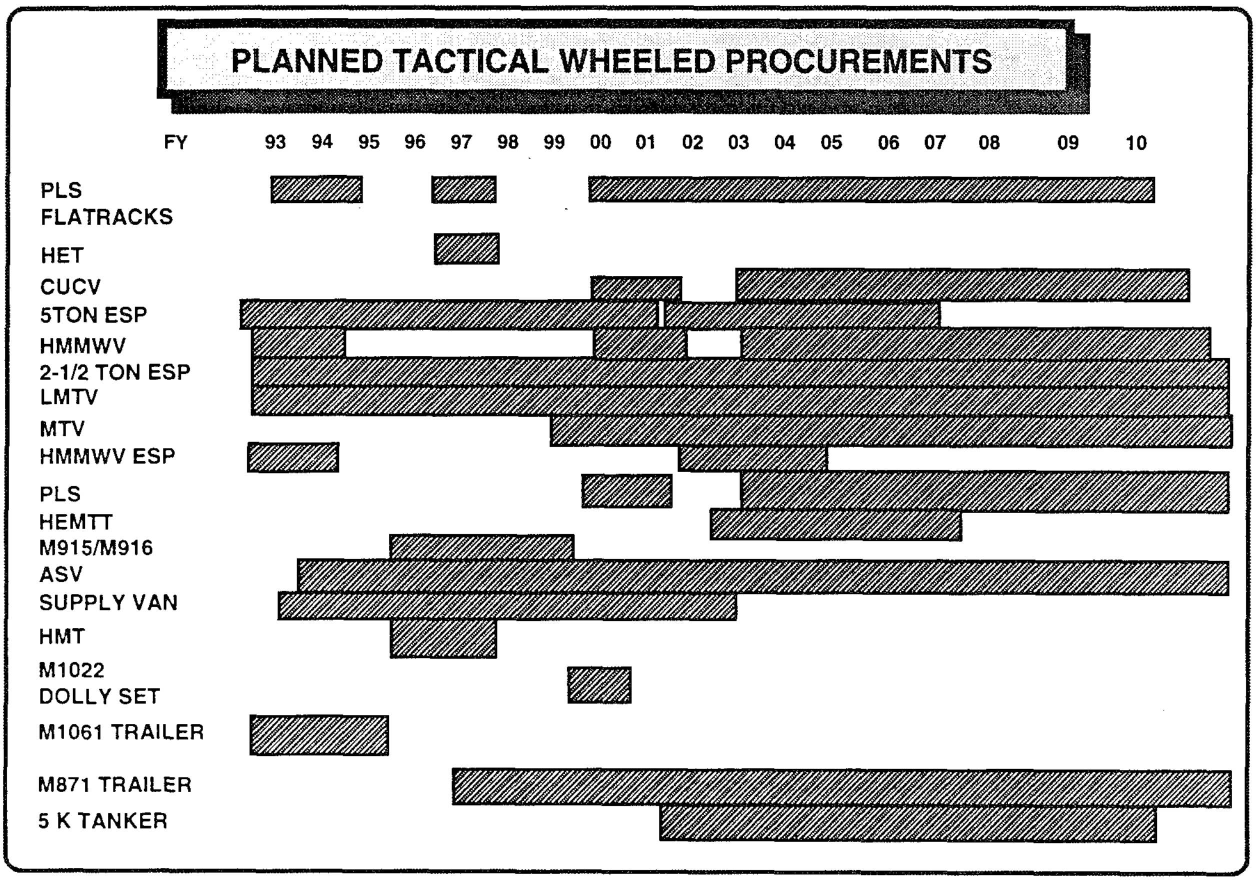


Figure H-16

TWV Programmed in the POM. Section 2 previously assessed how the POM and EPA funding affect the capability and relative health of each fleet segment. Shown in Figure H-16 is a pictorial representation of TWV procurements currently planned.

Modernization Strategies. There are basically two strategies for modernizing the whole or portions of the TWV fleet. First is modernization by replacement or "buy new." Most previous analysis has shown this to be the least cost alternative when all costs of ownership are considered. This alternative has the highest up front investment cost with the lowest operations and support costs. Lesser levels of modernization, may be achieved by upgrading current assets. This alternative has the advantage of having a smaller up front investment, but may not achieve the same level of modernization as buy new.

Replacement Modernization Strategy. The Army's fleet replacement requirements are computed on the basis of Economic Useful Life (EUL). EUL is an estimate of the average age at which an asset is more cost effective to replace than retain. For example, the current 2-1/2 ton truck has an EUL of 20 years. The average 2-1/2 ton vehicle in the inventory is four years beyond that -- the point it should have been replaced. There is an O&S bill and an efficiency bill in keeping trucks past their EUL. What level of resources must be used to maintain the fleet at its ideal half-life? Various studies calculate $1.2B to $1.6B per year. A funding level of $600-800M per year is required to maintain acceptable levels of modernization.

ADDITIONAL FUNDS REQUIRED

PROGRAM	FY 97	FY 98	FY 99	FY 00	FY 01
FMTV	339	352	212	143	0
HEAVY TRUCKS (PLS, HET,HEMTT)	110	132	132	77	77
YARD TRACTOR	15	0	0	0	0
HMMWV	13.4	14.2	0	4.7	4.8
HMMWV UPGRADE	0	40	20	0	40
5 TON REMAN	0	50	40	20	27
2-1/2 REMAN	60	90	90	50	70
PLS FLATRACKS	0	30	60	24	19
TOTAL ($M)	537.4	708.2	554	318.7	237.8

Figure H-17

Upgrade Based Modernization Strategy. TWV, like all hardware systems, deteriorate with use. If replacement is not feasible when deterioration becomes a liability, or is cost prohibitive, other alternatives must be explored. Upgrade programs can address either the capability deficiencies or cost of ownership characteristics. ESPs extend the service life of candidate vehicles while addressing vehicle modernization shortcomings.

TWV Investment Strategy. Congressional language accompanying the FY 95 Defense Appropriations required the Army to report on its TWV Investment Strategy. Army planners struggled with the competing modernization strategy approaches (buy new vs upgrade) and developed a comprehensive Investment Strategy, based on complementary strategies of buy new and upgrade. The Investment Strategy, when adequately resourced, will satisfy the goals of achieving an affordable level of modernization, reducing support costs, and addressing the industrial base question.

Truck Industrial Base. As the Army and its budget downsize, concerns arise about the ability of the Army to continue its programmed TWV acquisitions from the industrial base. Perhaps equally important, are concerns over availability of the vendor base for repair part and component supply. The Investment Strategy at the $600-$800M level will meet these concerns.

Depot Rebuild and Overhaul Programs. Depot programs typically restore vehicles to their issueable condition (one that approximates the initial configuration of vehicles). Such a restoration/rebuild program can convert some TWV to other uses as well. The current depot program focuses on the heavy fleet.

Major Army Command (MACOM) Overhaul Programs. Army MACOMs can also develop programs to meet their specific needs. U.S. Army Forces Command has developed an innovative program that permits vehicle overhaul at minimum cost. The MACOM program adds life to the vehicle and provides units with an asset in better condition than it previously had.

Commercial Assets Mobilization (CAM) Program. The Army explored this earlier, but did not pursue it. However, the program is under consideration again. The program would permit the Army to lease commercial vehicles similar to those the Army uses in the heavy commercial design fleet. This program has the advantage that units would be able to train and be ready. The program would apply to lower priority units. Funding for the program is a problem. CAM requires procurement funds to lease vehicles, or operation and maintenance funds to procure vehicles. Innovative contracting methods and funding will be required.

Return from Europe (RETROEUR) Program. This program uses National Guard and Reserve repair sites to bring equipment returning from Europe up to fully mission capable standards. The Army is using this program to fill unit shortages. The Army National Guard, Army Reserve, and high priority Active Component units benefit from this program.

SECTION 4

CONCLUSION

> ***"Sometimes soldiers like me need to be reminded that trucks are as important as tanks"***
> General Norman Schwarzkopf

This Army Modernization Plan reaffirms the goals, objectives, and fleet architecture of the Army TWV Modernization Plans since 1989. Changes described here primarily relate to changes ascribed to the TWV Investment Strategy and funding adjustments. The long held goal of TWV Modernization - to provide TWV capable of fulfilling future battlefield mission requirements at an affordable cost of ownership, remains unchanged.

TWV funding in the POM remains below that required on an annual basis. The out years look good, but it is the now that has the greatest impact on the fleet. The following chart provides visual summation of what the fleet is (and will be) like, based on current funding.

FLEET AVERAGE AGE 1995 vs END POM/EPA

VEHICLE	ECONOMIC LIFE	MAX FLEET AVG AGE OBJECTIVE	FLEET AVERAGE AGE 1995	FLEET AVERAGE AGE 2011
CUCV	12	6	9.2	25
HMMWV	14	7	5.2	12.4
SUSV	15	7.5	5.8	21.7
M151	15	N/A	17.7	N/A
M880	7	N/A	17.1	N/A
2-1/2 TON	20	10	25.1	21.5
5 TON	22	11	13.8	16.5
PLS	20	10	0.5	14.6
HEMTT	20	10	8.0	8.5
ENG TRAC	20	10	10.8	21.6
LINE HAUL	20	10	11.1	25.7
HET	14	7	8.6	12.0
YARD TRAC	10	5	14.9	29.9
TOTAL AVG		8.9	11.8	15.8

Figure H-18

ANNEX I

LOGISTICS

SECTION 1

INTRODUCTION

"Logistics comprises the means and arrangements which work out the plans of strategy and tactics. Strategy decides where to act; logistics brings the troops to this point."
General Antoine Henri Jomini - Summary of the Art of War

Logistics supports mobilization, deployment, reception, movement, sustainment, reconstitution, redeployment, and demobilization of military forces across the full range of military operations. Logistics at all levels delivers effective and decisive combat power focused on the tactical level. The Army's logistics modernization objective rests on projecting the force, sustaining the force, and providing core support to the force.

Strategic logistics includes the nation's industrial base and its link to military forces. Private sector support for warehousing, maintenance, and materiel management, closely linking the Army to the sustainment base, results in significant reductions in Army managed stockpiles of supplies and materiel.

Operational Logistics ties strategic capabilities to tactical requirements. Support is required to sustain Army, joint, and multinational campaigns in any future conflicts from general war to operations other than war. Future organizational structure consists of Army Combat Service Support (CSS) units with modernized equipment, augmented by DoD civilians, contractors, and host nation resources. Logistics at this level focuses on reception, discharge, onward movement of forces, positioning of facilities, materiel management, movement control, distribution, reconstitution, and redeployment.

Tactical Logistics combines all logistics activities that sustain soldiers and their systems. Military units are the majority of the logistics organizations at this level; however, DoD civilians and contractors have a significant role to play. Tactical logistics focuses on manning, arming, fueling, fixing, moving, and sustaining soldiers and their equipment. Planners can tailor CSS forces for future modular organizations to match deploying force needs.

The Army traditionally provides distribution support to other services, multinational forces, and sometimes, directly to civilian populations. These roles are expected to expand. The Army continues to develop doctrine and force structure to effectively and economically provide logistics tailorable for any contingency.

SECTION 2

CURRENT PROGRAM ASSESSMENT

> *"Without supplies neither a general nor a soldier is good for anything."*
> Clearchus of Sparta: Speech to the Greek army in Asia Minor

Project The Force

Airdrop Delivery Systems. Improved airdrop delivery systems are required to increase our force projection capability and to sustain forces throughout the range of military operations. Precision guided cargo systems are required to accurately deliver warfighting and sustainment provisions as well as reduce aircraft vulnerability and the numbers of aircraft needed to conduct airdrop operations. Improved airdrop systems can increase cargo capability to nearly double the current tonnage per aircraft, per pass, thereby maximizing aircraft capacity and reducing dispersion on the drop zone. Enhancements to cargo and personnel systems are required to: reduce complexity and labor intensity; improve readiness; increase the probability that materials delivered will land in usable condition; increase the survivability of aircraft and crew; and increase accuracy and weight capacity of delivery systems. Low cost, disposable cargo systems are required to reduce the cost of humanitarian aid and disaster relief airdrop operations.

PROJECT THE FORCE - PROGRAM ASSESSMENTS

SYSTEM/MDEP	NEAR-TERM FY96-98	MID -TERM FY99-01	FAR-TERM FY02-11
AIRDROP DELIVERY	AMBER	AMBER	AMBER
AIRLIFT	AMBER	AMBER	GREEN
DEPLOYMENT OUTLOAD (RAIL CARS)	AMBER	AMBER	GREEN
LOGISITICS-OVER-THE-SHORE	RED	RED	RED
SEALIFT	RED	AMBER	GREEN

Figure I-1

AIRDROP DELIVERY SYSTEM

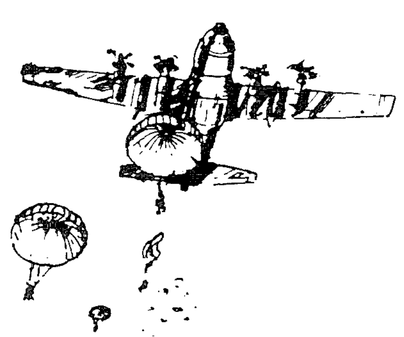


Figure I-2

The assessment for near-, mid- and far-terms is **AMBER** for reasons of inadequate funds for research and development, and procurement. Funding constraints delay research and development of the 500' cargo airdrop systems required by early entry forces for rapid insertion of essential warfighting equipment; the parachute jettison system which enhances the safety of cargo airdrop operations; and the family of advanced precision airborne delivery systems, needed for precise delivery of resupply for early entry force sustainment.

Airlift. Airlift is part of the strategic deployment triad of airlift, preposition equipment, and fast deployment ships. The Mobility Requirements Study and Mobile Requirements Study Bottom Up Review Update determined that 120-140 C-17 Aircraft were required for force projection. The current procurement plan is for the Air Force to procure 120 aircraft. The C-17 is really three planes in one. Its length and wingspan are comparable to the C-141 but lifts twice the payload. It carries outsized equipment over intercontinental distances and does it more efficiently than the C-5. It can operate on the same airfields as the C-130 but carries four times the payload. The C-17 is operational with the Air Force. Near- and mid-term is rating is **AMBER**. Once the 120 planes are procured in will be **GREEN** in the far-term.

Deployment Outload Rail Cars. Rail cars are required at predetermined locations for initial outload of the first deploying units and equipment. Commercial rail carriers cannot provide needed equipment within the first seven days of mobilization. Various types of rail cars are required for Force Package 1. Requirements include cars prestaged at the installation of the Initial Ready Brigade, commercial cars for the tank plant, free running system rail cars, and rail cars for depots. 1,945 rail cars are required for Force Package 1. Currently 829 are on hand or on contract. The remaining rail cars required are programmed to be procured by FY01. This is an integral part of the Army Strategic Mobility Program. Current and projected on-hand shortages cause the near-term and mid-terms to be rated **AMBER.** The projected funding fully supports the rail car procurement for Force Package 1, causing the far-term rating of **GREEN.**

Logistics-over-the-Shore. Army watercraft missions are diverse, dynamic, and demanding. The Army is required to maintain the capability to discharge personnel and equipment from vessels regardless of port availability or condition. Strategic sealift delivers over 95% of the equipment required by operating military forces. The Army watercraft program is the critical link when that tonnage is projected over the shore, through fixed ports not accessible to large vessels, or fixed ports that are not adequate without the use of Army watercraft. Logistics-over-the-Shore equipment requirements include vessels designed to transport cargo between the strategic sealift ship and a pier, beach or other watercraft; and floating utility craft such as floating cranes, tugs, barges, floating piers and floating discharge platforms. Figure I-3 shows a detailed comparison of equipment requirements, on-hand and projected procurement.

The Logistics-over-the-Shore equipment currently funded, but pending fielding and programmed procurements from FY97 to FY01, include five floating cranes, five pusher tugs, eight causeway ferries, five causeway piers, and 23 lighter amphibious resupply cargo boat upgrades. The Army Reserves will fund one floating crane.

There is currently no on-hand capability, nor programmed procurement of Roll-on/Roll-off Discharge Facilities. These floating discharge platforms provide the vital link to allow wheeled vehicles to drive on and off the strategic sealift ships when fixed ports are not adequate or available. This shortfall results in a requirement to lift all cargo on and off the strategic sealift vessel and greatly increases discharge time requirements.

		SYSTEM	RQMT	EXISTING	POM	COMMENTS
SHIP HANDLING	& DISCHARGE	RO/RO DISCHARGE CAUSEWAY	9	NONE	NONE	$13.4M CUT IN FY 95
		TUGS				
		100 FT	0	19	NONE	RETAIN IN LIEU OF 128 FT
		128 FT	21	6	NONE	
		CRANES				
		115 TON	6	NONE	5	USAR PROCURING 1
		89 TON	0	10	0	AVE AGE: 39 YEARS RETAIN IN LIEU OF 115 TON
SHIP TO SHORE	MOVEMENT	TUGS				
		45 FT	0	2	NONE	AVE AGE: 40; IN LIEU OF PUSHERS
		65 FT	0	11	NONE	AVE AGE: 40; IN LIEU OF PUSHERS
		PUSHER	19	6 (LEASED)	5	
		LCUs				
		LCU-2000	54	35	NONE	
		LCU-1600	4	13	NONE	RETAIN IN LIEU OF LCU-2000
		LCMs				
		LCM-8-MOD0	0	25	NONE	RETAIN IN LIEU OF LCM-8-MOD1
		LCM-8-MOD1	108	89	NONE	AVE AGE: 25 YEARS
		LARC-LX	23	23	NONE	UPGRADED IN POM; AVE AGE: 32 YRS
		LSVs	6	6	NONE	
		CAUSEWAYS				
		FERRY	17	NONE	8	
		PIER	6	NONE	5	
CMD & CNTRL/	LOGISTICS	LOGISTICS SERVICE CRAFT	19	NONE	NONE	
		FERRY HARBOR	3	3	NONE	
		PATROL BOATS	8	8	NONE	
		J/Q/T BOATS	4	4	NONE	
		FMS	3	3	NONE	AVE AGE: 41 YEARS

Figure I-3

The Army's top watercraft research and development objective is to obtain the capability to continue to discharge strategic sealift in adverse sea conditions. This priority is supported by the CINCs, the Joint Staff, and our sister Services. There is currently no programmed funding for Logistics-over-the-Shore research and development in FY 96-98, FY 00-01. Near, mid and far-term are rated **RED** due to severe shortages of required watercraft and craft average age.

Sealift Capability. The Army supports the U.S. Navy's acquisition of strategic sealift. Figure I - 4 shows, by vessel categories, FY01 end state requirements. Afloat prepositioning requires one brigade task force set, one theater opening unit equipment set, 30 days of supply to support early deploying divisions of the contingency corps, and a port opening set. The requirement for prepositioning can be met by large militarily useful vessels from the commercial market. Surge sealift requires vessels to move two heavy divisions to overseas locations within 30 days and with no more than 1/9th of a division at risk on any one ship. Finally, the sustaining sealift shipping must establish a sea line of communication within 30 days. Strategic sealift assets are operated by the Military Sealift Command, a component of U.S. Transportation Command. Near-term program is rated **RED** due to the lack of dedicated, or available sealift vessels. This condition will improve upon receipt of the five large medium speed Roll-on/ Roll-off conversion ships, fourteen new large medium speed Roll on/ Roll off ships, and five Roll-on/ Roll-off ships. As a result, the mid-term rating will be **AMBER** and the far-term **GREEN**.

CATEGORY	TYPES OFSHIPS	RQMT	FUND	UNFUND	IMPACT/REMARKS
AFLOAT PREPOSITIONING	AUXILARY CRANE	1	1		
	LIGHTER ABOARD	3	3		VESSELS ARE LEASED BY ARMY
	CONTAINER	2	2		VESSELS ARE LEASED BY ARMY
	HEAVY LIFT PREPOSITIONED	2	2		PROJECTED TO LEASE 2D VESSEL FY 98/99
	LARGE MEDIUM SPEED ROLL-ON ROLL-OFF	8	8		
SURGE	FAST SEALIFT	8	8		
	LARGE MEDIUM SPEED ROLL-ON ROLL-OFF	11	11		
	ROLL-ON ROLL-OFF	36	31	5	29 SHIPS ARE OPERATIONAL 2 SHIPS NEED MODIFICATION 5 SHIPS ARE PROGRAMMED IN FY96/97 TO BE PROCURED BY NAVY 21 SHIPS EARMARKED FOR ARMY
SUSTAINMENT	READY RESERVE FORCE SEALIFT	VAR			RUN BY NAVY; REQUIREMENTS UNKNOWN
	CHARTERED COMMERCIAL (INCL FOREIGN)	VAR			REQUIREMENTS UNKNOWN

Figure I-4

Sustain The Force - Automation

Combat Service Support Control System. One of the five principle information systems supporting the Army Global Command and Control system, connected by the Army Tactical Command and Control System. This key component of the Army Battle Command and Control System incorporates capabilities which provide logistical near real time situational awareness from brigade though corps level. The system replaces an unstructured, slow, labor-intensive manual system not at all responsive to present day battlefield command and control requirements. Automatic connectivity between the system and onboard consumption sensors associated with the digital appliqué and communications eliminates the need for manual input from logistical, medical, financial, and personnel systems. This is a key piece of FORCE XXI logistics digitization. The Army Battlefield Command System cannot fully achieve the objective force level operational capability until the Combat Service Support Control System is fielded. Fielding to the contingency force will occur by FY01.

SUSTAIN THE FORCE - PROGRAM ASSESSMENTS

AUTOMATION

SYSTEM/MDEP	NEAR-TERM FY96-98	MID -TERM FY99-01	FAR-TERM FY02-11
COMBAT SERVICE SUPPORT CONTROL SYSTEM	AMBER	AMBER	GREEN
CORPS/THEATER ADP SERVICE CENTER -II	RED	RED	RED
LOGISTICS TECHNOLOGY	GREEN	GREEN	GREEN
STANDARD ARMY MANAGEMENT INFORMATION SYSTEMS COMPUTER	AMBER	AMBER	AMBER
TOTAL DISTRIBUTION PROGRAM	AMBER	AMBER	AMBER

Figure I-5

The near-and mid-term program is rated **AMBER** due to extended procurement duration. Reduced procurement slows the conversion to integrated, automated decision-making capabilities, and causes combat service support commanders in Force Packages 2 and 3, Army National Guard, and Army Reserve units to use less efficient, slower, manual information management tools. Programs for the far-term will increase procurement, hence the **GREEN** rating.

Corps/Theater Automation Data Processing Service Center - Phase II. The Block I version is a ruggedized, tactical, general purpose computer system designed to provide information processing support for logistical and medical combat service support applications at corps and theater levels. This system, consisting of three commercial utility trucks, three trailers, a tent, a minicomputer, and remotes, provides a mobile, survivable, and transportable data processing service center for tactical combat service support units. The software used in this configuration is the standard Army retail supply system and the Army medical management information system. This system replaces some Phase I decentralized automated service support systems and all corps/theater automation data processing service centers.

The Block II version has a split-based operations configuration with fly away capability. The mini-computer at the sustainment base is connected by various communications modes to microcomputers and laptops in the area of operations. Fly-away boxes provide corps-wide asset visibility and a remote query capability.

The Block II version is unfunded after FY95. Block I version of the system has been fielded to the Total Army for medical information software and to Force Packages 2 and 3 for supply information software. Block II version, a component of split-based operations, was fielded to Force Package 1 after a successful initial operational test and evaluation. Funds are being requested under the Total Distribution Program for active Army and reserves and under National Guard for their systems. The near-, mid- and far-term program is rated **RED**, since funding of the split-based operations configuration is uncertain. If funds are received, the whole program will be rated **GREEN**.

Logistics Technological Systems. Microcircuit Technology in Logistics Applications is being used for sustainment operations throughout the Army. This program consists of the Automated Manifest System and Radio Frequency Technology.

Automated Manifest System automates data entry of shipping manifests for containerized materiel using laser optical cards. These credit card size devices made of materiel similar to compact disks are placed on seavan containers and air pallets. Radio frequency technology permits rapid and accurate data capture, retrieval and transmission of supply and transportation data of container/pallet contents. It provides inside the box visibility and in-transit visibility tracking. These tags are the electronic equivalent of a barcode label. Tags are attached to containers and are read by interrogators as they pass through specific nodes. This capability, used in conjunction with satellite tracking and communications systems, allows in-transit visibility even in austere environments.

The total program is rated **GREEN**. This technology is being implemented at Contingency Corps, Europe, National Training Center, and several CONUS locations. Assuming present funding levels are retained, it will be fielded Army wide by FY02.

The Standard Army Management Information Systems Computer Platform. This program provides commercial off-the-shelf systems in support of combat service support missions. This computer platform replaces the current tactical Army combat computer systems, some decentralized automated supply service systems, and manual systems. These transportable, user friendly systems provide improved accuracy, timeliness, handling, and transmission of personnel, logistical, and medical data compared to manual systems. The near-term goal is to field to Force Packages 1 and 2. The mid-term goal is to field to the Total Army. Far term program completes cyclic fielding every eight years vice five years, the optimum.

Requests are neither timely, nor accurate due to the absence of real time systems interfaces and information sharing among existing systems. Human operators must extract data from one system and key it into another creating bottlenecks. Users of the current automated systems must use couriers to transport floppy disks across the battlefield to perform combat service support missions. Where automation exists today, the flow of information is impeded by a mix of various computer hardware systems, software languages, and operating systems, as well as by the lack of communication from users in the forward areas to the CONUS. Various major and special commands have developed their own unique systems to support combat service support; however, these systems do not interface with the standard systems. For the near-, mid-, and far-terms this program is rated **AMBER** due to procurement limitations extending the optimum five year replacement cycle to eight years. Increased funding will allow the five year cycle and the whole program would be rated **GREEN**.

Total Distribution Program. This program will provide asset visibility from "Factory to Foxhole". The program's key objective is developing an objective distribution system. The foundation of the Total Distribution Program is the Total Distribution Action Plan which identifies 140 issues with milestones for implementing corrective actions. Fifteen Army and Joint agencies are responsible for the issues. Of the original 140 issues, 23 have been identified as critical and are being intensively managed. They focus on: developing an assured logistics communications capability connecting the theater of operations with the sustaining base; supporting essential materiel handling equipment and transportation requirements; linking logistics information systems; developing in-container, in-transit, and in-process asset visibility. The Total Distribution Program is funded to resolve five specific issues:

First, the Mobile Gateway Van is a communications capability consisting of commercial off-the-shelf components, mounted in a tactical shelter on a High Mobility Multi-purpose Wheeled Vehicle. These gateways allow deployed units to receive and exchange unclassified test and data messages with supporting automated systems in the rear support area and sustaining base. The first two have been fielded to a theater level signal brigade providing communications, as well as resources to meet contingency operations needs. Three more gateways are being assembled for fielding to theater level signal brigades. This capability will satisfy urgent requirements until an In-line Network Encryption device can be fielded.

Second, Combat Service Support Automated Information System Interfaces and block asynchronous transmission software are designed to electronically exchange information with other tactical and sustaining base automation systems. A total of 480 interfaces are required, including 55 per corps and 10 per division. Standard Army Management Information Systems will be modified for interfaces between the systems. 65 interim interfaces have been issued to XVIII Corps and will be replaced with newer versions in FY96.

Third, the Army is modernizing its theater communications systems via digital technologies. For the communication pathways and networks to work, tactical area communications systems are needed. Integral to these systems are large capacity switches that direct both voice and data through circuit and packet switching. The Army has a total requirement for 66 switches to support two simultaneous MRCs. The Army has converted and fielded 49 of the required 66 switches; 16 switches need to be converted to handle packet switch capabilities. The conversions will occur FY95-98.

Fourth, Total Asset Visibility/Intransit Visibility provides materiel managers with information on location, quantity, condition and movement of assets. Total asset visibility software was installed throughout the Army at installations, depots, and arsenals. There are 311,482 items that are now provided visibility and more than 3800 managers throughout the Army have the capability. Contingency Force and Force Package 2 were fielded in FY95. The Total Army will be fielded by FY03.

Fifth, microchip technology (discussed under logistics technology).

The total program is rated **AMBER**. Execution of the program will be extended in the FY97-01 period due to significant funding decrements. The Army will not be able to provide key links in the communication network extending the TAV capability to the tactical logistician. If funding is restored, the program will be rated **GREEN**.

Sustain The Force

Combat Service Support Equipment. These systems provide for the personal needs and sustainment of troops in the field and are essential to maintaining the soldier's morale and quality of life. Current programs include the Laundry and Dry Cleaning System, the Family of Space Heaters, the Containerized Self Service Laundry, the Family of Field Latrines, the Army Field Feeding System-Future, and Soft Shelter programs.

SUSTAIN THE FORCE - PROGRAM ASSESSMENTS			
SYSTEM/MDEP	NEAR-TERM FY96-98	MID-TERM FY99-01	FAR-TERM FY02-11
COMBAT SERVICE SUPPORT EQUIPMENT	AMBER	AMBER	AMBER
FORCE PROVIDER	RED	RED	GREEN
PETROLEUM DISTRIBUTION EQUIPMENT	RED	RED	RED
TACTICAL RIGID WALL SHELTER	AMBER	AMBER	AMBER
WATER MODERNIZATION	AMBER	AMBER	AMBER

Figure I-6

The Laundry and Dry Cleaning System, now in development, is a water saving field laundering system that uses 240 gallons of water per day to launder 400 pounds of clothing per hour. The system consists of two 100-pound capacity commercial laundry machines mounted on a dedicated M-871 trailer, hauled by a tractor and powered by a 30KW tactical quiet generator. One system will replace four current laundry units in field service companies.

The Family of Space Heaters program, now in development, consists of four heaters: Space Heater-Small, intended for use with the newly fielded Soldier Crew Tent; Space Heater-Arctic, for use in Alaska and other cold climates; Space Heater-Medium, for use in general purpose and TEMPER Tents; and Space Heater-Connective, for use in the Modular Command Post System tent and other applications that require more accurate temperature control. These heaters operate cleanly, efficiently, and safely on the variety of fuels available on the battlefield, and need no external power sources.

The Containerized Self Service Laundry, also in development, consists of nondevelopmental, self-service type washing machines and clothes drying equipment that will allow soldiers in rear areas to wash their own personal clothing items.

The Family of Latrines program, under development, includes the Modular Initial Deployment Latrine, the Maturing Theater Latrine, and the Follow-On Latrine. The first latrine is programmed to be classified as a Common Table Of Allowance item. The other latrines are programmed to be stored in the Collective Support System Operational Project and be available to support CINC requirements.

The Army Field Feeding System-Future consists of a combination of new and currently fielded equipment which will provide the capability to prepare and distribute three hot meals including one A/B meal per day at the battalion level. It includes the Mobile Kitchen Trailer, Sanitation Center, Kitchen Company Level Field Feeding-

Enhanced, High Mobility Multi-Purpose Wheeled Vehicle, and High Mobility Trailer. Mobile Kitchen Trailers are currently fielded, and will be replaced on a 1 for 2 basis in FP1 units by the Containerized Kitchen, now in development.

Soft shelters support the warfighter in all areas of the battlefield from man-portable tentage for dismounted soldiers, and vehicle crew tents, to chemical/ biological hardened tentage for medical hospitals. Soft shelters provide protection from climatic extremes as well as battlefield threats, while minimizing weight and volume. Current programs include the Large Area Night Maintenance Shelter, Modular General Purpose Tent System, Lightweight Maintenance Enclosure, Ballistic Protection System, and Ammunition Solar Shades.

The family of Improved Environmental Control Units, currently in research and development, will offer better reliability, maintainability, and efficiency than currently fielded environmental control units, and will also use a non-ozone depleting refrigerant. These environmental control units are designed for the broad range of command and control intelligence electronic warfare tactical shelter applications, and are required for successful operation of sensitive mission critical equipment in adverse environments. FY98 production is currently planned.

Field heaters will be developed through a non-developmental effort which will provide 60,000 BTUH and 400,000 BTUH heaters for billeting and maintenance tents/ shelters. These heaters will also be used by combat armor and aviation units for readiness and maintenance of equipment. These will be electronically powered multifuel heaters, and will be used to replace dangerous and overage gasoline heaters currently fielded. The 400,000 BTUH heater is currently scheduled for FY00 production.

This program is rated **AMBER** for near-, mid-, and far-terms. Funding shortfalls have delayed the research and development of the Laundry and Dry Cleaning System, and soft shelter programs. Mid- and far-term funding is not sufficient to carry out planned field and food service equipment and soft shelter modernization program.

Force Provider. This collective support system contains all materiel necessary to provide quality food, billeting, hygiene services, and morale, welfare, and recreation activities for 550 soldiers. Facilities such as well lighted air conditioned tents, kitchens, showers, and latrines are included. The primary mission is to provide the front-line soldier a brief respite from the rigors of the combat theater. Additionally, it provides an increased capability for humanitarian aid, disaster relief, theater reception, and reconstitution missions.

Force Provider modules will be packaged and stored in shipping containers ready for operations and provide support above organic capability. Total requirement is 36 modules to support the Contingency Force. One module is presently at Guantanamo supporting U.S. military personnel engaged in the refugee relief operation, six are on the preposition ship Gopher State, six are positioned at Sierra Army Depot ready to support deployments, two are being assembled, and ten are programmed FY96-01. Shortfall is eleven modules. The program is rated **RED** through the mid-term due to a shortage of Force Provider modules; only 69% (25/36) of the requirement is filled through FY01. If programmed funds are received, rating goes to **GREEN** in the far term.

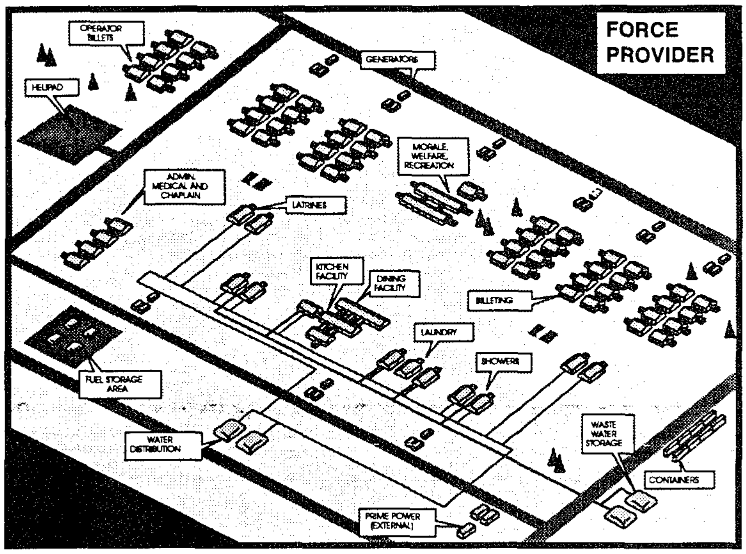


Figure I-7

Petroleum Distribution Equipment. This program provides the capability to perform battlefield sustainment operations including: receiving and transferring petroleum from trucks and ships, permanent and temporary storage facilities; movement of petroleum between storage to and within corps and division areas; quality surveillance testing, and dispensing in support of tactical operations, including rapid refueling of airfields. Systems to accomplish such operations include: the Inland Petroleum Distribution System; Fuel System Supply Point; Forward Area Refueling Equipment; Tanker Aviation Refueling System; and a variety of fuel pumps and collapsible tanks. These systems support the Army's mission to supply fuel for all land-based forces, including Marines and Air Force.

This program is rated **RED** for near-, mid-, and far-terms. A 40% shortage for the Inland Petroleum Distribution System critically impedes capability for operations in Southwest Asia and Korea. Current resources support only 80% of required Contingency Corps hoseline operations. Additional funds are needed to develop and procure a petroleum quality analysis system, a lightweight tactical fuel distribution system, Aviation Forward Area Refueling Systems, and Arctic Refueling And Supply Equipment.

Tactical Rigid Wall Shelters. Rigid Wall Shelters provide high quality workspace capable of sustaining, protecting, and transporting new and existing systems on the battlefield. Shelters provide a survivable and protected environment during chemical agent attack; provide protection against the effects of electromagnetic interference; and provide the mobility and transportability required for strategic and tactical deployments. A large number of battlefield systems depend on the capabilities of rigid wall shelters; such systems include command and control, medical, communications, maintenance, and field feeding.

Completing development in FY96 and entering production is the Standardized Integrated Command Post System, a vehicle mounted shelter which provides on-board power, environmental control, equipment racks, and lighting for tactical command and control systems. Also completing development and entering limited production is the Chemical/ Biological Protected Shelter, a rapidly deployable, hybrid rigid/soft shelter for forward medical treatment in a contaminated environment.

Current development programs include cargo bed covers which provide a family of low cost, securable enclosures for vehicles and trailers, and the large Standardized Integrated Command Post System Shelter, a mobile Corps or Division command post in an expandable shelter with power, environmental control, wiring, lighting, and up to eight workstations.

This program is rated **AMBER** for the near-, mid-, and far-terms due to inadequate research and development funding for current and future programs, and lack of production funding. Additional funding is needed to maximize shelter survivability against increasing threats, to incorporate preplanned product improvements, and to reduce shelter signature.

Water Modernization. The Army is the DoD executive agent for water production and distribution. To accomplish this mission effectively, improvements in water support and sustainment are required, for example, faster bulk distribution of water to unit trains and logistics transfer points, increased water storage assets, improved water packaging capabilities, and additional water purification capabilities. The Army requires additional 3,000 gallons per hour Reverse Osmosis Water Purification Units to fill requirements beyond the Contingency Force. In addition, the 600 Gallons Per Hour Reverse Osmosis Water Purification Units are approaching the end of their life expectancy and do not have capability to operate in cold environments or with sources of high salinity. They are scheduled to be replaced with a 1500 gallons per hour system on a one for two basis, reducing equipment and operator requirements while enhancing water purification capabilities for division and brigade units.

3000 GPH ROWPU

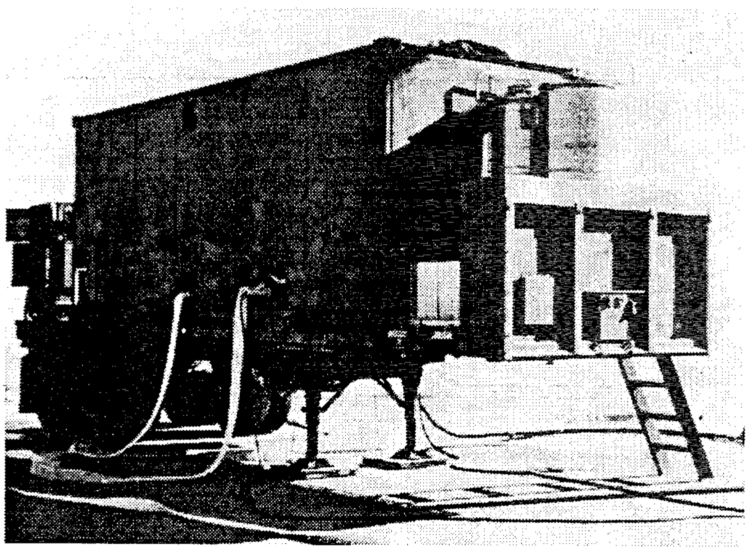


Figure I-8

Future water supply efforts will investigate hand held individual water purifiers with salt water purification capability and improved analysis capability to measure contaminants including NBC. New concepts for water supply such as recovery from engine exhaust, and atmospheric extraction will be investigated to reduce resupply and extend mission range in arid environments. Technologies for collecting and treating wastewater will be evaluated to reduce negative health and environmental impacts.

The assessment for this program for near-, mid-, and far-terms is **AMBER**. Water production and distribution equipment does not meet the total support and sustainment requirement. Procurement of the 3,000 gallons per hour Reverse Osmosis Water Purification Unit is sufficient only for the Contingency Force and training base. Research and development of a 1,500 gallons per hour Reverse Osmosis Water Purification Unit is required to meet brigade/division production requirements.

Core Support

Ammunition. This program consists of training and war reserve ammunition for the Army; and industrial facility support of conventional ammunition, demilitarization, and stockpile management (OMA funded) for all Services. In response to the FY 95-99 Program Review, the Army conducted a management and functional area assessment of conventional ammunition. The assessment was a detailed, comprehensive review of the entire life cycle process of ammunition. In ammunition modernization, the Army identified 17 modern war reserve items to provide threat overmatch capability. The Army was able to fund 12 of 17 items. Ammunition funding has improved but remains short of the Functional Area Analysis goals. Assessment for this area (less training) is **AMBER** for near-, mid-, and far-terms. Training ammunition is rated **GREEN** in near-term and **AMBER** in mid- and far-terms.

Explosive Ordnance Disposal. This program procures and develops specialized tools and test equipment required by soldiers to perform dangerous "render safe" operations on unexploded ordnance. Proper equipment enhances mobility, productivity, and safety of operations. Presently, fiberscopes and x-ray sets are available to replace antiquated tools and test items. But such equipment is also fast becoming outmoded. Improvements are required in the area of remote and robotic ordnance neutralization. The Navy is conducting research and development of these systems as the DoD executive agent. Modernization items include the remote controlled reconnaissance monitor, the remote ordnance neutralization system, and the mobile ordnance disrupter system. These

CORE SUPPORT - PROGRAM ASSESSMENTS

SYSTEM/MDEP	NEAR-TERM FY96-98	MID-TERM FY99-01	FAR-TERM FY02-11
AMMUNITION	AMBER	AMBER	AMBER
EXPLOSIVE ORDNANCE DISPOSAL	RED	RED	RED
INTEGRATED FAMILY OF TEST EQUIPMENT	RED	AMBER	AMBER
MAINTENANCE EQUIPMENT	RED	AMBER	RED
MATERIEL HANDLING EQUIPMENT	AMBER	AMBER	AMBER
TACTICAL ELECTRICAL POWER	AMBER	RED	RED
TEST MEASUREMENT DIAGNOSTIC EQUIPMENT MODERNIZATION	AMBER	AMBER	RED

Figure I-9

systems would replace the antiquated items currently in the field. However, due to funding constraints, the Army is not programmed to procure such items as they complete development. This program is rated **RED** for near-, mid-, and far-terms. No procurement funds are programmed to acquire improved explosive ordnance disposal equipment which is required for rapid and safe clearing of unexploded ordnance on the battlefield.

Integrated Family of Test Equipment. This program develops modular, reconfigurable automatic test equipment to satisfy test requirements across equipment commodities and to meet the operational readiness needs of sophisticated systems. It consists of commercial-based automatic test equipment ruggedized for field use and is intended to eliminate the spread of system unique automatic test equipment and reduce use of obsolete automatic test equipment.

The Integrated Family of Test Equipment standardization reduces support structure costs while replacing numerous currently fielded weapon system-specific automatic test equipment. A broad range of unique, weapon-specific test equipment is currently in the field: the land combat support system for TOW, DRAGON, and Shillelagh; test support system and electronic equipment test facility for aviation; and the electronic quality assurance test equipment for other weapons, communications, and electronics equipment. Generic test equipment reduces structure requirements and enhances readiness.

Such equipment isolates/repairs weapon system faults to the electronic line replaceable unit at maintenance support units. This is accomplished through state of the art general purpose, automatic testing and diagnostic equipment for electronic intensive weapon systems maintenance. It consists of the Soldier Portable On-Board Repair Tool for front-line and flightline on-system testing; the Base Shop Test Facility for off-system testing; the commercial equivalent equipment for depot and fixed facility locations; and the Electro-Optical Test Facility for electro-optical repairs. This program is **RED** for the near-term and **AMBER** for the mid- and far-terms. The shortfall must be overcome by a combination of system specific or antiquated test equipment, all of which increase operational costs.

Maintenance Equipment. Maintenance equipment modernization consists of procurement of limited ordnance support equipment required to modernize units and enhance the capabilities to support readiness of weapon systems. This consists of hydraulic repair trailers, shop equipment contact maintenance trucks, welding shops, major shop equipment items, forward repair system, and improved recovery systems.

The hydraulic repair trailer consists of a watertight, aluminum, compartmentalized enclosure mounted on a trailer and powered by a field power generator. Accompanying hydraulic tools enable repair and testing of numerous types of hose using common equipment.

The shop equipment contact maintenance truck is an enclosure that houses an array of powered and hand tools, air compressor, and welding equipment mounted on a HMMWV. Two variations projected to be fielded are the Aviation and Engineer/Ordnance. All shelters can be transferred from one truck chassis to another without modification. The chassis replace current overage vehicles that lack the mobility required by unit maintainers and forward maintenance support teams.

The welding shop is a 2-1/2 ton trailer mounted, self contained unit with provisions for accomplishing oxyacetylene, electric arc, metal inert gas, tungsten inert gas, and carbon arc welding for ferrous and nonferrous metals. This system provides field fix capabilities using modern welding technologies.

Major shop equipment items include service kits, torch outfits, brake machines, lathes, and fuel injection tool sets. Many items of presently fielded equipment are antiquated and require replacement. This program provides minimal relief.

The forward repair system replaces current tracked maintenance vehicles. The current family of repair vehicles provides only limited onboard storage for repair modules and diagnostic tools. The wheeled repair vehicle improves mobility and support provided by unit mechanics and direct support repairers in armor and mechanized battalions and their direct support maintenance support units.

HERCULES, formerly known as the improved recovery vehicle, provides recovery support to Abrams tanks and systems mounted on the Abrams chassis (see Annex B). HERCULES is a product improved M88A1.

The Maintenance Equipment program is rated **RED** for the near-term, **AMBER** for the mid-term, and **RED** for the far-term due to reduced procurements. The Contingency Force receives only 33% of the contact maintenance trucks, and 10% of HERCULES. No forward support systems are funded.

Materiel Handling Equipment. Army materiel handling equipment is overage and in insufficient quantity to meet current lifting, unstuffing, and handling requirements. Materiel handling equipment modernization consists of three systems: All-Terrain Lifter, Articulated System; 50,000 pound Rough Terrain Container Handler; and Container Cargo Retriever.

The All-Terrain Lifter, Articulated System is a 10,000 pound capacity forklift which replaces the current overage 6,000 and 10,000 pound forklifts on a one for one basis. This system's extendible boom provides an interface with aircraft cargo systems and a new container pallet stuffing and unstuffing capability.

The 50,000 pound Rough Terrain Container Handler is used in transportation units to transfer, lift, move, and stack 20, 35 and 40-foot long containers. This equipment provides essential container handling capabilities for Logistics-over-the-Shore as well as aerial, rail and seaport operations.

The program is rated **AMBER** for the near-, mid-, and far-terms due to shortages and over-aged condition of current fleet. FY96 resourcing is sufficient to procure All-Terrain Lifter, Articulated Systems for Contingency Corps requirements Funding to procure 50,000 pound Rough Terrain Container Handlers is sufficient to support 57% of Force Package 1.

Tactical Electrical Power. The new Tactical Quiet Generators support new system fieldings and replace antiquated military standard systems, which average 18 years of age. The new generators standardize fuel, provide audible and signal suppression, improve high altitude electromagnetic pulse protection to electrical power systems and reduce operations and maintenance costs. The Tactical Electrical Power program for near-term is rated **AMBER**. Only the contingency force receives this equipment. Resources are unavailable to support forward deployed and follow-on forces, and peacekeeping and humanitarian missions. The mid- and far-terms are rated **RED** because of inadequate funding for replacements.

Test Equipment Modernization. Modernized test, measurement, and diagnostic equipment replaces obsolete equipment and upgrades maintenance capabilities including the calibration repair maintenance function. This program procures state of the art, cost effective, nondevelopmental item hardware required for horizontal technology integration, digitization, and new weapon systems. Approximately 2,500 makes and models of general purpose test equipment items have been replaced with sixty nondevelopmental items since initiation of this program in 1981. The current program includes ammeters, frequency counters, multi-meters, oscilloscopes, pitostatic test sets, radio test sets, signal generators, spectrum analyzers, and voltmeters. This program is rated **RED** for the near-term, **AMBER** for the mid-term, and **RED** for the far-term because only 25% of total force requirements are met. Current antiquated automated test equipment in the field continues to impede effective maintenance programs.

SECTION 3

RESEARCH, DEVELOPMENT AND ACQUISITION STRATEGY

> *"Every unit that is not supported is a defeated unit."*
> Maurice de Saxe: Mes Reveries.

Airdrop Delivery Systems. Current research and development funds provide a wedge only. The Guided Parafoil Aerial Delivery System - Light Rapid Acquisition Program and C-17 engineering support effort will conclude in FY96. The Advanced Tactical Parachute System and Advanced Reserve Parachute System will be fielded in FY99-00.

Deployment Outload Rail Cars. The Army is procuring rail cars for the requirement to deploy its initial ready brigades. Requirements include cars prestaged at the installation of the ready brigades, commercial cars for the tank plant, free running system rail cars and rail cars required for depots. New rail cars have a life expectancy of 40 years. Options to include buying used cars with a life expectancy of at least 25 years or commercially leasing rail cars are being pursued. These options may provide potential time and cost savings without impacting readiness.

Logistics-over-the-Shore. There are no research and development funds for this program. The Army's top watercraft research and development objective is to obtain the capability to discharge strategic sealift in adverse sea conditions. Unfunded research and development also includes required engineering for modification and upgrade of obsolete watercraft.

Combat Service Support Control System. Current research and development funds allow completion of Version 5 objective software. The first production will occur toward the end of FY96. Fielding of the Contingency Corps will occur by FY02.

The Corps Theater ADP Service Center - Phase II. The Corps\Theater ADP Service Center - Phase Two Block II procurement will occur once funds are received. Minicomputers, micro and laptop computers will be bought off of commercial contracts.

Logistical Technological Systems. The logistics marking and symbology systems are procured as nondevelopmental items. These items can be bought as the latest technology dictates. The current contract with several vendors is open ended; items are bought as they are needed. The microchip technology portion is part of an existing Air Force contract.

Standard Army Management Information Systems Computers. Standard Army management information systems computers are nondevelopmental items. The current contract, with several vendors, is opened ended. Items are bought as they are needed and as the latest technology dictates.

Total Distribution Program. The Total Distribution Program consists of separate integrated critical fixes that correct the shortfalls of the whole program. Total Asset Visibility capability continues to be developed adding additional classes of supply, enhancements, and broadening item coverage. The software development effort to integrate automatic identification technology into existing and emerging supply and transportation systems has begun and will continue through FY02. Software enhancements for both asset visibility and in-transit visibility are also being accomplished. Automated Identification Technology is being procured using an existing Air Force contract to fulfill Army needs. Computer interfaces are bought via an open ended contract with several vendors, and items are bought as they are needed. Software enhancements continue to provide information system connectivity to the tactical packet network. Large capacity switches related to tactical communications are being converted by project managers.

Combat Service Support Equipment. The Laundry and Dry Cleaning System is scheduled for technical and operational testing in FY97 and FY98 respectively, with type classification in 4Q FY98. Procurement is scheduled for FY99. The Family of Space Heaters planned type classification dates are 3Q FY96 for the Space Heater-Convective, with procurement scheduled for FY97; and 3Q FY97 for the Space Heater-Small and Space Heater-Arctic, with procurement scheduled for FY98. The Containerized Self Service Laundry is scheduled to be type classified in 4Q FY97. Procurement is scheduled for FY98. The Modular General Purpose Tent System is scheduled for type classification standard in FY96 with procurement in FY97. Soft shelters are procured by the Defense Logistics Agency. Latrines under development are scheduled for type classification in 3d Qtr FY99-2d Qtr FY00. Component systems of the Army Field Feeding System-Future are being procured to support FP1 fieldings. The Containerized Kitchen is scheduled for type classification standard in FY97 and procurement in FY98.

Force Provider. In 1996, competitive contracts will be awarded to procure equipment to produce two 550 person modules. Where available, options will be exercised on existing requirements contracts to reduce costs. Equipment will be procured from available stock. The current schedule allows for the delivery of two modules in December 1996. Future deliveries are scheduled as follows: two modules each in 1997, 1998, 1999; and one module each in 2000 and 2001. The operational project stock modules are to be prepositioned on ships or at Sierra Army Depot.

In addition, a preplanned product improvement program is being accomplished. Improvements are to be made in the laundry and latrine subsystems. These improved subsystems will be incorporated into the production modules. As part of the production program, a winterization kit is to be assembled to expand Force Provider's deployment capabilities. The winterization kit will be purchased in sufficient quantities to support up to one third of the total Force Provider capability. The kits will remain in operational project stock until required to support Force Provider modules deployed to climates with temperatures below +32 degrees F. The winterization kit is to be available for production by December 1996 and provides capabilities to operate Force Provider at temperatures down to -15 degrees F.

Petroleum Distribution Equipment. The Petroleum Quality Analysis System is in the Demonstration and Validation phase. The Advanced Aviation Forward Area Refueling system deliveries begin in FY99. A production contract for the Modular Base Petroleum Laboratory was awarded in FY95 with one system funded in FY95 and a second in FY96. Inland Petroleum Distribution System components are procured through FY01 and assembly/containerization of this system is ongoing at Sierra Army Depot.

Tactical Rigid Wall Shelters. Most shelters are customer funded and procured periodically. Two shelters, however, have production funding: the Chemically and Biologically Protected Shelter type classified limited procurement urgent in December 1994; and the Standardized Integrated Command Post System Rigid Wall Shelter, which will be type classified standard in FY96. Both will be procured competitively beginning in FY96.

Water Modernization. The Lightweight Water Purifier Milestone I/II is planned for March 96 with initial operational test and evaluation scheduled in early FY97. Candidate systems are currently being evaluated. The Packaged Water System Milestone I/II is planned for 2Q FY97 with initial operational test and evaluation conducted in early FY98. Milestone I for the 1500 gallon per hour Reverse Osmosis Water Purification Unit is scheduled for 1Q FY96 and initial operational test and evaluation is planned for 2Q FY99.

Ammunition. The government-owned ammunition base has been reduced from 16 active plants in 1991 to 9 today - with facility divestiture continuing throughout the FY 96-01 program. The ammunition production base manufactures ammunition items requested by all Services; minimally supports plant downsizing and closure plans; and inadequately supports reduction of DoD's backlog of ammunition demilitarization items.

For ammunition logistics, current technology base funding provides these demonstrations: new ammunition packaging technologies; explosive safety improvements; improved rearm systems for artillery, attack helicopters, and air defense weapon systems; teleoperated handling and movement equipment; and source data automation technologies. Some of these technologies transition to item developers for insertion into system development programs, such as the Lightweight 155mm Howitzer, PATRIOT Missile, Apache attack helicopters, and the Total Distribution Program. Others can be inserted into new production, into programs for the selective repack of operational stocks, or directly into logistics system nodes.

Explosive Ordnance Disposal. Research and development of key elements of Explosive Ordnance Disposal items is conducted by the U.S. Navy, as DoD executive agent. Key systems required for adequate support and safety of soldiers who conduct Explosive Ordnance Disposal missions include the mobile ordnance disrupter system, the remote controlled reconnaissance monitor, and the remote ordnance neutralization system. No Army research and development nor procurement is programmed.

Integrated Family of Test Equipment. The base shop test facility and contact test set are both in production (started in 1992). First Unit Equipped for the base shop was January 1993 and production continues through FY01. First Unit Equipped for the test set was September 1994; award of a follow-on contract for a smaller, lighter weight version is planned.

Procurement reductions result in lack of support for electro-optical automatic test and calibration equipment and fielding support to key weapon systems. Reduced production between FY 97-99 causes an increase in maintenance costs to support workloads from Paladin, Ground Based Sensor, Improved TOW Acquisition System, Javelin, Nuclear Biological Chemical Fox, and the Unmanned Aerial Vehicle. Electro-optical capability is added to integrated family of test equipment in FY98.

Maintenance Equipment. The high mobility multipurpose wheeled vehicle contact maintenance truck fielding commenced in FY96. Initially, the High Mobility Multipurpose Wheeled Vehicle chassis is provided to using units. The shelter and tools are delivered, as produced, as a separate entity. This supports the reconfigurability criteria of the system. On the forward repair system, development and evaluation during FY96 will determine if the work station can be mounted on a flat rack that is off-loaded at a field site. The work station would be self-contained and independent from the chassis. The HERCULES contract is in place to apply M88A1 upgrades.

Materiel Handling Equipment. There is a FY 96-97 scheduled nondevelopmental item buy of the All-Terrain Lifter Articulated System with subsequent buys scheduled to FY03 to support Contingency Force operations. There is a FY96 procurement effort to buy a limited number of 50,000 pound Rough Terrain Container Handlers to equip two companies.

Tactical Electrical Power. The contract for modernized 3 kilowatt tactical generator sets was terminated due to continued technical difficulties meeting stringent physical/ performance requirements. This program will be restarted in FY96 with a revised acquisition strategy using multiple contractors in a run-off development with lower risk technical requirements.

Test Equipment Modernization. Identification and evaluation of nondevelopmental items continues for manual and semiautomatic general purpose test equipment at troop unit and higher level. Equipment is identified for replacement using performance history and life cycle cost. Nondevelopmental item procedures are used to award best-value contracts based on life cycle cost, and to consolidate test measurement diagnostic equipment makes and models where possible.

SECTION 4

CONCLUSION

> *"Do what you can, with what you have, where you are."*
> Theodore Roosevelt

The Total Combat Service Support funding level (minus tactical wheel vehicles) unfortunately continues its downward trend. A $832M cut from just last year was realized as of POM Lock. Though many of the programs are projected to receive increases in the out years of FY00 and FY01, between FY96 and FY99 funding is very lean. Currently, the POM forecasts a 65% overall decrement in the combat service support area between FY95 and FY98.

Despite the bleak future, some bright spots were seen this President's Budget. Tactical Quiet Generator, Combat Service Support Control System, Water Modernization and Material Handling Equipment was funded to fill 100% of the Contingency Force. Rail cars, cranes, tugs, the LARC 60 Service Life Extension Program were funded for FP1. Standard Army Management Information Systems Computers are also being funded, as well as various type of test equipment, petroleum distribution equipment, 69% of Force Provider, and research and development for airdrop delivery systems. Each system has already been discussed in earlier pages.

Our current emphasis is: Logistics-over-the-shore, Rail Deployment, Logistics Automation, Materiel Handling Equipment modernization, and Tactical Power Modernization.

ANNEX J

AVIATION

SECTION 1

INTRODUCTION

The National Military Strategy (NMS) emphasizes the fluidity of future military operations and the requirement to meet these challenges using a combination of forward based and rapidly deployable CONUS based forces. Force XXI is the response to meet these future challenges. *Versatility, mobility, modularity, doctrinal flexibility, and joint/multinational connectivity* are all singled out as key to future success. Force XXI encompasses the impact of information age technologies and knowledge-based warfare on future operations. ***Army Aviation remains at the forefront of innovation, change, and technological overmatch in response to the Force XXI challenge. Its mobility, versatility, and lethality ensure an ever increasing relevance to the needs of the joint/combined force in support of national objectives.***

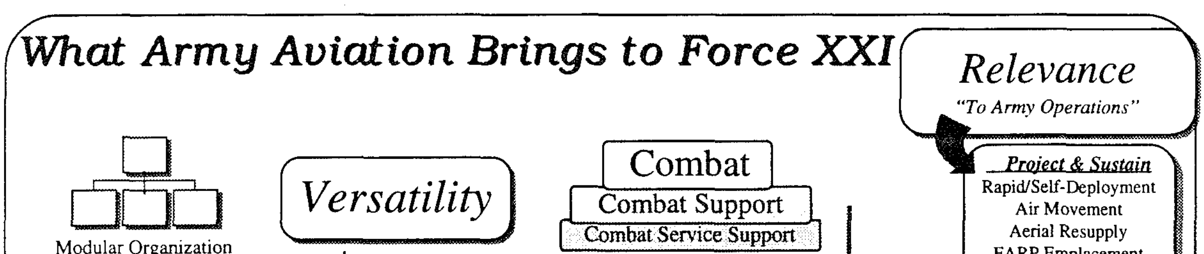


Figure J-1

Aviation, as a maneuver member of the combined arms team, provides combat, combat support, combat service support, and special operations forces across the full range of military operations. Air Cavalry units conduct reconnaissance and security operations to provide the tactical commander critical combat information, early warning, and force protection. Attack helicopters provide the joint task force commander a unique firepower asset; providing the capability to deliver precise, lethal fires with minimal collateral damage in day/night and adverse weather conditions. Utility and cargo helicopter units provide tactical air movement of combat forces and their assets, allow commanders and their staffs to rapidly traverse and see the battlefield, and assist in front line medical evacuations. Special Operations Aviation (SOA) conducts a broad spectrum of combat and combat support missions across the continuum of conflict. SOA platforms modified with the terrain following terrain avoidance (TFTA) radar, aerial refueling, advanced aircraft survivability equipment (ASE), and avionics enhance the operational envelope and provide unique capabilities to the warfighting commander. Fixed Wing aircraft provide essential combat support and combat service support: operational airlift, intelligence and electronic warfare, and intratheater personnel/cargo transportation. *Collectively, aviation provides the combined arms ground force the lethality, speed, mobility, and flexibility to operate in any austere or improved area of the world.*

To assure aviation forces continue to deliver required combat power and support, our forces must have adequate equipment, training, and force structure. The aviation modernization strategy addresses each of the Army's modernization objectives, providing the roadmap to address our critical deficiencies and attain Force XXI objectives. The objective strategy reduces each of the rotary and fixed wing fleets to

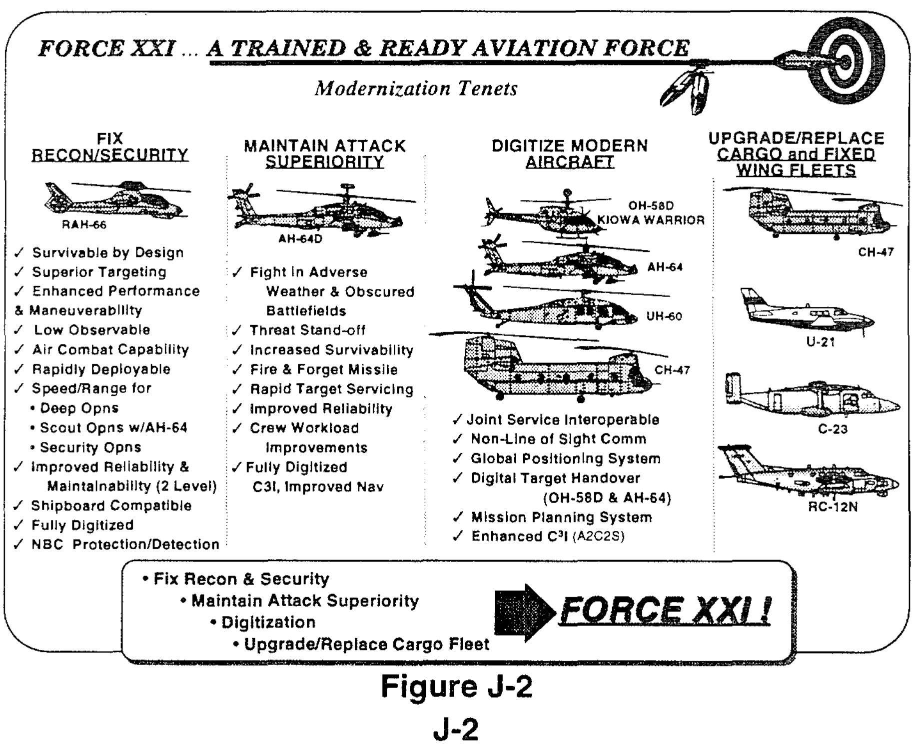


Figure J-2

four aircraft types. Materiel modernization objectives and focus are driven by four tenets: (1) Solve Army Aviation's most critical battlefield deficiency -- armed tactical reconnaissance and security; (2) Maintain technological overmatch and world class attack helicopter capability into the 21st Century; (3) Enhance command, control, communications, and intelligence (C3I) and joint/combined interoperability through battlefield digitization; and (4) Upgrade and/or replace our aging cargo/fixed wing fleet.

The RAH-66 Comanche is the Army's number one long term modernization program. The Comanche incorporates revolutionary technologies to acquire and process battlefield information with stealth and speed. It provides accurate and timely reports to tactical commanders using digital data transfer, and responds immediately to the tactical commander's firepower or combat information needs during day/night and adverse weather operations. *Comanche is one of the key systems of the joint digital battlefield.* Additionally, it provides critical combat power to light and contingency forces during early/forced entry operations and is designed to close undetected when scouting for the heavily armed AH-64 Apaches. Fielding of the Comanche will meet the requirements for the Special Operations Aviation light attack platform, closing the gap in the modernization of SOA aircraft. Until Comanche is fielded, the OH-58D Kiowa Warrior provides some of these capabilities, although with some risk due to deficiencies in flight performance, survivability, and weapon payload. Equipped with electro-optical target acquisition and armament, the OH-58D Kiowa Warrior has improved night fighting and armed reconnaissance capabilities not provided by the OH-58A/C or AH-1.

The AH-64D Longbow Apache provides Army maneuver commanders a primary direct fire platform with unprecedented survivability, firepower, and near-term digitization and processing capability to fight worldwide in day/night, adverse weather, and obscured battlefields. Its millimeter wave fire control radar, fire and forget Hellfire missile, precise direction finding to threat RF emitters, and cockpit management and digitization enhancements *give the Army attack helicopter technological superiority well into the 21st Century.*

Aviation's primary digitization thrusts are toward programs which enhance situational awareness, joint communications, command and control, airspace management, and operational tempo. The objective is to apply digitization improvements to all Army aircraft, enhancing total situational awareness, instantaneous information exchange, and reducing the possibility of fratricide. Special emphasis is placed on transferring threat and target information to/from sensor and weapons platforms (such as JSTARS, national satellite broadcasts, RAH-66, or AH-64D) to the deciders and shooters in as close to real time as possible. Additionally, special emphasis is placed on the development of an Aviation Systems of Systems Architecture (ASOSA). This architecture will encompass all aspects of computers, communication, electronics, power management, distribution, and is key to the cost effective application of these enhancements. Continued software improvements and integration of the digital map and TFTA in the MH-47E and MH-60K further expand

SOA's ability to maneuver on the battlefield. Combining the real time moving map with the multi-mission advanced tactical trainer (MATT) in the upgraded command and control console will provide real time threat and situational awareness information to the commander. Digitization upgrades to the UH-60 and CH-47 are focused on improving their ability to communicate and navigate, thereby increasing their efficiency in supporting ground operations. OH-58D Kiowa Warrior and AH-64D Longbow will demonstrate aviation's initial digitization efforts in TF XXI.

Aviation modernization likewise occurs in vital 'core' programs that provide essential hardware, support equipment, and the new technologies required to digitize the force. These programs enhance mission survivability, airspace command and control, and aircraft maintainability and supportability. Equally, aviation's training and simulation strategy complements these efforts by harnessing computer technology to provide joint/combined arms training in constructive, virtual, live, and developmental simulation environments at significantly lower costs.

To train Aviation's soldiers, crews, and leaders to operate on the joint/combined battlefield, training simulation requirements have been consolidated in the *Aviation Combined Arms Tactical Trainer (AVCATT).* Training effectiveness is achieved through: 1) Standardized training across the combined arms team for all levels of training and in all active and reserve component attack, reconnaissance, assault, and lift units worldwide, 2) The capability to train to fight using scenario based training focused on mission accomplishment and tactical decision-making in realistic combat environments, and 3) The capability for unit commanders, staff, and aircrews to train and fight together. The result is maximization of the training dollar and a trained and ready aviation force.

While moving to fulfill 21st Century modernization and training objectives, the Army must also tackle the pressing problems endemic to its aging, Vietnam era fleet. The OH-58A/C and AH-1 (replaced initially by the OH-58D Kiowa Warrior and ultimately by RAH-66 Comanche), UH-1 (to be replaced by UH-60), and the U-21(objective replacement is C-XX Short Range) are only marginally effective and by the turn of the century will each average over 30 years of age. Until these aircraft can be completely removed from the inventory, they must be sustained. Some CH-47D airframes will begin exceeding 40 years of age at the turn of the century. The first UH-60s procured will reach 30 years old in FY08. The C-12 fixed wing aircraft has been conducting operational support airlift missions since 1974. Until total replacement, sustaining these aircraft is crucial to minimize safety, readiness, and logistics issues.

The Aviation Systems of Systems Architecture (ASOSA), as a subset of the Army's Technical Architecture, will capture Army common, aviation common, and platform mission specific requirements, standards, and physical implementations. Resulting in a documented baseline, the ASOSA will provide improved holistic architecture, data exchange, commonality and reuse, integration, and infrastructure. The ASOSA outlined path for inter- and intraconnectivity of aircraft systems will maximize the use of NDI and off-the-shelf components for commonality, and develop migration plans to aid in technology insertion.

Aviation's modernization strategy is balanced. Sustainment programs address reliability/safety upgrade requirements where current and projected needs are being met. Technology insertions are used to improve existing systems to adjust to evolving mission requirements or stay inside opposing force capabilities. New system acquisition and aging aircraft retirement are outlined where sustainment or technology insertions are not cost effective. The modernization strategy contributes to the Total Army, involving both active and reserve components. ***Implementation of this strategy impacts each of the Army's modernization objectives, focusing squarely on achieving the Army's ultimate goal: Land Force Dominance in the 21st Century.***

SECTION 2

CURRENT PROGRAM ASSESSMENT

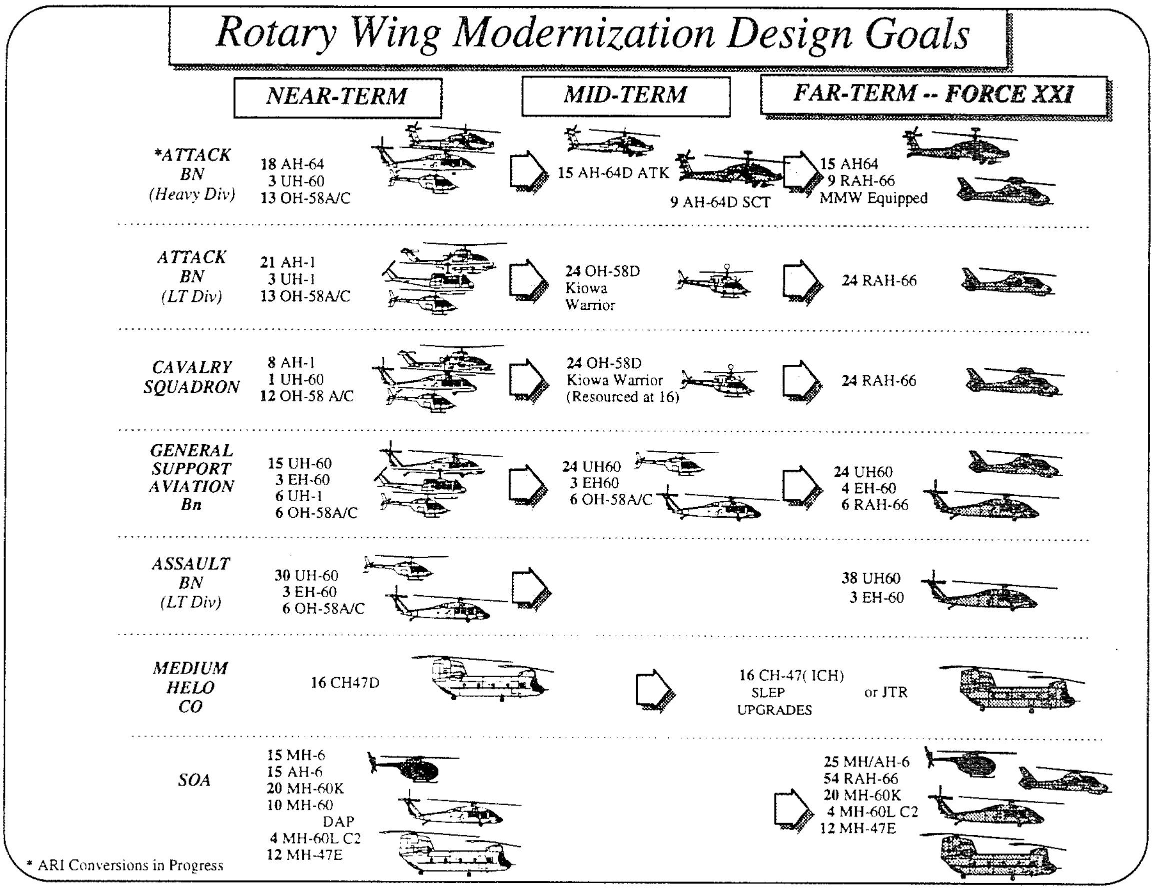


Figure J-3

Rotary Wing Modernization Design Goals. Our rotary wing modernization design goals are built around the strategy of replacing older, technologically obsolete aircraft with fewer, more capable systems. The ultimate objective of the plan is to reduce the number, type, and models of rotary wing aircraft; thereby reducing operating and support costs. Figure J-3 depicts unit structure for the basic building blocks of the aviation force under this strategy. The impact of the Aviation Restructure Initiative (ARI) is evident in the mid-term as the number of aircraft types within a unit are reduced and utility aircraft support is consolidated to reduce personnel and support costs. The RAH-66 Comanche is the centerpiece of this plan, replacing 1960s technology AH-1 and OH-58A/C aircraft and the OH-58D Kiowa Warrior in air cavalry units and light attack battalions. In addition, it will replace AH-64 aircraft employed in the scout role in heavy division attack battalions. Rotary Wing requirements based upon this strategy and ARI implementation under a 4 Corps/18 Division Total Army force are at Figure J-4.

Requirements

RAH-66	AH-64		M/UH-60 A/L/K	LUH	M/CH-47 D/E
1104	**728**	*Aircraft in TOE Units*	**1569**	**96**	**397**
391	**259**	*Float, Attrition, TDA & Training*	**557**	**35**	**128**
1495	**987***	*Total Requirements*	**2126****	**131**	**525**

* AH-64 requirement until sufficient quantities of RAH-66 are fielded to displace AH-64 scouts in attack battalions. Until RAH-66 is fielded, 5 ARNG attack battalions remain resourced with AH-1due to inadequate fiscal resources.

** Excluding SEMA (EH-60). Figures include 447 UH-60 MEDEVAC.

Figure J-4

Fixed Wing Modernization Design Goals. Fixed wing modernization design goals are shown in Figure J-5. This strategy, detailed in the approved Fixed Wing Investment Strategy, recommends four standard platforms to satisfy short and medium range utility, executive transport, and multimission requirements.

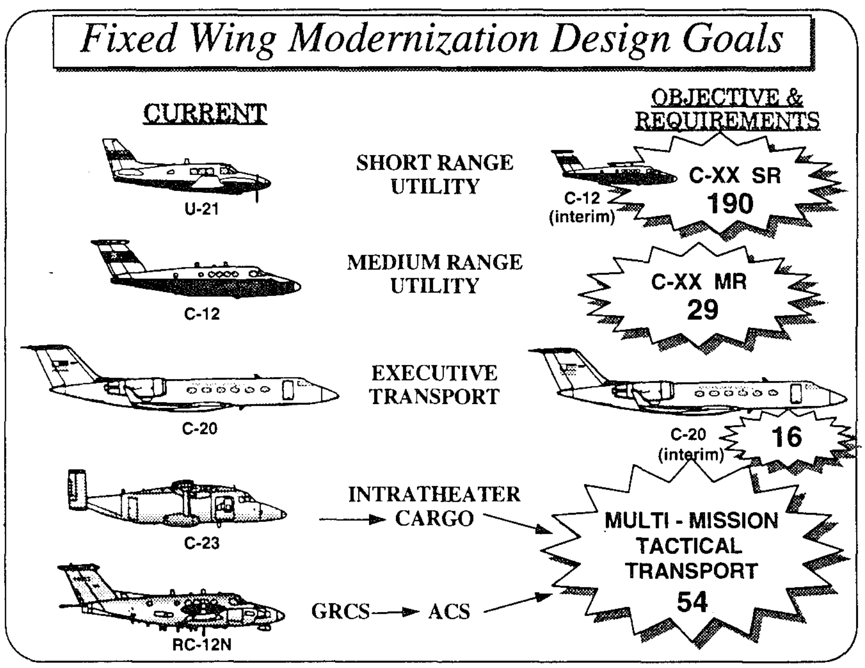


Figure J-5

Program Assessment. This assessment examines capabilities from the standpoint of where we are now (the near-term force), how our modernization plan leads us to our objective Force XXI requirements (the far-term force), and the force that bridges the gap between the two (the mid-term force). Each are viewed through the perspective of time.

The assessment charts (Figures J-6 through J-10) show our various aircraft systems and a shaded assessment on a bar scale. The ruler that appears adjacent to these scales graphically portrays an unprioritized list of capability requirements for that particular mission area. Comparing the requirements on the ruler below the height of each bar provides an indication of the capabilities offered by each alternative.

Reconnaissance and Security. Armed tactical reconnaissance is Army Aviation's number one deficiency. The results of force-on-force training at the National Training Center (NTC) show an 85% correlation between the effectiveness of reconnaissance and the positive outcome of battles. Figure J-6 provides an assessment of air cavalry troop capabilities to conduct reconnaissance and security in the near-term, mid-term, and far-term.

The AH-1 and OH-58A/C team continues to be **RED**. Both aircraft lack the capabilities to operate effectively at night and in reduced visibility; neither have adequate flight performance for global operations; and neither have adequate targeting sensors. The average age of these Vietnam era airframes is greater than 25 years, exceeding the 20-year useful age criteria (based on technological obsolescence and average annual flight hours). The near-term marginal capability of this "day only" team continues to diminish as threat technology advances and proliferates, and supportability problems grow. Modernization delays increase both the supportability costs and warfighting risks to the total force. Unfortunately, current resource constraints necessitate retention of these aircraft in the fleet well into the 21st Century.

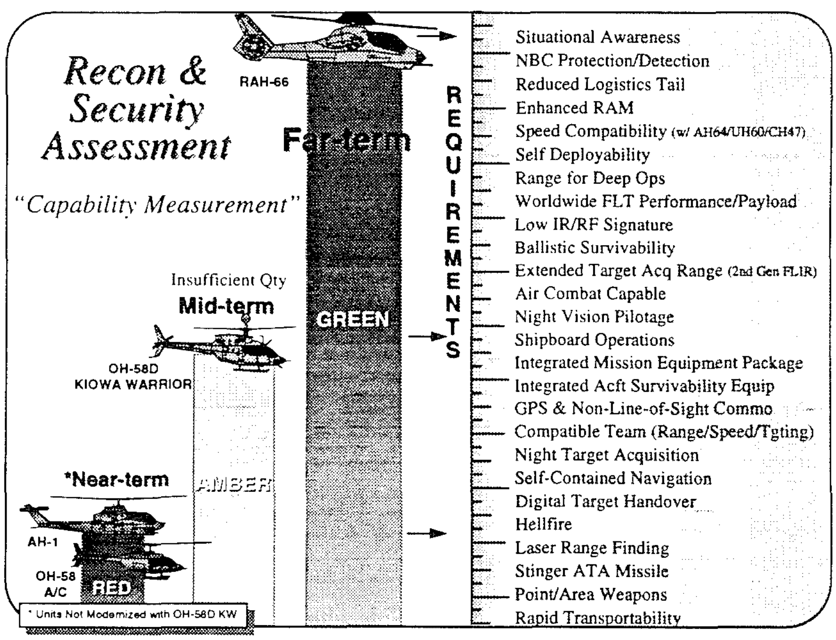


Figure J-6

The OH-58D Kiowa Warrior is a significant improvement over the AH-1 and OH58A/C team and bridges the gap in the mid-term force until the Comanche is fielded. However, the Kiowa Warrior offers limited airframe growth potential and suffers from range, speed, and weapon payload deficiencies. Consequently, the mid-term reconnaissance/security fleet is rated **AMBER.** Although upgrades, principally digitization, are programmed to improve mission equipment performance, improving capabilities to meet the full range of cavalry/light attack missions is cost prohibitive.

The RAH-66 Comanche, with its revolutionary mission equipment package, advanced survivability features, and unprecedented maintainability will solve the reconnaissance and security deficiencies. It will provide immediate tactical targeting, prioritization, and enemy information to joint force tactical commanders at all levels. Most important, the RAH-66 Comanche will possess the required mission capabilities for the 21st century, meet National Military Strategy requirements for the total force, and will achieve Force XXI objectives. Consequently, Comanche equipped forces are rated as **GREEN** in the far-term.

Attack. Figure J-7 is an assessment of our attack helicopter capability. The attack mission is currently performed by two different scout/attack teams. In some divisions, AH-1 and OH-58A/C aircraft (assessed **RED**) continue to perform the attack mission. As the primary light division attack team, these aircraft fight blind at night (with the exception of limited quantities of AH-1F C-Nite aircraft) and lack the weapon systems and mission equipment required for effective combat operations. Averaging more than 25 years in age, this team is becoming increasingly unsupportable in terms of maintenance and survivability. The mid-term OH-58D Kiowa Warrior, when fielded to light division attack battalions, is rated **AMBER**. Fielding the RAH-66 Comanche to light division attack battalions will provide a survivable aircraft with the speed, deployability, payload, and logistical supportability features required by these units. In those units not converted to the Aviation Restructure Initiative structure, the AH-64A and OH-58A/C team is rated **AMBER**, primarily due to limitations of the OH-58 scout. In the near and mid-term, the Aviation Restructure Initiative provides attack battalions with only one aircraft type (AH-64A/D), expediting retirement of obsolete OH-58A/Cs and reducing the logistics burden. While the AH-64A (current non-Longbow equipped Apache) provides a vastly improved scout capability as compared to the OH-58A/C, its signature (radar, infrared, and visual) limit effectiveness. The aircraft remains vulnerable to modern threat air defenses when employed in the close-in scout role and lacks adequate integration for efficient team management/coordination. For this reason, the pure AH-64A attack battalion is rated **AMBER**. Introduction of the AH-64D Longbow Apache provides extended range, adverse weather target acquisition coupled with a fire and forget missile. Longbow Apache will increase lethality 400% and survivability 700% as compared to AH-64A. However, despite AH-64D procurement in the mid-term period, 70% of the heavy attack fleet will remain equipped with the unmodernized AH-64As. Fielding the RAH-66 as the scout aircraft for heavy division/corps attack battalions in the 2015 timeframe will allow transfer of AH-64A aircraft to other nonmodernized units. The far-term fielding of the AH-64D in combination with the RAH-66 will result in the attack battalion capability rating of **GREEN**.

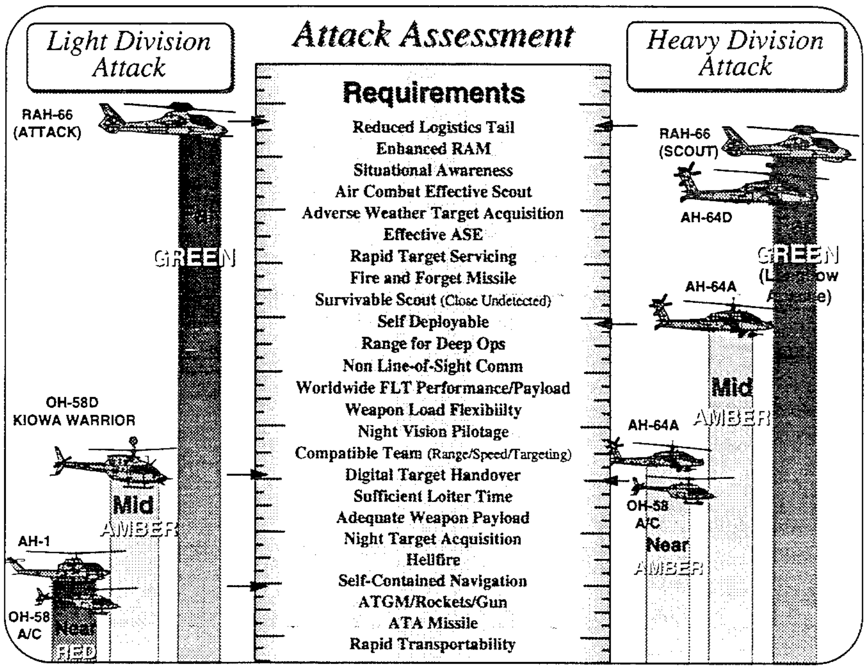


Figure J-7

Utility. The assessment is depicted in Figure J-8. The near-term utility fleet is **AMBER.** The UH-1H (assessed **RED**) is an old airframe that possesses inadequate lift, speed, range, and survivability. The UH-60A/L Blackhawk, however,

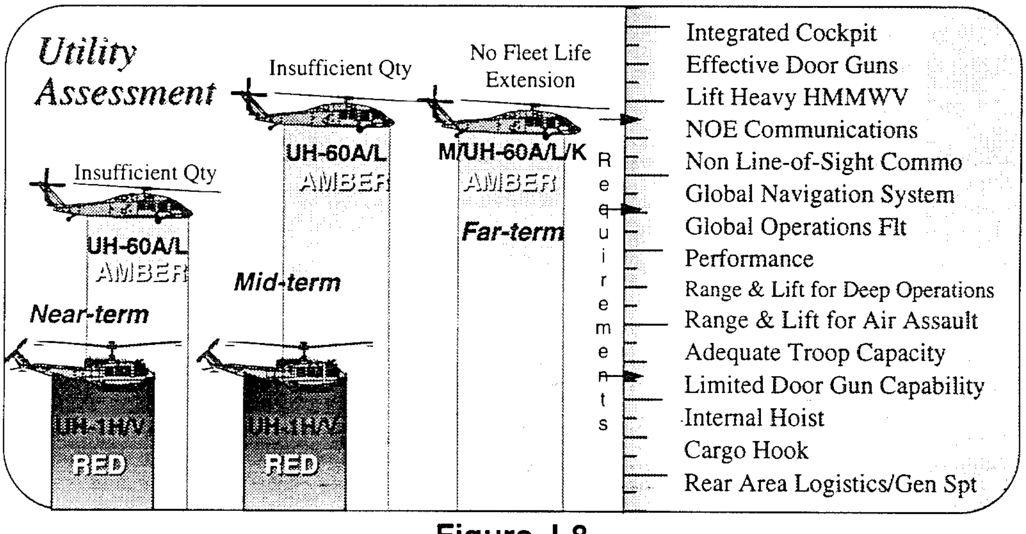


Figure J-8

(assessed **AMBER** due to limited quantities), is a solid performer with excellent deployability, survivability, maintainability, and growth potential. This workhorse of Army aviation has proven itself in joint combat operations from Grenada to Somalia. During air assaults or in support of deep operations, the Black Hawk allows friendly forces to penetrate or bypass obstacles and terrain barriers, strike over extended distances, and attack the threat when and where it is most vulnerable. The UH-60 Black Hawk is self deployable/air transportable, enhances light forces' operational tempo during maneuver, increases mobility of troops and equipment, improves aeromedical evacuation, extends logistical support capability, and serves to synchronize the battlefield in its command and control role. Digitization of the utility fleet, including the MH-60K modification, and continued refurbishment of older A models carry it into the 21st century. However, additional aircraft procurement is required to fully meet MEDEVAC and utility requirements. In the far term, the UH-60 fleet will begin approaching the end of its projected useful life. Sustainment/modernization issues must be addressed as no UH-60 replacement is foreseen until the FY25 timeframe.

MEDEVAC. The UH-1V MEDEVAC (assessed **RED**) lacks the speed, range, endurance, patient regulating capability, and survivability to adequately support maneuver forces. As configured, the aircraft no longer meets mission requirements. These shortfalls are magnified during high/hot environment operations (above 4,000 feet and 95 degrees) that further limit worldwide MEDEVAC support. After the current multi-year deliveries and ARI fieldings of the UH-60, the MEDEVAC fleet will still be 50% UH-1/V, to include some contingency corps units.

The UH-60A MEDEVAC (assessed **AMBER**) lacks the capability to meet many of its assigned missions: sustainment of casualties over extended distances; shore to ship evacuation; supporting combat search and rescue; and patient regulating. Additionally, the UH-60 MEDEVAC is not capable of functioning on the digitized battlefield or using tele-medicine technology.

Light Utility. The Light Utility Helicopter (LUH) concept is an unfunded nondevelopmental item (NDI) initiative to fill the TOE mission role of performing flights for staff transport, liaison, air messenger service, and air movement of supplies. Additionally, the LUH augments Corps air ambulance resources. The airframe for the LUH role has not yet been identified. The LUH requirement is for 131 aircraft. At least through the mid-term, the UH-1 will fill the LUH requirement.

Cargo. The cargo fleet assessment is depicted in Figure J-9. The CH-47D is currently rated **GREEN**. Minor enhancements to digitize and to improve its supportability and payload capacity are required. By the turn of the century these airframes reach 40+ years in age. With a replacement unlikely until the FY20 timeframe, the far-term assessment is rated **RED**. Modernization efforts will be centered on delaying CH-47D and MH-47E retirement by extending aircraft life through vibration reduction, structural modifications, and addition of a minimum essential database for digitization compatibility. Additionally, the 712 to 714 engine conversion is necessary to regain performance/payload lost due to the addition of modifications such as the engine air particle separators.

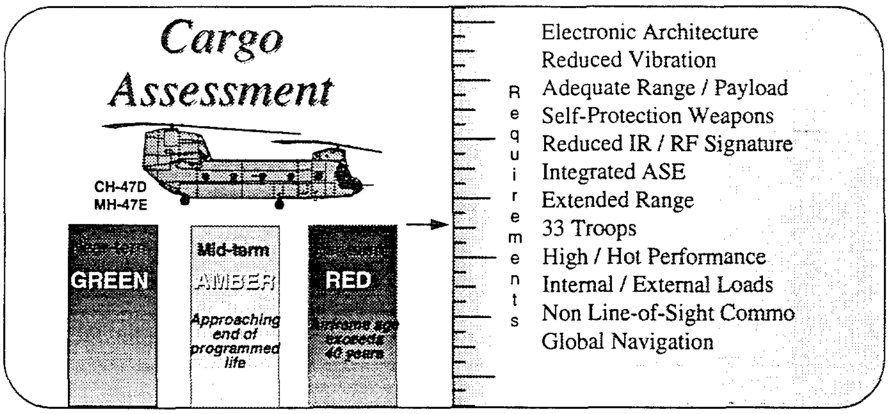


Figure J-9

Fixed Wing. The fixed wing fleet assessment is depicted in Figure J-10.

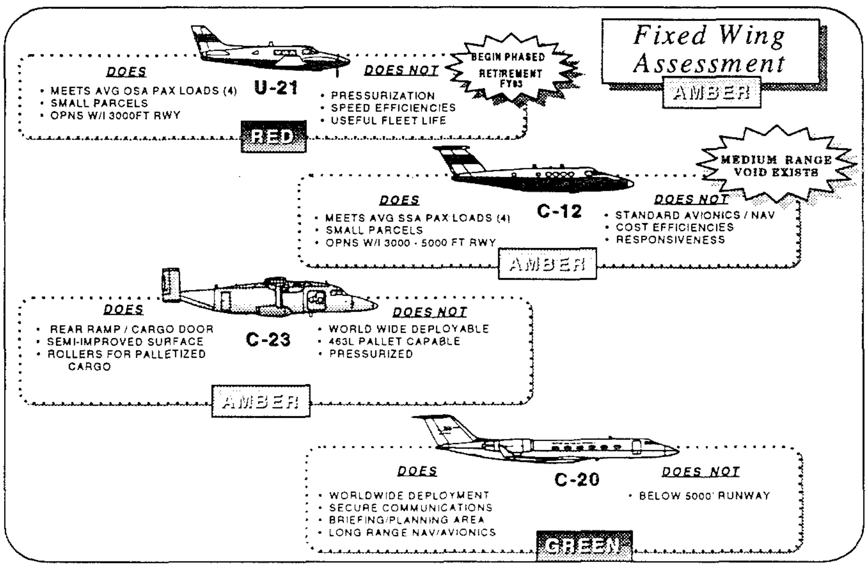


Figure J-10

The Army's fixed wing fleet consists of 20 different types of airplanes. This diverse and varied fleet is increasingly difficult to manage and is expensive to operate and sustain. Additionally, the lack of a standardized fleet and the numerous cockpit configurations have an adverse impact upon training and operational standardization.

The Army's fixed wing modernization plan focuses on four basic aircraft types to satisfy our wartime requirements. The modernized fleet will consist of a short (0-500NM), medium (500-1800NM), and long range (1800 plus NM) utility aircraft (C-XX SR, MR, and LR) and an unfunded Multi-Mission Medium Tactical Transport (M3T2). Two fleet aircraft currently meet the short range (C-12) and long range (C-20) requirements. The C-12 is gradually replacing the aging and unpressurized U-21 fleet and a limited number of C-20s are performing the long range mission. The C-12, with its limited range and speed, is not a cost effective aircraft for the medium range mission.

Filling the C-XX MR requirement is the Army's highest fixed wing procurement priority; however, competing priorities prevent funding. Procurement of the C-XX MR aircraft will allow the Army to modernize both the medium and short range requirements by cascading C-12s to the short range mission, thus retiring obsolete U-21s. The C-XX MR will provide cost effective transportation for tactical commanders, key staff, couriers, and critical small item logistics support to meet wartime requirements.

The C-23 currently fills a cargo mission, but lacks the payload, range, or speed desired for the Army's future M3T2 requirement. The fixed wing modernization plan must be supported and funded to attain a **GREEN** rating. The C-12 (assessed **AMBER**) begins to reach the end of its useful life in FY09. A near-term avionics upgrade is needed to standardize the myriad cockpit configurations in the C-12 fleet. This upgrade will ensure the C-12 fleet is capable of operating in the National Airspace System and has the required data/communications links to operate on the digitized battlefield of the 21st century. The U-21 (assessed **RED**), a less capable aircraft approaching 30 years in age and now in phased retirement, may remain in service indefinitely to make up for the limited quantities of C-12 aircraft.

Conclusion. A summary of the aviation mission area assessment for near-term, mid-term, and far-term is shown in Figure J-11. The Comanche and Apache Longbow helicopters solve reconnaissance and attack deficiencies; they remain Army aviation's major focus to correct critical warfighting shortfalls. However, continued procurement of UH-60 Blackhawks, a life extension for the CH-47, and initiation of the fixed wing investment strategy are equally important to a balanced strategy. Modernization of our core programs (avionics, aircraft survivability equipment, aviation life support equipment, air traffic services, aviation support equipment) is essential to the support and sustainment of our aircraft programs. Without attention to outyear fleet sustainment/modernization issues, the obsolescing fleet problems of today (AH-1, OH-58A/C, UH-1, and U-21) will be compounded by aging UH-60, CH-47, OH-58D Kiowa Warrior, AH-64, and C-12s.

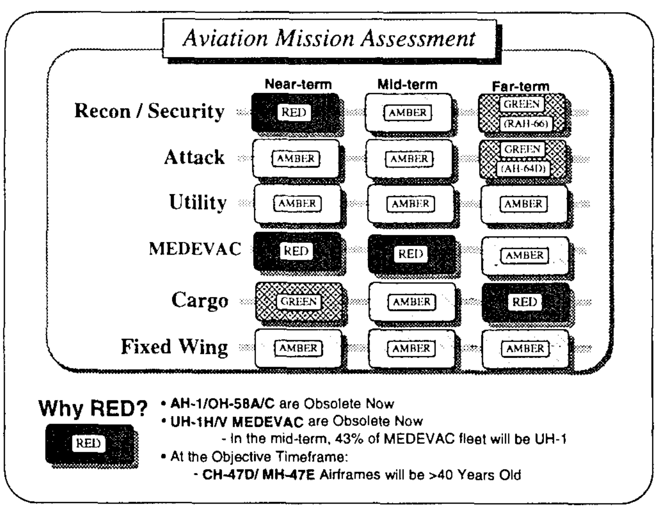


Figure J-11

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

Aviation RDA Strategy. The Research, Development, and Acquisition (RDA) strategy has four steps: develop and procure, improve, sustain, and retire aircraft. When neither upgrades nor technology insertions can provide required capabilities, or the cost-benefit ratio is too high, the modernization strategy looks to new systems for development and fielding. The second step looks to improve existing systems, staying inside potential opposing force capabilities or addressing evolving mission requirements through technology insertion and integration. The next step evaluates the current fleet's capability to meet warfighting requirements. If it meets required needs, the fleet is sustained by safety and reliability, availability and maintainability (RAM) upgrades to achieve operation and support cost reductions and improved sustainability. Lastly, as new systems are procured, old and technologically obsolete aircraft are retired. Inherent in this process is the development of aviation Science and Technology (S&T) to enhance aviation capabilities in the next century, and provide the enabling capabilities for future systems.

The objective of our RDA strategy is to apply our limited resources (Figure J-12) to maximize return on investment in addressing our mission needs.

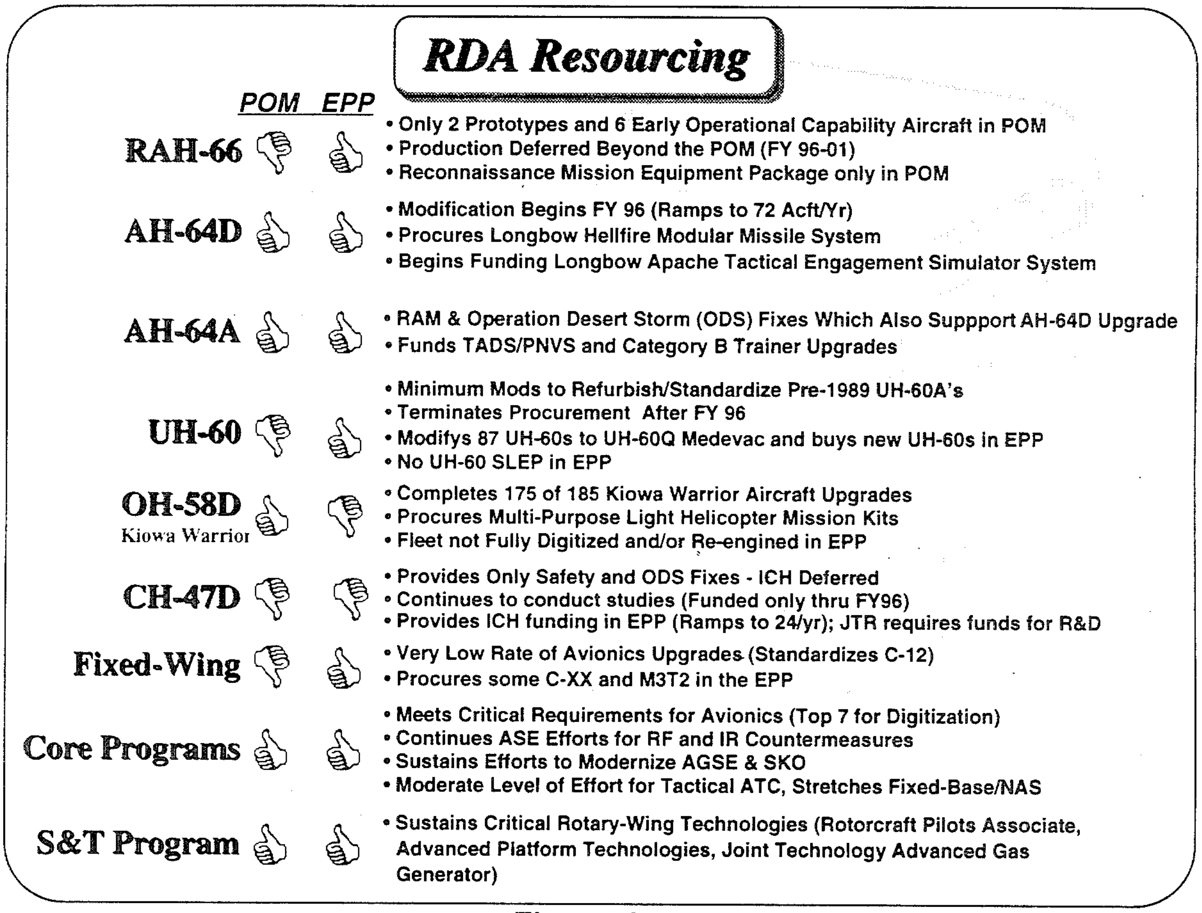


Figure J-12

Aircraft Modernization. Aviation's rotary wing fleet (to include new procurement, modernization upgrades, and retirements) with projected resourcing is summarized in Figure J-13. The composition of the rotary wing fleet can be determined for any year out to FY17. Comparing Figure J-13 with Figure J-05, the impact of the resource constrained procurement strategy is illustrated; retirements of obsolete aircraft are significantly slowed; over 950 UH-1s remain in the fleet in FY17 without continued UH-60 procurement; and over 300 AH-1 Cobras must be retained in attack and air cavalry units well into the 21st Century.

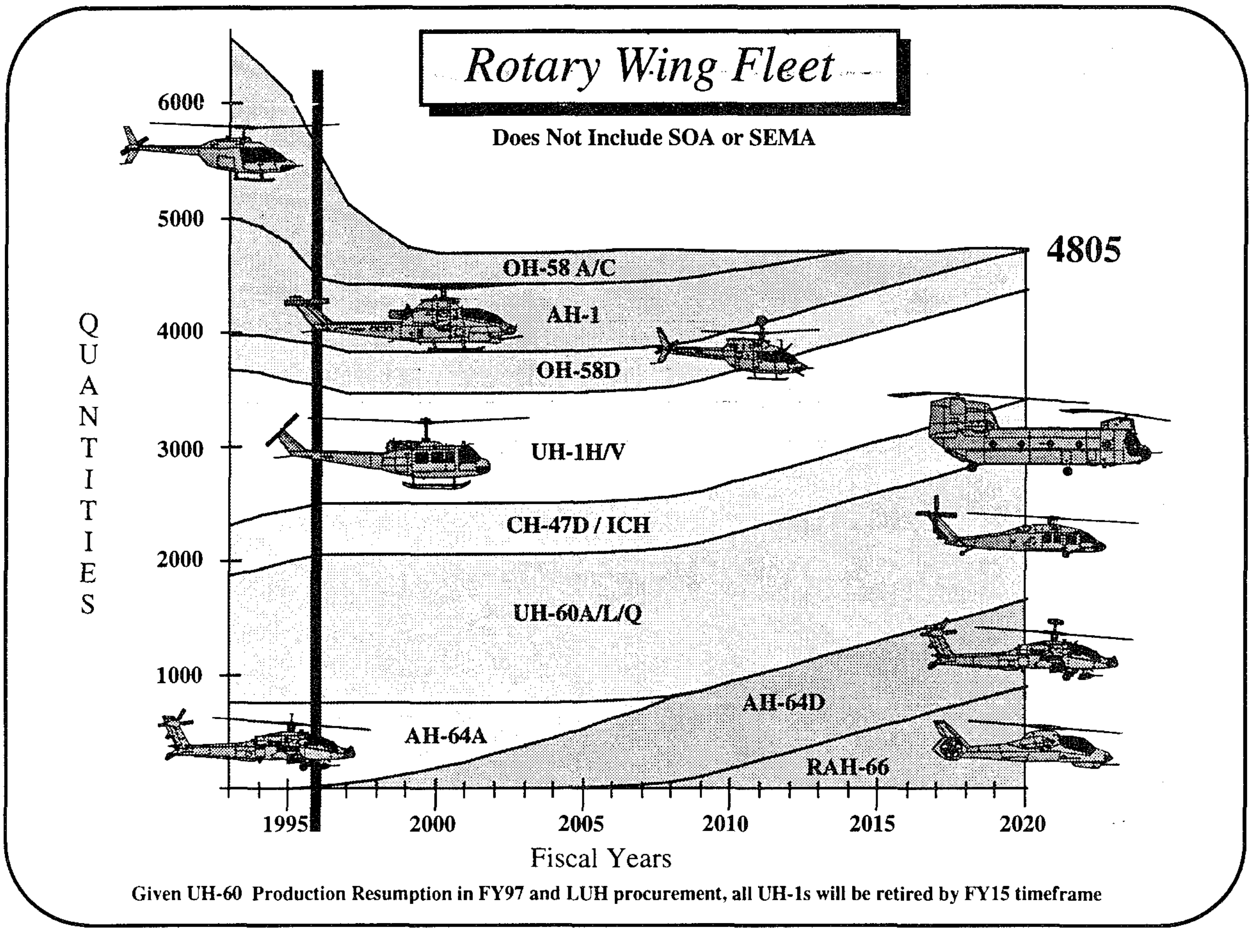


Figure J-13

Reconnaissance & Security. The U.S. Army remains committed to the RAH-66 Comanche as the centerpiece of its aviation modernization strategy. This strategy continues to focus on the replacement of the Vietnam-era AH-1 and OH-58A/C. The RAH-66 is a key component of the digital battlefield, resolving the Army's armed reconnaissance deficiencies. The Office of the Secretary of Defense has approved the acquisition strategy to build two prototypes and six early operational capability aircraft equipped with the reconnaissance mission equipment package in FY 01-03. The objective is to place the aircraft into operational units for soldier evaluation, thus demonstrating revolutionary capabilities and reducing program risk. The first prototype was rolled-out on 25 May 95 and is on target for first flight in November 95. This intent is to posture the program for full production and acceleration of the current FY06 Initial

Operational Capability (IOC). The OH-58D Kiowa Warrior serves as an interim aircraft in high priority units until RAH-66 is fielded. The retrofit and modification of 382 OH-58D AHIPs and OH-58As to the Kiowa Warrior configuration (Hellfire, Stinger, rockets, .50 caliber machine gun) will be completed in 1998. Selected Multipurpose Light Helicopter kits are also scheduled for procurement. Follow-on upgrades include incorporation of fleet standard digital systems; improved Master Controller Processor Unit; and reliability, availability, and maintainability enhanced performance (RAMEP) engine upgrades.

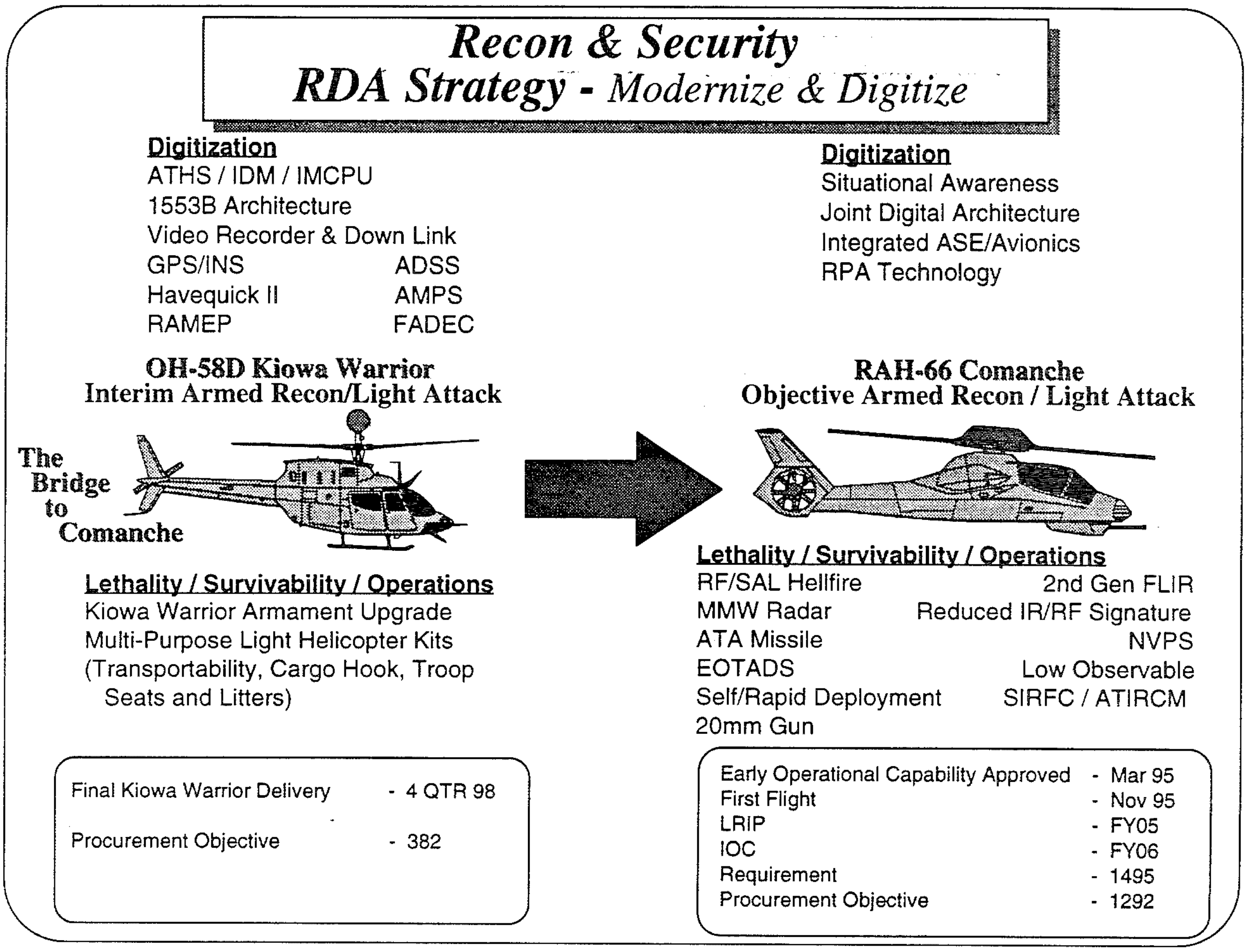


Figure J-14

Attack. The mid- and far-term objective is to modify 758 AH-64As to the AH-64D Longbow Apache. Approximately 227 AH-64Ds will be equipped with the Longbow mast-mounted millimeter wave (MMW) fire control radar (FCR) and T700-GE-701C engines. All aircraft will receive total electronic integration; precision inertial and GPS navigation; state of the art weapon, display, and system redundant processors; MANPRINT cockpit; joint compatible digitized communications suite; interactive electronic technical manuals; and aircraft reliability improvements. AH-64As will be modified with identified Operation Desert Storm RAM modifications prior to modifying to the AH-64D.

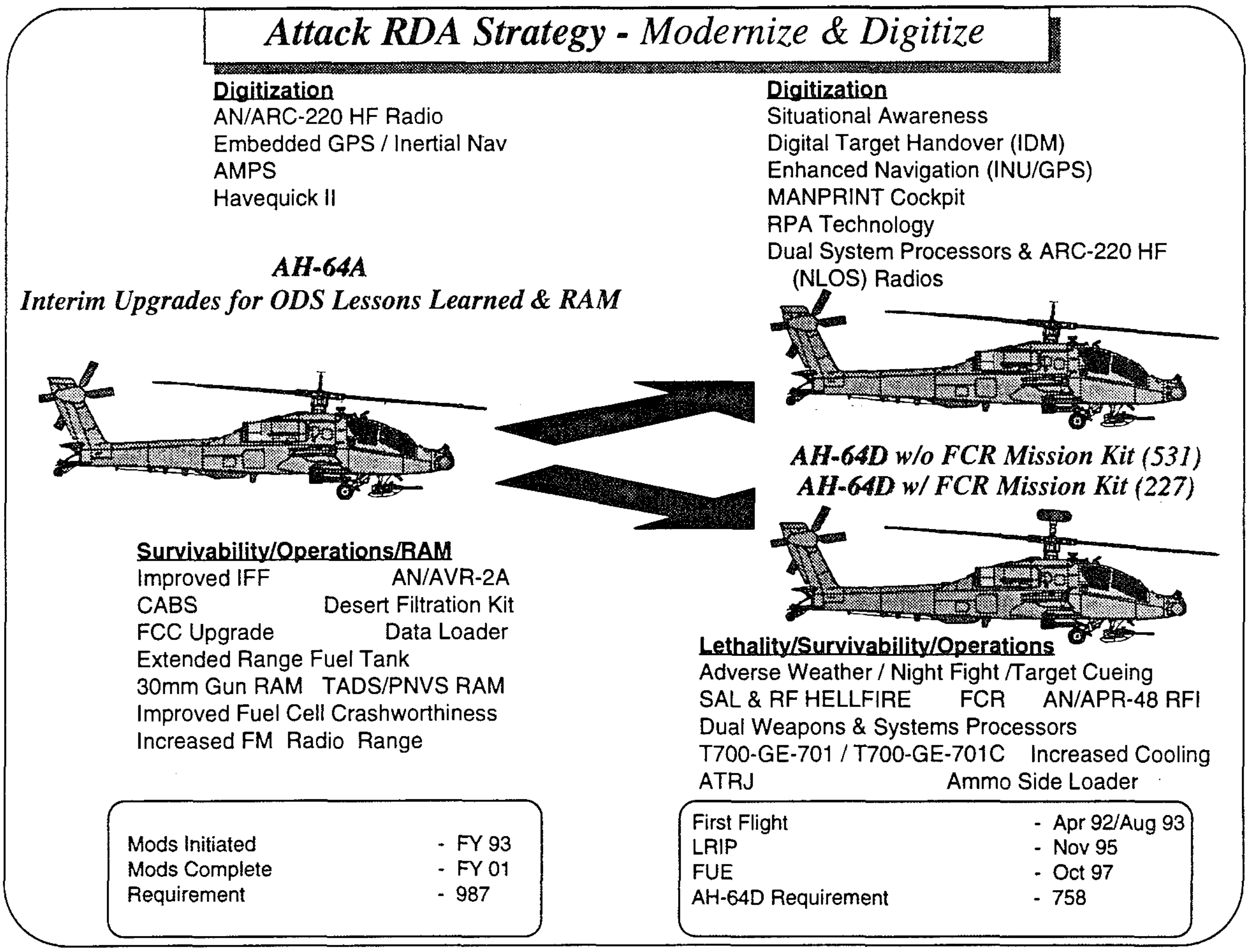


Figure J-15

Utility. Modernizing the utility fleet requires 2,045 UH-60A/L, 66 EH-60A/L, 81 MH-60A/L/K, and 131 light utility helicopters (LUH) for light cargo, liaison, courier, command support, general support, and other secondary tasks. The POM terminates UH-60 procurement after FY96 at 1450 (not including SEMA) aircraft which will necessitate retention of 964 UH-1 aircraft in the inventory. Modernization of the UH-60 continues with the standardization of 300 pre-1989 A-models to the 1989 A-model baseline configuration (less hardpoints), and digitization, electromagnetic environment protection and improved radar warning upgrades. Upgrade of selected UH-60s with the Army Airborne Command and Control System (A2C2S) will provide commanders an effective, integrated, interoperable, airborne C2 system. Modification and improvements to SOA's C2 console will enable the commander to monitor the battlefield and plot current threat information via the digital map. He will have an enhanced capability to receive and transmit digital tactical information near simultaneously over joint communications nets. Alternatives for unresourced LUH requirements include an upgraded UH-1 (avionics/wiring upgrade), a commercial aircraft, or the UH-60. A UH-60 modernization program (unfunded) is required to assure effective operation of the older UH-60 fleet through the year 2025. Requirements include numerous RAM/safety/O&S cost reduction modifications and the incorporation of a 1553 data bus and associated avionics improvements for digital interoperability and maintenance support. Far-term funding is programmed to restart the UH-60 production line at 36 aircraft per year.

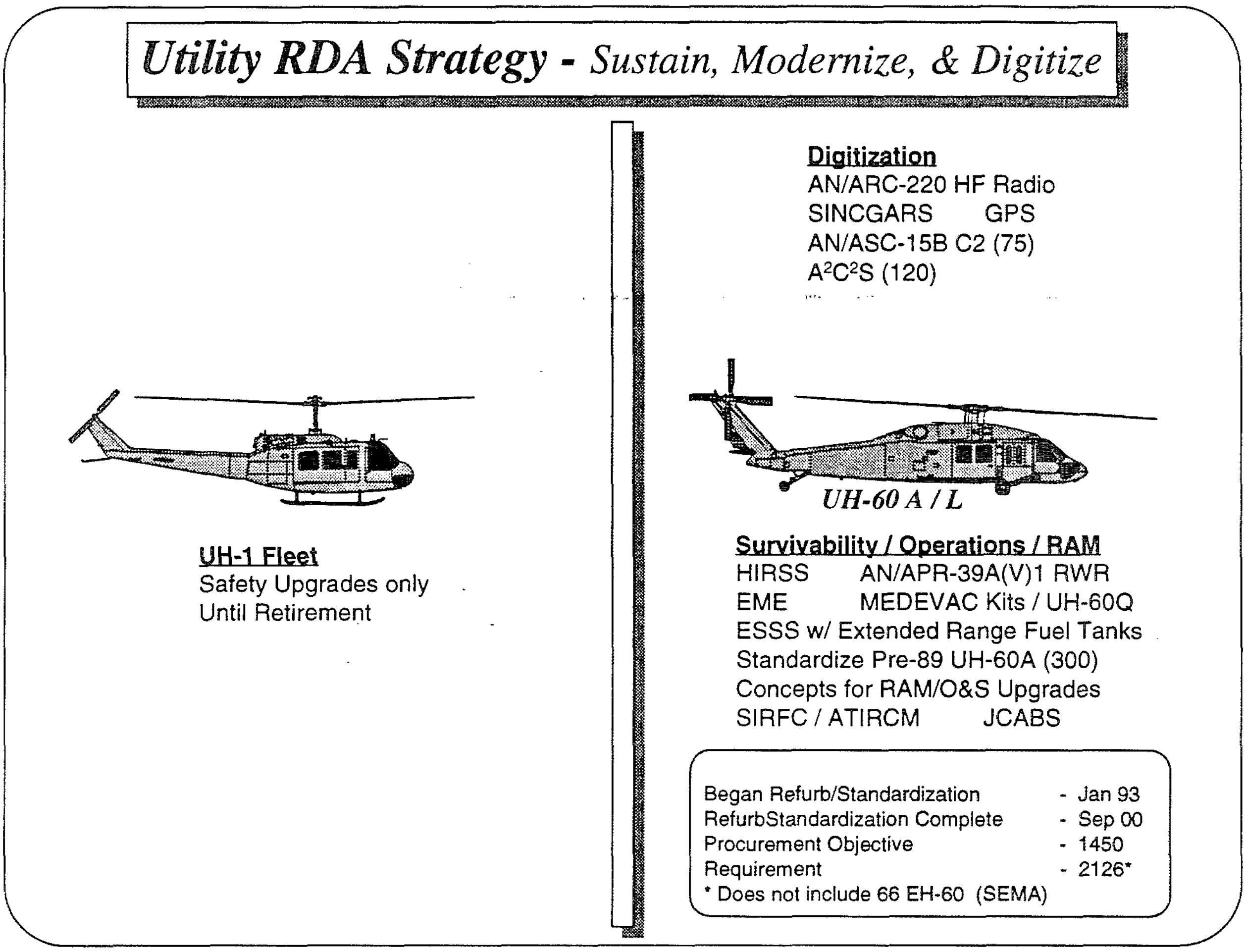


Figure J-16

MEDEVAC. Although the MEDEVAC requirement is currently 447 Blackhawk aircraft, the requirement for 87 UH-60Qs is currently unfunded in the POM, as are future fieldings of UH-60As beyond the 225 total expected by 1998. This will leave the MEDEVAC fleet fielded with UH-1 aircraft well into the next century.

Cargo. The force structure requires 488 CH-47Ds and 37 MH-47D/E. CH-47D procurement has been completed with the acquisition of 444 CH-47D, 11 MH-47D, and 26 MH-47E. The CH-47D modernization program extended aircraft life by approximately 20 years; consequently, the aircraft will begin to reach the end of programmed life in FY02. Studies are underway to define CH-47D upgrade requirements. The objective is to sustain the CH-47 through an Improved Cargo Helicopter (ICH) program with upgrades/service life extensions followed by a replacement system in the far-term. An immediate requirement is to upgrade the engine from the current 712 to a 714 with FADEC. This is required because the current 712 engine does not meet the present requirement. This upgrade will be completed separately from the ICH program.

The Advanced Cargo Transport (ACT), an Army cargo helicopter replacement, is in the early stages of concept development. The Joint Transport Rotorcraft (JTR) program is an S&T effort that will support the ACT requirement, as well as an envisioned joint service/commercial transport requirement. The JTR is in the early stages of concept development and is targeted to enter Army service in the 2020-2025 timeframe.

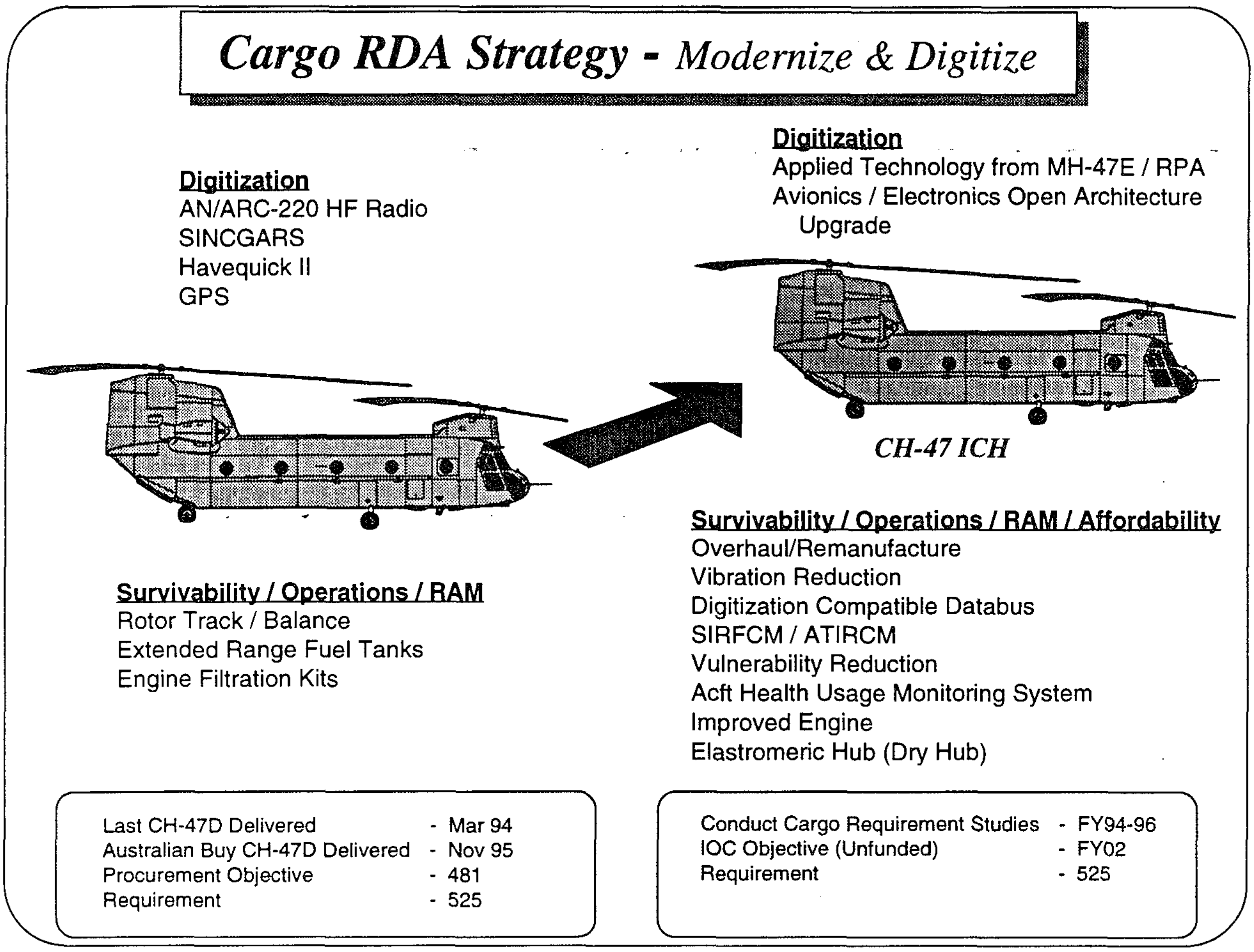


Figure J-17

SOA. Priorities for SOA RDT&E is the future A/MH-6 variant, SOA RAH-66 Comanche, next generation medium lift/assault (MH-47X or MH-XX), and the next generation Utility Assault. We must initiate the requirements for the follow-on generation of aircraft and improve survivability. SOA's C4I architecture must be common with the Army and compatible on the Joint battlefield. We must use technology to continue to "own the night". Our future revolves around our leverage of Army technology with minor modifications to meet our new missions. SOA's improvements across the fleet involve improvements to the airframe, communications, navigation, and weapons systems.

SOA Reconnaissance, Security, and Light Attack. Modernization plans for the MH/AH-6 "Little Bird" include current improvements to reduce weight and enhance mission capability. Near-term improvements include completion of the light weight weapons mounting platform or PLANK, fielding of the conformal fuel tanks and upgrading to the Airborne Electro-Optical Special Operations Payload (AESOP). The ASEOP provides a Hellfire guidance capability to the FLIR. Near-term objectives center around improvements to the powertrain, rotor system and structure under the Mission Enhanced Little Bird program (MELB). Other improvements include cockpit optimization and digitization including the next generation of FLIR. The direction for far-term requirements depend on the RAH-66 Comanche. SOA's "Little Bird" variant will complement the RAH-66 Comanche providing the deployability inherent in the MH-6 airframe with enhanced sensors and communications. To expand its role, maximum use of strap-on technology is planned for weapons, sensors, and special mission equipment.

SOA Utility. Modernization strategy for the MH-60L/K fleet revolves around installing the Aerial Refuel Probes, integration of the embedded Inertial Navigation System (INS), Global Positioning System (GPS), advanced ASE, passive TFTA, and upgrades to the communications suite. The Improved Defensive Armed Penetrator (IDAP) will receive a new weapons management system (WMS), AESOP, and an air-to-air capability. The C2 platforms and console will be upgraded with the digital map and MATT radio along with the upgraded communications capability. In the far-term, SOA efforts will include replacement of the IDAP with possibly the RAH-66 Comanche and initiatives to identify a next generation utility aircraft.

SOA Cargo. Modernization strategy for the MH-47 fleet includes the fleet fielding of digital map, TFTA, upgraded communications suite, and the embedded INS/GPS. The MH-47 C2 platforms and consoles will be standardized with the MH-60 platforms providing the same capability. Involved in the ASE package will be an IR suppression system for the MH-47.

Utility Fixed Wing. The utility fixed wing modernization strategy is focused on the requirements for Service Support Aircraft (SSA) and CINC Support Aircraft (CSA). The current SSA fleet consists of C-20 Gulfstream and C-21 executive jet aircraft plus C-12, C-26, U-21, and A-90 turboprop aircraft. Modernization of the fleet includes an avionics upgrade to standardize C-12 cockpits, upgrades to commercial standards for the C-20 fleet, and the acquisition of C-XX Short and Medium Range (SR/MR) aircraft. The C-XX (MR) is a nondevelopmental commercial aircraft that supplements the C-20, C-21, and C-12 aircraft; it rapidly deploys senior leaders during initial operations. The C-XX (SR) is a proposed program to replace the aging U-21 and older C-12 aircraft as it reaches the projected 30 year life. The current POM slips the C-XX (SR) program beyond FY01. The current CINC Support Aircraft (CSA) fleet consists of the C-23A/B Sherpa, C-12, U-21, and non-standard aircraft. The Multi-Mission Medium Tactical Transport (M3T2) aircraft is an unfunded, proposed, common platform which performs the Airborne Common Sensor (ACS), special operations, and intra-theater utility cargo missions. Acquiring these aircraft permits reduction and standardization of the fixed wing fleet to four basic airframes.

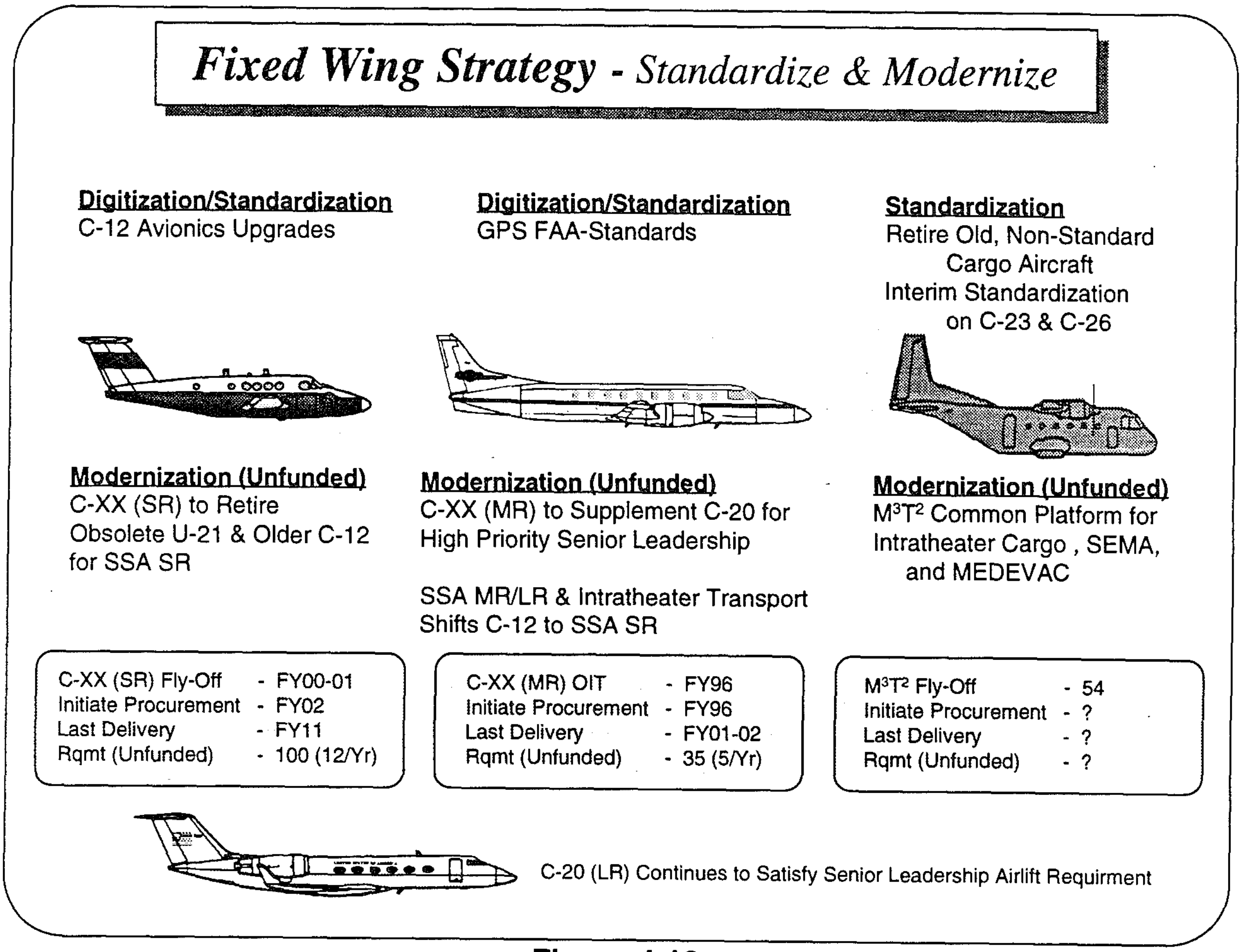


Figure J-18

Core Programs. Essential to the support and sustainment of our major aircraft programs are "core" aviation programs. These programs provide required mission and support equipment, as well as upgrades or new technologies that ensure the mission capabilities and operational supportability of aircraft and aircraft support systems. The core programs include Aircraft Electronic Combat (includes Aircraft Survivability Equipment (ASE) and Aviation Electronics (Avionics)), Aviation Ground Support Equipment (AGSE), Aviation Life Support Equipment (ALSE), and Air Traffic Services (ATS). The priority is to modernize first-to-fight units and their supporting elements.

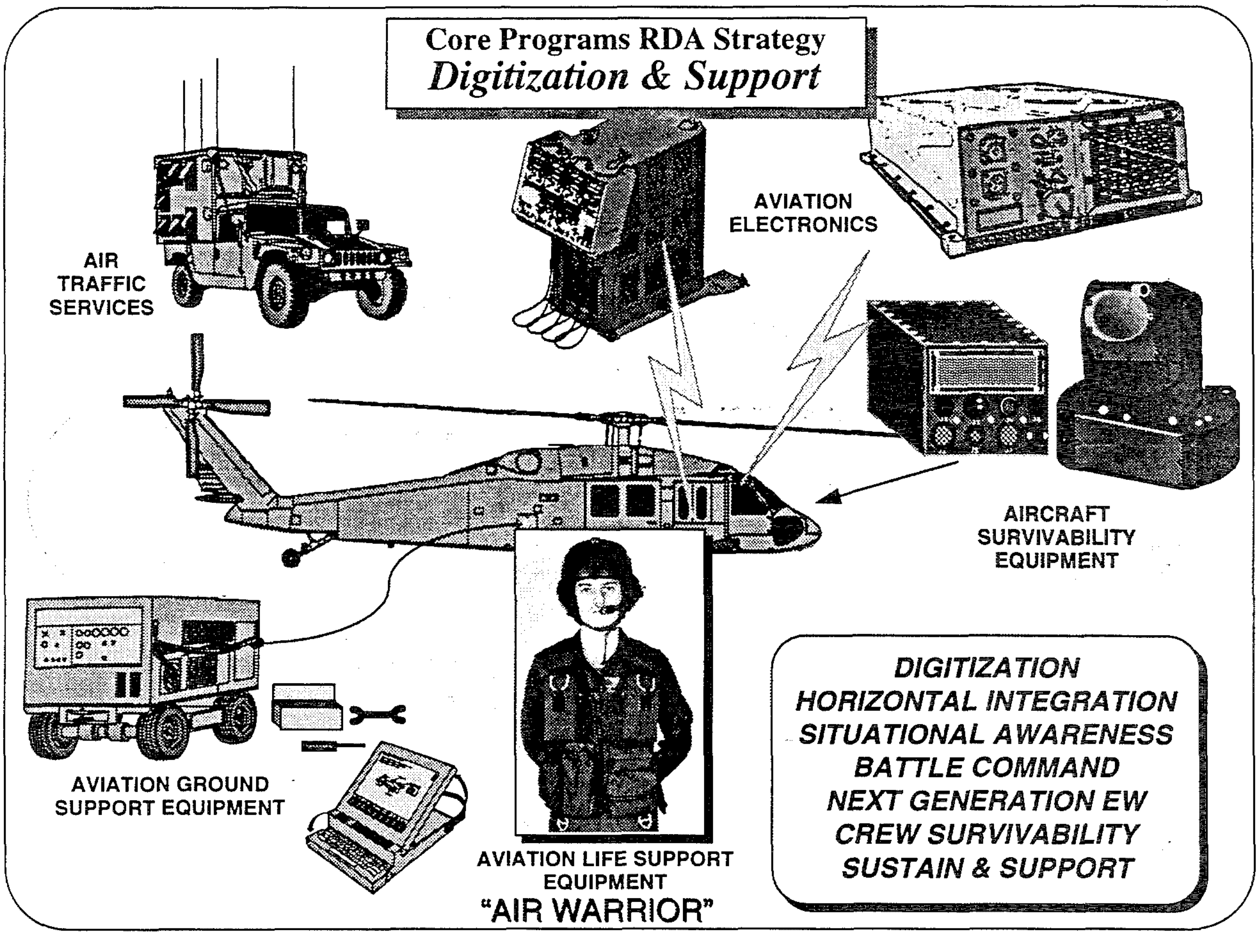


Figure J-19

ASE. The ASE program includes radio frequency (RF), infrared (IR), and electro-optical (EO) countermeasure devices to detect and defeat threat anti-aircraft systems. As Army aviation continues to modernize, aircraft systems must have necessary ASE items installed at the production line or via field retrofit. Advanced Threat IR Countermeasures (ATIRCM) and Suite of Integrated Radar Frequency Countermeasures (SIRFCM) are the two most critical ASE programs for Army Aviation electronic warfare. They provide robust situational awareness, improved target identification, interfaces for digital target handover, missionized electronic order of battle, and substantially improved effectiveness against current and projected threat. The SIRFC program replaces three aging systems: AN/ALQ-136 pulse radar jammer, AN/ALQ-162 continuous wave radar jammer, and AN/APR-39 radar warning receiver. The SIRFC is a lightweight RF system using an integrated, modular architecture that consolidates warning and jamming functions for consolidated multi-spectral countermeasures response.

SOA's near-term focus will incorporate Infra-Red (IR)/Radio Frequency (RF) countermeasures, such as the ALE-47 and advanced jammers to defeat current and projected threat systems. Long-term solutions for SOA include the advanced threat IR countermeasures (ATIRCM) and advanced threat radar jammer (ATRJ) programs being fielded for the total force as well as incorporating passive technology and low possibility of intercept (LPI)/low probability of intercept (LPD) to reduce detection.

Avionics. The avionics program addresses digital battlefield capabilities to: ensure aviation meets Force XXI combined arms and joint requirements for digital battlefield communications, navigation, information interchange, and target handover; that the avionics components are compatible, interoperable, and supportable; and, that optimum use is made of common and synergistic components. The avionics acquisition strategy is to develop and migrate to a comprehensive computer, communications, electronics and power architecture. The on-board ASE systems will not only protect aircrews, but will become additional sensors, passing back information to update the commander's picture of the battlefield. The common architecture across all Army systems will improve information transport, data processing, and will provide soldiers and commanders with complete and timely situational awareness. Hardware programs include: GPS (including embedded GPS); AN/ARC-220 Nap-of-the-Earth Communications High Frequency Radio; AN/ARC-164 Havequick II radio; Improved Data Modem; A2C2S; Aviation Mission Planning Station (AMPS)/Data Transfer System; and Aviation Tactical Operations Center (AVTOC). Simulation and technical architectures are tools being used to ensure the Army meets fully integrated digitization goals.

Improvements to the communications and navigation suites for SOA ensure compatibility with Single Channel Ground-Air Radio system (SINCGARS), the UHF radio program (HAVEQUICK), satellite communications (SATCOM), and integrates the AN/ARS-6 personnel locator system (PLS). All systems will be 1553 data bus compatible and will reduce cockpit clutter. As SOA fields SOF peculiar equipment, modernization of the aircraft complements the modernization of the total force.

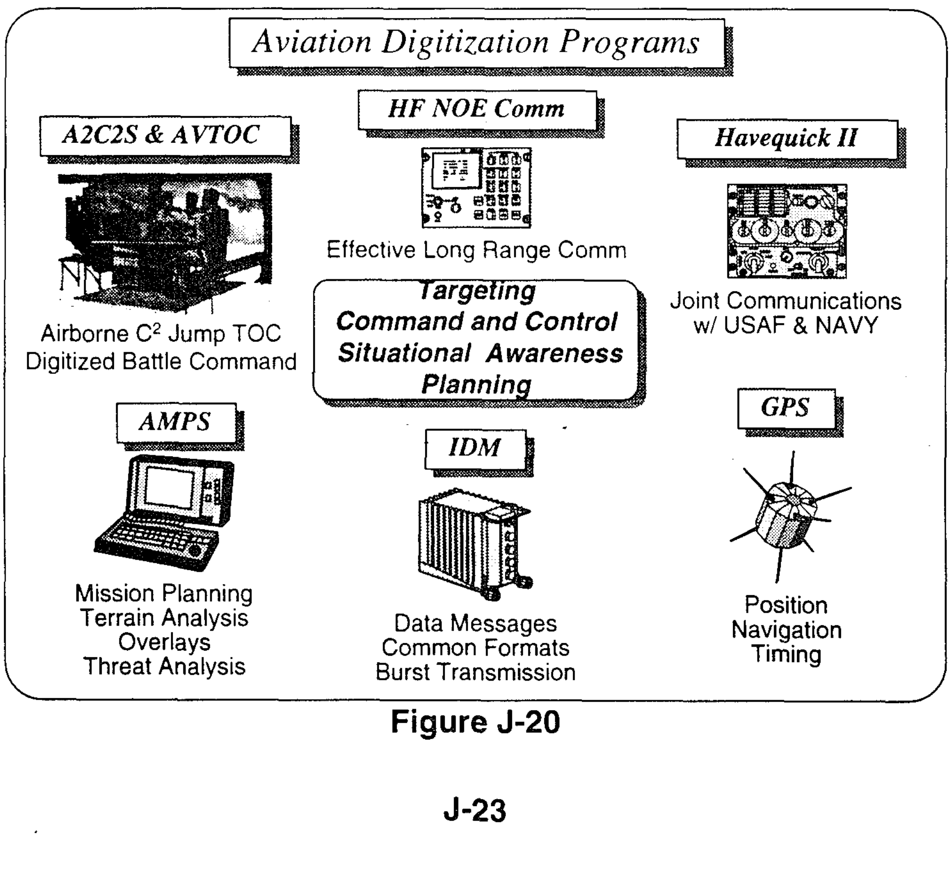


Figure J-20

AGSE. The AGSE program develops and procures GSE; Sets, Kits and Outfits (SKO); and cargo handling equipment. The program maximizes the use of nondevelopmental items for materiel development and acquisition. Major efforts include: Unit Maintenance Aerial Recovery Kit; the Soldier Portable On-System Repair Tool; the Unit Level Logistics System-Aviation; and the divisional and non-divisional AVIM shop set complexes. Examination of programs that support AVIM modularity is also being conducted. The ARI and changes to ARI are also being examined with regard to modularity and the impact on the basis of issue for GSE, SKO, and materiel handling equipment (MHE). The main focus is to ensure that AGSE acquisition and fielding is compatible with Force XXI objectives and task organization of support elements. The Advanced Aviation Forward Area Refueling System will provide more reliable, rapid, and safer tactical refueling of aircraft capabilities. MHE for ammo and fuel handling is essential to tactical warfighting enhancements. Cargo handling equipment improvements use new technologies and concepts for cargo loading, off-loading, and transportability for potential application to the ICH and JTR.

ALSE. The Aviation Life Support Equipment (ALSE) program encompasses items of equipment needed to protect, sustain, and enhance the performance of Army aircrews and passengers on the ground and during flight. The primary ALSE emphasis is on the joint services Air Warrior (AW) program. The AW design will use a modular approach to allow the commander and aircrew to tailor the system to their specific mission. The design will also allow for future enhancements and expansion of the AW system and interfacing equipment. The Air Warrior requirement and evaluation process will also determine which life support equipment technologies and programs should transition from the RDECs, other services, as well as from industry via nondevelopmental items as near-term fixes. The other major ALSE effort is the Cockpit Air Bag system (CABS). The installation of airbags in helicopters is expected to reduce potentially survivable aircraft crash fatalities by 23% and severe injuries by 50%.

SOA continues to improve passenger small arms protection with the Ballistic Armor Suppression system (BASS) and the Small Arms Protection system (SAPS), reducing weight of the removable armor paneling while providing improved protection.

ATS. To support Army and worldwide commitments, Air Traffic Services (ATS) must be capable of supporting various types of aircraft across the entire operational continuum. As new systems and technologies are inserted in the aviation fleet, ATS concepts, doctrine, and systems must keep pace. Operational requirements for Air Traffic Control (ATC) hardware focus primarily on ATS support of Army Airspace Command and Control. However, ATS also contributes to total force battle command through enhanced situational awareness. Four tactical ATS systems are funded for development and acquisition: the Tactical Terminal Control System; Air Traffic Navigation, Integration, and Coordination System; Tactical Airspace Integration System; and Mobile Tower System. These systems provide the digital link among tactical ATS, aircraft, and the Army Tactical Command and Control System. Fixed base ATS supports joint, combined, and individual service training and provides equipment to support force projection deployment airfields. In concert with FAA programs to modernization the National Airspace System (NAS), fixed base ATC facilities will be upgraded for NAS integration so they are transparent to the user.

Munitions. The Hellfire II and RF Longbow Hellfire missiles are complementary systems for both the AH-64D and RAH-66. The missiles permit precision engagements in electro-optic countermeasure environments and adverse weather. The Hellfire II has an enhanced laser seeker, is countermeasure hardened, and has an improved lethality warhead. The Longbow Hellfire missile uses the Hellfire II missile bus and warhead and incorporates a MMW seeker. Hellfire II production terminates in FY95, short of the inventory needed to replace the defeatable SAL-Hellfires. Production of the RF Longbow Hellfire begins in FY97. Concepts are being evaluated for a low cost precision kill (LCPK) weapon guided munition (to complement the Hydra-70 family of rockets and supplement Hellfire) to provide a cheaper, more capable means of defeating non- or lightly armored targets in clutter and urban terrain. The Army's Combined Arms Weapons System (TACAWS) is an Advanced Technology Demonstrator (ATD) effort to develop a common combined arms missile (to replace TOW and Stinger) and a UH-60 door-gun compatible with ground systems.

Aviation Science and Technology Program. The aviation S&T program is the underpinning for technology, and aircraft/avionics integration programs. It develops the foundation for aviation's system upgrades and next generation/future systems capabilities to meet changing threats, mission requirements, and to support the modernization strategy. Through the tri-Service Project Reliance and Joint Aeronautical Commanders Group, the aviation S&T program is the DoD lead and focus for rotorcraft technologies. The Army Science and Technology Master Plan details the S&T strategy for aviation. The aviation S&T strategy (Figure J-21) shows the interrelationship between aviation disciplines, Technology Demonstrations (TD), and ATDs. The Aviation S&T program addresses: aeromechanics; flight controls; structures; drive trains and propulsion; subsystems; weapons integration; aircrew-aircraft integration and human-machine crew integration; survivability and safety; and advanced concepts for DoD rotorcraft. It addresses these via application of DoD, NASA and academic resources, simulation, virtual prototyping, and Integrated Product and Process Development. These approaches reduce risk, minimize costs, and enhance multi-service and dual-use applications derived from the aviation S&T program.

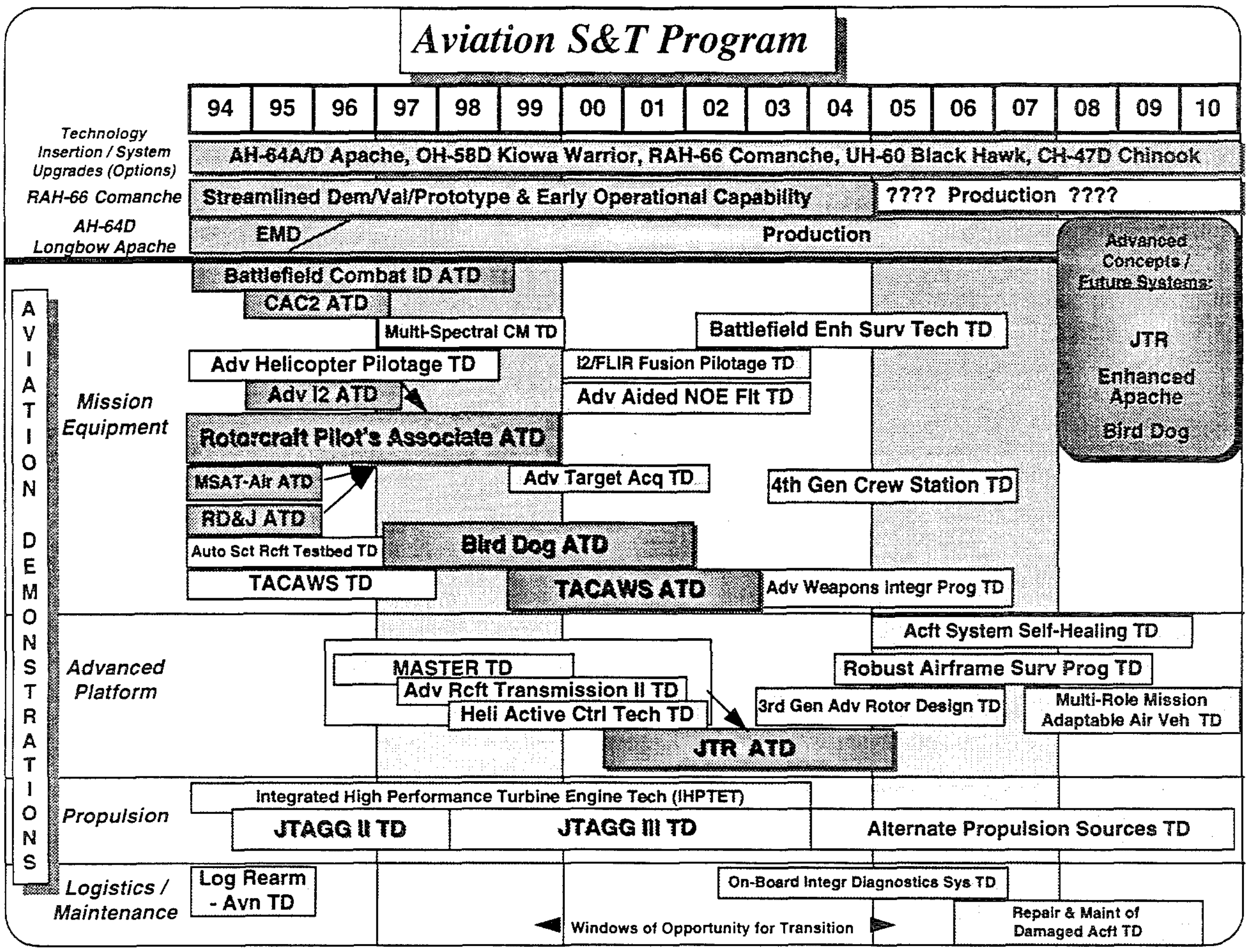


Figure J-21

Aviation Demonstrations. The key Aviation ATD is the Rotorcraft Pilot's Associate (RPA). The RPA ATD develops and demonstrates revolutionary improvements in combat helicopter mission effectiveness through the application of Artificial Intelligence (AI) for Cognitive Decision Aiding (CDA), plus integration of advanced pilotage, target acquisition, weapons and fire control, communications, controls and displays, navigation, sensors, survivability, and flight control technologies. The RPA technology is targeted for use in the AH-64D Longbow Apache, RAH-66 Comanche, and special operations aircraft. Other ATDs supporting aviation include Battlefield Combat Identification, Advanced Image Intensification (I2), and Radar Deception and Jamming (RD&J). Current TDs that are candidate ATDs include: Bird Dog (a concept for a manned helicopter and UAV team), JTR (envisioned as a rotorcraft with the potential to meet military cargo and troop transport needs), and TACAWS Air-to-Air and Air-To-Ground (ATA/ATG) integration (demonstrates the integration on a rotorcraft of a lightweight, fire-and-forget, multirole missile system for air-to-air and air-to-ground engagements). Air/Land Enhanced Reconnaissance and Targeting (ALERT) is a proposed ATD of a flying testbed of a automatic target acquisition suite which synergistically processes target features from a 2nd Generation FLIR and laser sensors. Technology demonstrations in support of JTR address airframes, structures, rotors, and transmissions. Key TDs are: Joint Turbine Advanced Gas Generator (JTAGG) which seeks to demonstrate improvements in performance, efficiency, and power-to-weight ratio over current production engines; Manufacturing and Structures Technology for Efficient Rotorcraft (MASTER); Helicopter Active Control Technology (HACT); and Advanced Rotorcraft Transmission (ART).

Horizontal Technology Integration (HTI). Army aviation is developing advanced capabilities which can provide solutions to required battlefield capabilities for other members of the combined arms team; specifically: Comanche computer processors, Enhanced Communication Interface Terminal, A2C2S, AMPS, Comanche 2nd Generation FLIR, RPA's Cognitive Decision Aiding System, ANVIS Heads-Up Display, turbine engine technologies, and maintenance prognostics/diagnostics. Additionally, the joint Integrated Communications, Navigation, and Identification Avionics program has tremendous HTI potential. Programs such as AI2, I2/FLIR Fusion, MSCM, TACAWS, and LCPK weapon have also been conceived as multi-application efforts supporting armor, air defense, intelligence/electronic warfare, SOF, as well as aviation requirements.

Battle Laboratory Initiatives. Aviation participation in battle laboratory experiments and demonstrations focuses on the Force XXI objectives and improving our ability to conduct C2, acquire targets, collect and disseminate battlefield information, and plan missions with increased flexibility. The Aviation Force XXI Campaign Plan defines aviation capabilities required to achieve Force XXI goals and identifies Advanced Warfighting Experiments (AWE) and ATDs to examine these capabilities. Near-term battle laboratory participation centers on digitization of the battlefield, early entry force design, and Theater Missile Defense. Upcoming experiments emphasize organizational redesign and integration of information age technology into brigade through Corps. Aviation will integrate near-term and follow-on concepts such as AVTOC, A2C2S, TAIS, Longbow, Comanche, RPA, Bird Dog, and JTAGG, into these AWEs/ATDs to create a more agile, versatile, and lethal aviation force. Initial planning has begun with the Mounted Battle Lab to include RPA, Advanced Precision Kill Munition, and Bird Dog in a series of Advanced Lethality AWEs.

Conclusion. Aviation's RDA strategy applies our constrained resources to address the most critical warfighting needs. Funding realities result in program slips and numerous unfunded requirements. The shortfall between the UH-60 requirement and procurement objective through the POM requires indefinite retention of over 950 UH-1 aircraft. Delays in RAH-66 procurement will force retention of AH-1 and OH-58A/C until the 2020 timeframe. In this timeframe, the last aircraft produced in these fleets will be between 37 (AH-1) and 47 (OH-58A/C) years old. Retirement of the OH-58D Kiowa Warrior fleet will be delayed until after FY25. For our cargo fleets, the Improved Cargo Helicopter life extension to the CH-47D applies an interim solution to a major operational concern: the need to sustain an airframe approaching 40 years of age at the turn of the century. The same can be said for the fixed wing fleet, as the retirement of U-21 aircraft procured in the 1960s and early 1970s has been delayed by lack of a replacement. As the modernization strategy is stretched beyond the POM years, additional sustainment/modernization issues must be addressed for the UH-60, AH-64, and OH-58D Kiowa Warrior.

SECTION 4

CONCLUSION

The future of Army aviation has been mapped out along a path to achieve a fully modernized, Force XXI-capable combat arm. This plan is a realistic, proactive course of continuous improvement supporting National Military Strategy and Army modernization objectives.

Figure J-22 summarizes aviation program resourcing under the FY97-01 Program Objective Memorandum (POM). *Fiscal shortfalls over the POM place the aviation modernization program at risk in a number of areas.* A number of critical aviation programs are unfunded. The UH-60 multi-year procurement program was stopped after 1996, leaving a shortfall of over 700 UH-60s to fill a four corps, 18 division requirement. Aviation digitization programs are, for the most part, only funded for units of our contingency forces. This creates potential incompatibility within the aviation fleet. There are no procurement dollars to support the CH-47D service life extension/ sustainment program. Moreover, these airframes will begin approaching 40 years of age at the turn of the century. A replacement aircraft, the Joint Transport Rotorcraft, is not envisioned until the FY20-25 timeframe. Both AH-64D and RAH-66 receive funding in the POM.

POM FY97-01

DOES:

RAH-66	• RDT&E Streamlined Funding • Build 2 Prototypes & 6 EOC Acft
AH-64D	• Ramps to 52 from a 72/yr plan • Procures LB Hellfire Missile • Funds TESS RDTE
AH-64A	• RAM and ODS Fixes • Funds TADS/PNVS/CATB
FW, CH-47 OH-58A/C, AH-1, UH-1	• Provides Min Safety of Flt Mods
CORE	• Minimum ATC, ALSE, ASE, AGSE • Digitizes most of Contingency Force
UH-60	• Min Mod Funds Incl Most of Refurb Program • Completes FY92-96 Multi-Year Plan
OH-58D Kiowa Warrior	• Partially Completes Engine, Processor, Digit.Upgrades • GPS/INS • CSMET

DOES *NOT:*

RAH-66	• Procure any aircraft
AH-64D	• Complete FCR and T700-GE-701C Procurement / Upgrade
UH-60	• Continue Procurement after FY96 • No LUH • No UH-60 Life Extension
OH-58D Kiowa Warrior	• **Fund Requirement for 507** • **Complete the Requirement for 10 Kiowa Warrior Retrofits** • **Complete Engine, Processor, and Digitization Upgrades**
CH-47	• Fund CH-47D Life Extension
Hellfire	• Procure Hellfire II for Total Rqmt
NTH	• Procure 74 Tactical Helicopter Trainers
UH-60Q	• Modify any UH-60A MEDEVAC
AVCATT	• No Funding until FY01
Fixed Wing	• Buy C-XX or M3T2 • C-12 Avionics Upgrade
TADSS	• Integrate System / Non-System TADSS

Figure J-22

However, the production decision for RAH-66 is deferred beyond the POM and the Longbow Hellfire cost reduction program is underfunded. Continued Congressional and OSD support for both of these programs is critical. In the fixed wing arena, the POM provides no funding for C-XX or M3T2, and severely under funds the C-12 avionics upgrade. Our number one S&T program, the Rotorcraft Pilot's Associate ATD, has been stretched out to FY99 due to significant cuts in FY94. There is no funding to procure a Tactical Helicopter Trainer to replace the OH-58A/C aircraft currently used to conduct combat skills training for Initial Entry Rotary Wing (IERW) training. Full funding for next generation EW systems (SIRFCM) and (ATIRCM), digitization, and other core programs is essential to realize aviation situational awareness, tactical flexibility, combat support, and sustainment.

Army aviation supports soldiers worldwide today. Aviation is organized to optimize its unique capabilities, both in peacetime operations and in combat. Whether conducting tactical reconnaissance, security operations, force protection, attack helicopter operations, air assaults, combat support, or combat service support operations, *aviation enhances the efficiency and effectiveness of all battlefield operating systems while bringing its own unique capabilities to the fight-- capabilities that complement those of other arms and services.* While the possibility of a major conflict exists, crises short of such conflict are more probable. These require response by rapidly assembled and projected forces, to locations throughout the world, on a moments notice. Just Cause, Desert Storm, Restore Hope, and Uphold Democracy are recent examples. Aviation is uniquely suited to meet such challenges; however, sufficient funding of key aviation programs is necessary to ensure the continued essential warfighting capabilities of this highly versatile force.

The Aviation Modernization Plan (AMP) is a resource-constrained strategy which identifies the significant shortfalls in reconnaissance/security; provides attack helicopter fixes; makes major strides in digitizing the force; and sustains our utility, cargo, and fixed wing fleets. It emphasizes the necessity of fully fielding both Comanche and Longbow Apache because they give the Army the highest payoff in warfighting capabilities. Without these systems, the cost to our nation could be much higher, both monetarily and in risk to lives. Given adequate resourcing, the AMP ensures aviation will continue to provide support across the range of military operations while significantly contributing to the Army's modernization goals and the attainment of its Force XXI objectives.

ANNEX K

NUCLEAR, BIOLOGICAL AND CHEMICAL

SECTION 1

INTRODUCTION

> *"In fact, in most areas where U.S. forces could potentially be engaged on a large scale, many of the most likely adversaries already possess chemical or biological weapons. Moreover, some of these states appear determined to acquire nuclear weapons. Weapons of mass destruction in the hands of a hostile regional power could threaten not only U.S. lives and U.S. interests but also the viability of U.S. regional power projection strategy."*
>
> Secretary of Defense's Annual Report to Congress, February 1995

Military forces of the future face unpredictable potential nuclear, biological, and chemical (NBC) threats in numerous regions throughout the world. This situation requires continuous modernization to produce versatile, rapidly deployable forces capable of fighting and winning in the future strategic environment. This 21st Century Force must train to fight and win against any enemy possessing Weapons of Mass Destruction (WMD). The Army must maintain a strong NBC defense capability to ensure force survivability after an NBC attack and sustained operations in an NBC contaminated environment. The cornerstones of future success include:

- Adequate resourcing of NBC defense programs;
- A joint Service approach to NBC defense;
- An aggressive NBC defense training program;
- Doctrine to emphasize operational tempo and force protection as equal goals;
- Using Information Age technology to improve warning and reporting systems;
- Enhancing faster response to NBC attacks.

The NBC mission area modernization strategy will ensure that U.S. forces can fight and win after a WMD attack.

NBC modernization will focus on doctrine, training, leadership, organizational, materiel, and soldier improvements that allow forces to:

- Identify and avoid NBC hazards;
- Survive NBC attacks and operate within the NBC battlespace; and
- Employ smoke and obscurants.

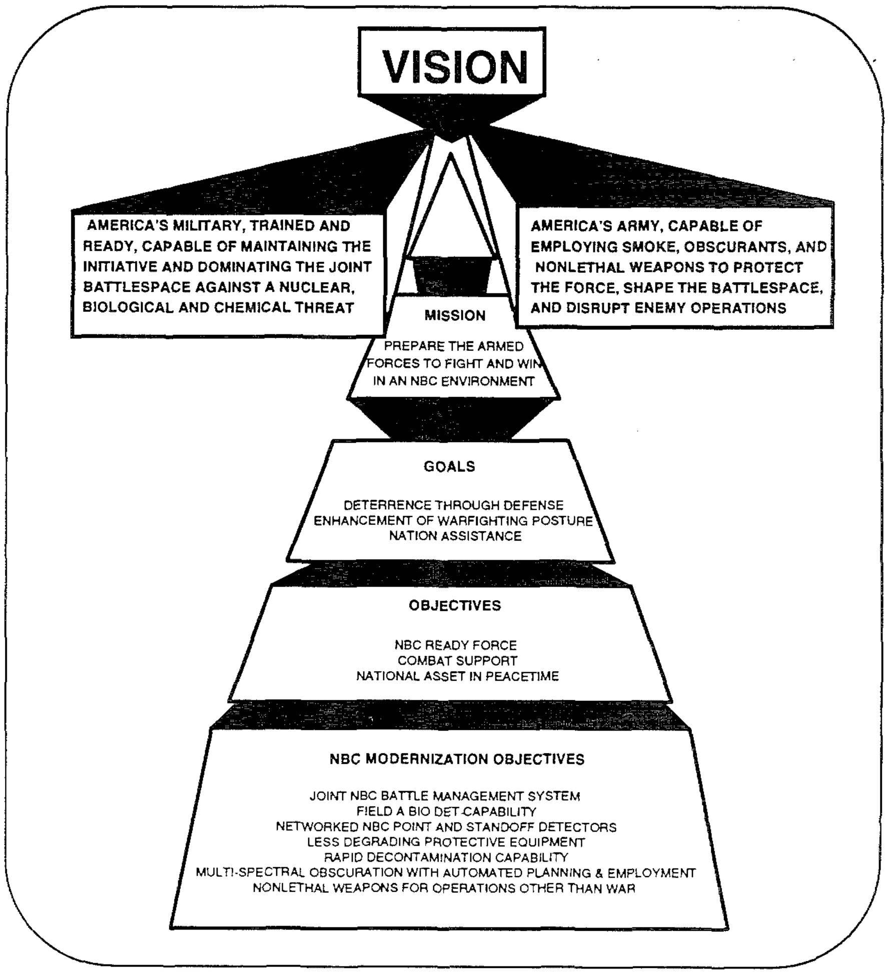


Figure K-1

Threat

The NBC threat has evolved into one of the world's most troubling concerns. WMD programs proliferated through the developing world beginning in the 1960's and continued in the 1980's when chemical and toxin weapons were used on the battlefields in North Africa, the Middle East, and Southeast Asia. This trend has continued in the 1990's, with chemical and biological (CB) agent types expanding and most WMD states having deep strike capabilities through ballistic missile programs.

Nuclear. Besides the five declared nuclear states, four and possibly five Third World states have nuclear weapons. Russia and the former Soviet Republics hold 30,000 nuclear weapons. China is modernizing its nuclear delivery capability. By contrast Third World states have a few low yield nuclear weapons deliverable by aircraft, missile, or by unconventional means such as trucks or ships. Their employment doctrine is less defined and their criteria for use are less predictable.

Biological. At least eleven countries are developing biological weapons. The effectiveness of biological warfare (BW) agents can now be enhanced through advanced biotechnology. Viruses may be made resistant to identification and treatment. Bacteria can be developed through genetic engineering that are environmentally durable. BW agents can be delivered by missiles, aerosol generators, aerial line sprays, or unconventional forces. Currently, BW agents are the cheapest WMD to produce and the hardest to detect. In August 1995, Iraq admitted to U.N. inspectors that it had developed a comprehensive biological warfare program with a full range of agents (anthrax, botolinom toxin, aflatoxin, ricin toxin, and others) weaponized for delivery by ballistic missiles, aerial bombs, rockets, artillery, and UAVs.

Chemical. As many as 25 nations are producing and stockpiling chemical weapons. Weapons systems from mortars to missiles can deliver chemical warfare (CW) agents. CW agents can penetrate defenses which protect troops from conventional high explosives. Currently, research is being conducted on new CW agents which will be more difficult to detect, decontaminate, and treat, and may penetrate standard charcoal filters.

Industrial Hazardous Material. During the fighting in Bosnia, Croatian fighters secured railroad tank cars and filled them with chlorine gas. The Croatian leaders then surrounded a key city with the tank cars and threatened to blow them up if the Serb fighters were to enter the city. The threat from intentional or accidental release of industrial hazardous material can cause serious casualties to U.S. forces in wartime actions or in operations other than war. This threat is not limited to chemical hazards but includes radioactive material from civilian nuclear reactors and research facilities, and biological material from hospitals.

Insurgent and terrorist groups can acquire or produce NBC materials. The Tokyo subway incident of March 1995 was not the first threat or attempt at terrorist CB agent use, but it served as an alert to the threat of CB terrorism. Twelve persons died in the attack and 5,500 were injured. Police raids on the AUM Shinrikyo cult facilities uncovered tons of precursor chemicals, materials for producing BW agent clostridium botulinum, and a document describing the enrichment of uranium through laser technology. Over the last three years, authorities from different countries have confiscated weapons grade nuclear material being smuggled through Europe.

NBC Modernization Strategy

NBC modernization strategy is based on eleven critical functions.

CHEMICAL CORPS MODERNIZATION STRATEGY

	OPTIMIZE READINESS AND TRAINING	PROVIDE MAXIMUM SURVIVABILITY	OVERMATCH OPPONENTS	DESIGN FOR FUTURE MODERNIZATION	MODERNIZE BY FORCE PACKAGING	FIELD SMALLER AND LIGHTER EQUIPMENT
JOINT SERVICE	✓	✓	✓	✓	✓	✓
FORCE XXI	✓	✓	✓	✓	✓	✓
DOCTRINE	✓	✓		✓		✓
FORCE STRUCTURE	✓	✓		✓	✓	✓
NBC INFO SYSTEMS	✓	✓		✓		✓
THEATER MISSILE DEFENSE	✓	✓	✓	✓	✓	
COUNTER-PROLIFERATION	✓	✓		✓		
SMOKE AND OBSCURANTS	✓	✓	✓	✓	✓	✓
COMBINED ARMS IN A NUC/CHEM ENVIRONMENT	✓	✓		✓	✓	✓
ENVIRONMENTAL	✓	✓		✓	✓	
OPERATIONS OTHER THAN WAR	✓	✓		✓	✓	

Figure K-2

Joint Service Applications

The DoD has made significant progress toward implementing Public Law 103-160, the National Defense Authorization Act for FY 1994, which mandated coordination and integration of all Service CB Defense RDA. The Joint NBC Defense Board approved the FY 97-01 Joint Service Chemical and Biological Defense Program Objective Memorandum (POM). This POM consolidated funding for all Service NBC Defense programs based on a joint priority list. A Joint Service NBC Defense Modernization Plan is being developed which will be a single, integrated DoD NBC Defense modernization strategy.

Force XXI

The revolution underway to Force XXI is a result of new and emerging information age technologies. The Chemical Corps is rapidly exploiting these technologies in Force Protection, Simultaneous Operations, and Offensive Overmatch.

Force Protection will benefit from information age technology which will drive advances in NBC reconnaissance, detection, and identification. A digitized warning and reporting system, integrated with detection and identification capabilities, will provide all Force XXI commanders with real time shared situational awareness of the NBC battlefield. This common picture will increase operational tempo as force options expand to avoid contamination and reduce the necessity to encapsulate in protective clothing.

Information age based NBC support will permit the Force XXI division to plan, prepare, execute, sustain, and recover as a seamless process while conducting prolonged simultaneous operations on the contaminated battlefield. Modernized decontamination systems will be versatile, multi-Service, easy-to-use and maintain, lightweight, deployable, and survivable.

Offensive Overmatch for Force XXI operations will require decisive control of the electromagnetic spectrum, the capability to defeat difficult target sets, and the need to limit casualties in certain circumstances. Multi-spectral smoke and obscurant technologies will expand frequency control and remain integral components to dominate the battlespace. Flame and incendiary weapons provide a significant advantage in many engagements. Characteristics such as oxygen consumption and heat generation are effects that expand beyond line of sight, and thus provide an ability to defeat covered or concealed targets. Nonlethal technologies will provide additional options in MOOTW when the force must be able to maintain and enforce peace while minimizing casualties.

Doctrine

Emerging joint and combined doctrine serves as the engine of change for the Chemical Corps as it moves towards Force XXI. New technologies may shape the future force; however, contamination avoidance, protection, and decontamination will remain valid as the three NBC defense principles. Joint Publication JP 3-11, provides Joint Doctrine for NBC Defense. Existing international agreements such as Standardization Agreements and Quadripartite Standardization Agreements are the foundation of coalition operations and should be extended to other allies. Joint and coalition doctrine for force protection, detection, and identification, warning and reporting, and reconstitution and recovery is necessary to establish a framework where all forces can accomplish fundamental NBC defense missions and provide a template for operating with other forces. The challenge is to develop interoperable joint and coalition tactics, techniques, and procedures.

Force Structure

Army Chemical Corps force structure provides NBC reconnaissance and detection, decontamination, and smoke support. The Chemical Force Structure at division is currently being redesigned by TRADOC. Redesign of chemical units at other echelons will be accomplished as a follow-on effort. As part of the Force XXI efforts, chemical force structure will be redesigned to optimize readiness and training, and to better support force packaging. Modular chemical organizations will provide the assets required to protect the force and multiply combat power to ensure continuous combat operations. Because chemical units will continue to be scarce combat support assets, they will need to be fully modernized, providing self sufficient packages to the supported force, and capable of multiple missions.

NBC Information Systems

Force XXI commanders and staffs must have an information system tailored to manage NBC battlefield information. A Chemical, Biological, and Radiological Information Management System (CBRIMS) that fully integrates into every command and control system is critically needed. It must work seamlessly, from the tactical through strategic level, and provide commanders and staffs the ability to automate their decision making process. The CBRIMS will use expert systems and artificial intelligence to maximize the benefits from information operations. It will synthesize data from individual sensors and sensor arrays, and deliver sensor to soldier warning and de-warning resulting in minimum casualties and maximum OPTEMPO.

Theater Missile Defense (TMD)

The Army Chemical School is committed to an accelerated program to enhance TMD passive defense. To focus TMD passive defense modernization, the Chemical Corps, in partnership with the Space and Strategic Defense Command, is developing a comprehensive investment strategy. TMD passive defense modernization efforts will focus on supporting Counterproliferation, reducing enemy targeting effectiveness, enhancing personnel and equipment survivability, warning the force, and planning and executing recovery and reconstitution operations. Based on the lessons learned from the Gulf War, the 1995 TMD Advanced Warfighting Experiment , and large-scale training exercises, force warning is one of the critical passive defense measures requiring modernization.

Counterproliferation

Counterproliferation is the DoD program to address the threat of WMD and their means of delivery. This program includes: supporting proliferation prevention and intelligence activities; deterring the use of WMD; defending against WMD and their NBC effects; and maintaining a robust option to find and destroy WMD forces. Capability improvements are being pursued in seven key Counterproliferation functional areas: proliferation prevention; strategic and tactical intelligence; battlefield surveillance;

counterforce; countering paramilitary, covert and terrorist WMD threats; active defense; and passive defense. The Chemical Corps role in Counterproliferation is primarily in passive defense. The Counterproliferation program leverages existing projects to accelerate fielding of critical NBC defense warfighting capabilities.

Smoke and Obscurants

Smoke and obscurants will continue to play a vital role on the battlefield, acting as a combat multiplier to counter enemy reconnaissance, surveillance, and target acquisition (RSTA). Modernization efforts focus on denying the enemy portions of the electromagnetic spectrum through large area obscuration in visual, infrared (IR), and miliimeter wave (MMW) frequencies, concealing high priority targets including airfields, bridges, ammunition depots, convoys and troop movements, and disrupting enemy operations. Multi-spectral obscurants are at the center of NBC modernization initiatives.

Combined Arms in an NBC Environment (CANE)

The CANE Program is one of the modernization drivers as it evaluates the operational impact of the present and future NBC threat in a Force XXI scenario. This includes determining the effects of an NBC environment on information-based operations, domination of battlespace, controlling the battle tempo, and protecting and recovering the committed force. Deficiencies will be determined, and strategies developed to correct them.

Environmental

Army Environmental Strategy into the 21st Century states that the Army will be a national leader in environmental and natural resource stewardship. The Chemical Corps is responsible for implementing this strategy within the NBC mission area and ensuring that environmental stewardship is an integral part of training.

Military Operations Other Than War (MOOTW)

Army chemical units are trained and equipped to provide support in case of an accident or incident worldwide. Chemical units can be task organized with reconnaissance, decontamination, and smoke capabilities tailored to support multiple types of MOOTW missions.

Chemical units and staffs can provide technical support and training to local, state, and federal agencies. Modernized equipment can be used to survey radiological and other hazardous material, monitor and calculate downwind contamination hazards, assess vulnerability and potential damage, and conduct decontamination operations.

SECTION 2

CURRENT PROGRAM ASSESSMENT

The Army NBC Mission Area consists of three distinct parts: NBC Defense; Smoke and Obscurants; and Flame, Incendiaries, and Nonlethal (FINL) weapons. The NBC Defense Program is governed by the provisions of Public Law (PL) 103-160, National Defense Authorization Act for Fiscal Year 1994. This law mandated the coordination and integration of all Service CB defense RDA. Funding for NBC defense is now consolidated into one DoD Program. Smoke and FINL were not consolidated by PL 103-160 and remain separate Army projects funded by the Army. This program assessment is based on the current threat, validated user requirements, and the FY97-01 NBC Defense POM. Modernization in the NBC mission area directly or indirectly supports modernization efforts in all other mission areas.

Overall NBC Mission Area Program Assessment: The rating has not changed from the 1995 Army Modernization Plan. The overall NBC program assessment is still **AMBER**. Additional funding could upgrade the ratings in contamination avoidance, decontamination, and smoke to **GREEN** in the far-term.

NBC Defense

Component	Near-Term (FY96-98)	Mid-Term (FY99-01)	Far-Term (FY02-11)
Contamination Avoidance	**AMBER**	**AMBER**	**AMBER**
Protection	**AMBER**	**AMBER**	**GREEN**
Decontamination	**AMBER**	**AMBER**	**AMBER**

Figure K-3

Contamination Avoidance. Although contamination avoidance is a primary NBC defense goal, it will remain **AMBER** throughout this modernization plan period due to several factors. In the near-term, the Long Range Standoff Biological Detection System (LRSBDS) will provide the capability to detect and map suspect biological aerosol clouds at ranges to 50 kilometers, but identification is not yet feasible. In the mid-term, the limiting factors are the continued lack of a mobile standoff CW detection capability, and limited fielding of reconnaissance, unit detection, and automated warning and reporting equipment and software. The **AMBER** rating in the far-term is based on the current funding limits which will only permit fielding new and improved capabilities to FP1. Only limited modernization can be achieved in FP2-FP4 due to constrained funding. An additional $252M has been requested in the FY97-01 Joint NBC Defense POM to improve contamination avoidance modernization.

Protection. This rating remains **AMBER** in the near-term. Individual protective equipment continues to burden the soldier and degrade his efficiency. Collective protection equipment will remain difficult to support and be of limited availability. In the mid-term, protective clothing improvements are focused on the Joint Service Lightweight Integrated Suit Technology (JSLIST). In the far-term, new protective masks, regenerable filter technology, and the Advanced Integrated Collective Protection System (AICPS) will upgrade this rating to **GREEN**.

Decontamination. New equipment, principally the Modular Decontamination System (MDS), will offer improvements for conducting decontamination operations in the mid-term. Decontamination, however, will remain **AMBER** through the far-term unless a technological breakthrough in waterless decontamination occurs. Because there is no large area decontamination capability being developed, port and airfield decontamination continue to be a joint concern. An additional $13M for decontamination science and technology, and $29M for MDS procurement, has been requested in the FY97-01 Joint NBC Defense POM. Lack of additional funds could cause this rating to become **RED** in the mid-term.

Smoke and Obscurants

Component	Near-Term (FY96-98)	Mid-Term (FY99-01)	Far-Term (FY02-11)
Smoke and Obscurants	**AMBER**	**AMBER**	**AMBER**

Figure K-4

The modernization plan for smoke and obscurants upgrades the large area smoke capability by adding multi-spectral obscurants to the smoke generator systems being fielded in the mid-term. Current funding, however, limits this fielding to FP1. The limited availability of multi-spectral smoke, along with limited vehicle self-protection systems and an almost nonexistent individual soldier obscuration capability, keep this rating **AMBER**. An additional $60M in the FY97-01 POM is required to complete modernized smoke generator fielding to FP2 in the mid-term.

Flame, Incendiary & Nonlethal (FINL)

Component	Near-Term (FY96-98)	Mid-Term (FY99-01)	Far-Term (FY02-11)
FINL	**RED**	**RED**	**RED**

Figure K-5

The assessment of FINL remains **RED** due to the uncorrected deficiencies in this area. Limited flame and incendiary delivery capability, a lack of antimateriel munitions, and no nonlethal munitions developments are the major deficiencies. This area has not been a high priority, and there is limited funding for technology advancements.

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

"The Chemical/Biological Challenge"

"Proliferation poses one of the most complex challenges the intelligence community will face for the remainder of the century. More than 25 countries may have or may be developing nuclear, biological and chemical weapons...and the means to deliver them."

R. James Woolsey, CIA Director, January 1993

Introduction

The proliferation of WMD increases the likelihood of U.S. forces being attacked with NBC weapons. The Defense Planning Guidance states that the U.S. must improve its military capabilities to deter and prevent the effective use of WMD, to defend against WMD, and to fight more effectively in a WMD environment. Implementation of the NBC Research, Development and Acquisition (RDA) modernization strategy will ensure U.S. forces are prepared to survive and fight effectively in an NBC environment.

The RDA strategy for the NBC mission area focuses on joint NBC defense capabilities, smoke and obscurants systems, and FINL technologies. Public Law 103-160 consolidated all nonmedical NBC defense funding into one DoD program and designated the Secretary of the Army as the executive agent. A Joint Service Agreement (JSA), dated 2 August 1994, established a joint program management structure for nonmedical NBC defense. The consolidated FY97-01 NBC Defense POM represents the first document produced under this JSA.

The nonmedical Joint NBC Defense Program consists of four commodity areas supported by a science and technology infrastructure. The areas are:

Contamination Avoidance. This area includes detection, identification, reconnaissance, and warning/reporting systems for nuclear contamination, chemical and biological agents.

Individual Protection. This area includes protective masks, protective clothing, and other individual protective items.

Collective Protection. This area includes filters and other equipment used to protect vehicles, vans, shelters, and other facilities.

Decontamination. This area includes decontaminants and equipment to decontaminate personal equipment, vehicles, and weapon systems.

The Army manages two additional commodity areas as part of the Army NBC Mission Area.

Smoke and Obscurants. This area includes the obscurant materials and the smoke generators, grenades, and projectiles used to counter enemy reconnaissance surveillance and target acquisition systems.

Flame, Incendiary and Nonlethal (FINL). This area includes flame and incendiary devices, riot control technologies , and materiel defeating munitions that minimize collateral damage.

Science and Technology

The foundation of the RDA strategy is a strong science and technology (S&T) program. The Army Science and Technology Master Plan (ASTMP) describes the Joint NBC Defense S&T strategy. The investment goal in NBC Defense S&T is to maximize limited resources by pursuing new technologies that enhance current warfighting capabilities, reduce or eliminate battlefield deficiencies, and provide affordable solutions for NBC defense. The technology base program is focused on joint, high priority needs. Major investments are planned in contamination avoidance technology, especially biological point detection and CB standoff detection. Resources are also available for individual protection, and modeling and simulation of NBC environments and systems. Efforts in decontamination, collective protection, smoke and obscurants, and FINL technologies have been significantly reduced and refocused on far-term capabilities.

NBC Mission Area Research, Development, and Acquisition

The U.S. policy objective is to "eliminate the threat of chemical and biological weapons use by achieving a worldwide, verifiable ban...of these weapons of mass destruction...Until this is achieved, the U.S. must rely on a credible deterrence policy that includes...a robust NBC defense capability to deny an enemy any significant military advantage from the use of these weapons." The NBC RDA program supports readiness and modernization by developing and procuring NBC defense equipment which have versatile joint Service applications, can be tailored to existing combat platforms, and horizontally integrated in future weapon systems. The RDA strategy is to provide affordable solutions which support warfighting requirements.

Contamination Avoidance Programs. Contamination avoidance represents the primary goal in NBC defense. The OSD Program Strategy Guidance identified the fielding of a theater level biological detection system as the highest priority.

Biological Detection. The current strategy includes fielding both a ground based biological agent point detection capability and a long range standoff aerosol cloud detector in FY96, and producing a short range standoff biodetection system in FY02. The ability to identify a biological agent with a mobile platform, rather than waiting days for a full laboratory analysis, will improve force protection and situational awareness.

The goal of the biological detection area is to provide a real-time capability to detect, identify, locate, and quantify biological warfare agents below incapacitating levels. Current emphasis is on multi-agent point detection with identification and standoff detection, ranging, and mapping. Within the next 3 to 5 years, complimentary detectors will be developed and integrated to improve reliability and reduce false alarms. The technology focus is to improve range, detection sensitivity, and identification specificity across the spectrum of biological agents while reducing system size, weight, and false alarm rate. The NBC defense tech base strategy includes a formal Advanced Technology Demonstration for Integrated Biodetection from FY 96-99.

The Biological Integrated Detection System (BIDS), currently in production, provides the capability to quickly (within 15 minutes) detect a biological attack and identify a limited number of agents. Planned improvements to the BIDS will increase sensitivity and agents identified, decrease response time, and automate certain technical procedures. A Joint Biological Point Detection System is being developed to provide a common detection suite for all Services.

In the near-term, the Long Range Standoff Biological Detection System (LRSBDS), mounted on a helicopter, will provide the capability to detect (identification is not yet feasible) and map suspect biological aerosol clouds at ranges to 50 kilometers. Planned improvements will focus on reducing size and weight, increasing the detection range to 100 kilometers, and making the laser safer. Beginning in the mid-term, a Joint Standoff Biological Detection System will be developed to detect and identify biological agents to a 5 kilometer range. The capability to quickly and automatically confirm an approaching biological warfare agent enhances force protection and minimizes operational risk.

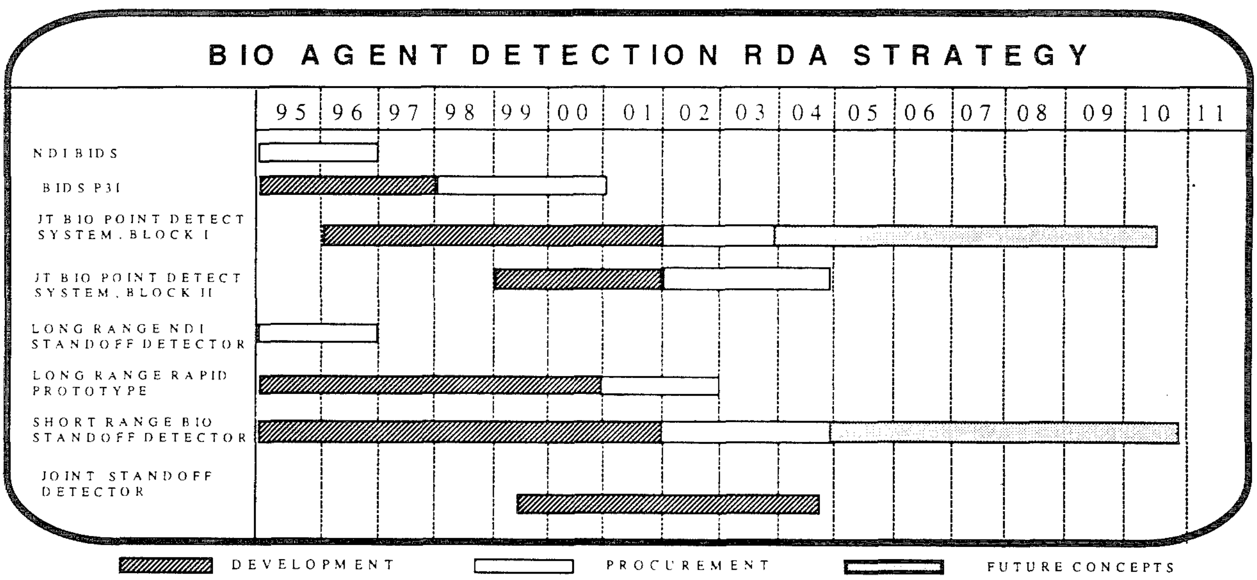


Figure K-6

Chemical And Nuclear Detection. The focus of the chemical detection area is on multi-agent sensors and detectors to provide real-time detection and identification of chemical agents. The current M93 FOX NBC Reconnaissance System (NBCRS) has chemical and nuclear unit detectors based on ion mobility, mass spectrometry, and Geiger-Muller technology. Improvements to NBCRS will be made through upgrades and technology insertions to add enhanced contamination avoidance capabilities. In the near-term, M21 remote chemical agent stand-off detection system (RSCAAL) will be fielded on the M93A1FOX NBCRS.

Standoff sensors are being developed for manned and unmanned aerial platforms to enhance contamination avoidance capabilities. Technologies being investigated include passive interferometry for ground and aerial reconnaissance, mass spectrometry for CB agent identification, infrared (IR) and ultraviolet (UV) laser techniques for standoff CB detection, and digital signal processing techniques for detection on the move.

The strategy for company level detection and warning focuses on fielding an automatic chemical point detector (ACADA) in the near-term, and fielding an improved, miniature CB agent sensor in the far-term. Emphasis is on smaller sensors with sensitivity levels to detect low concentrations to warn soldiers before they experience any harmful effects. These continuously enhanced multi-agent sensors exploit advances in biotechnology (receptor sites, DNA probes), microelectronics, and miniaturization techniques.

Warning And Reporting. The digitized battlefield offers opportunities to provide tactical commanders real-time NBC attack and contamination information. The goal for NBC warning is to replace both voice reporting of NBC attacks and manual hazard prediction with an automated and fully integrated warning and reporting system, providing a link between the NBC sensors and Service command and control systems. Our modernization strategy envisions NBC sensors linked to digital communications systems and NBC hazard analysis software to provide a real-time, automatic NBC warning and reporting system at all echelons. NBC systems that contribute to this vision include:

- M93A1 NBC Reconnaissance System (NBCRS). Integration of the M21 RSCAAL, communications and automation upgrades, along with the Global Positioning System (GPS) installation, will allow the NBCRS to transmit critical NBC reconnaissance information in real-time to battlefield commanders, thus improving our ability to synchronize maneuver with contamination avoidance.

- Multipurpose Integrated Chemical Agent Detector (MICAD) Network. MICAD offers the capability to integrate platoon level chemical and radiological sensors with tactical command and control communications systems to provide automatic NBC attack and hazard information in real-time. This will greatly improve the sharing of NBC information among commanders and staffs, enhancing the ability to synchronize the battle under NBC conditions.

- The Automated Nuclear, Biological, and Chemical Information System (ANBACIS) is under development by PM, Operations Technical Data Systems (OPTADS) and the U.S. Army Chemical School. ANBACIS is designed to increase the effectiveness, reliability, and speed of information flow at battalion level and higher to include: improving the speed of transmission of NBC warnings and reports, and assisting in the planning of NBC reconnaissance, decontamination, and smoke operations. In the near-term, ANBACIS continues to be improved and integrated into the Army's Battle Command System. ANBACIS is part of the Standard Army Command and Control System (STACCS) and is being integrated into the Maneuver Control System. In the far-term, the CBRIMS will be used throughout the DoD Global Command and Control System (GCCS).

- NBC Oracle. A follow-on concept that will capitalize on modeling and artificial intelligence technologies to add a decision aid software package to future command and control systems. In addition to processing and transmitting digitized information from NBC sensors, the NBC Oracle will use cloud transport models to provide downwind hazard and casualty predictions, protective posture options, and a contamination mapping capability integrated with digitized terrain maps.

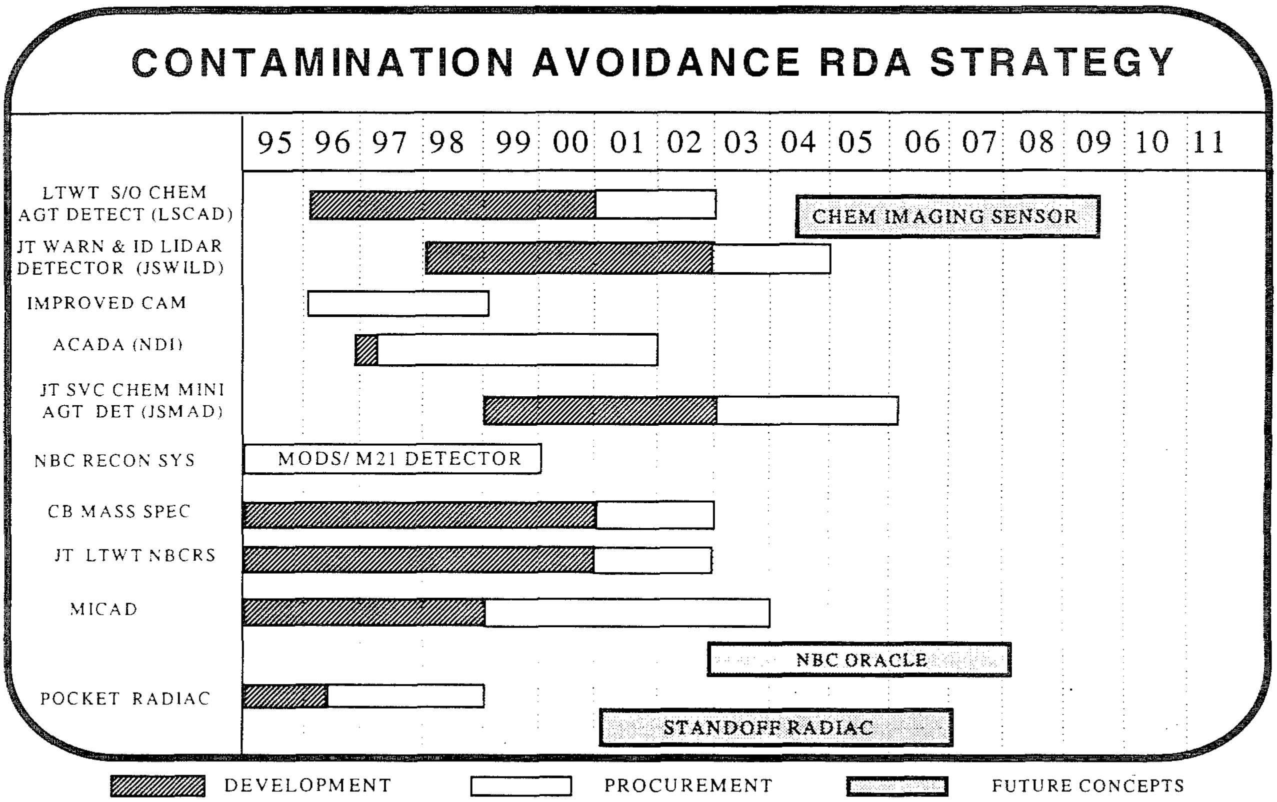


Figure K-7

Individual Protection. The objective is to provide protection against threat agents to minimize casualties and sustain the mission. The M40 series mask provides protection against current chemical and biological agents using a face-mounted canister. An improved air crew respiratory protection system, the XM45 Aircrew Mask, is scheduled for fielding in FY98. In the far-term RESPO 21 will improve respirator performance against current and future threat agents; enhance physiological design parameters; integrate CB protection with protection from environmental, ballistic and other threats; and improve weapons systems interface. These efforts support the 21st Century Land Warrior (21CLW) Top Level Demonstration.

The Joint Service Lightweight Integrated Suit Technology (JSLIST) is a three-phased program to develop improved protective clothing which meets all Service performance requirements. Protective clothing research is focused on developing new air permeable materials for CB overgarments, gloves, boots, rainwear, and garment components to provide improved protection against CB warfare threats while minimizing the physiological and psychological burdens. As materials demonstrate the desired CB protective characteristics and the established physiological performance parameters, they will be integrated into JSLIST.

Collective Protection Equipment (CPE), with regenerable filtration capability, will be available for integration into weapons platforms providing continuous air, eliminating the logistics and maintenance burdens of filter replacement, and providing protection against postulated future threats. A family of CB filtration systems integrated with environmental control and power systems is also being developed as Advanced Integrated CPE for vans, vehicles, and shelters. Future CPE will be smaller, lighter, require less power, and be fully integrated with environmental control and auxiliary power units.

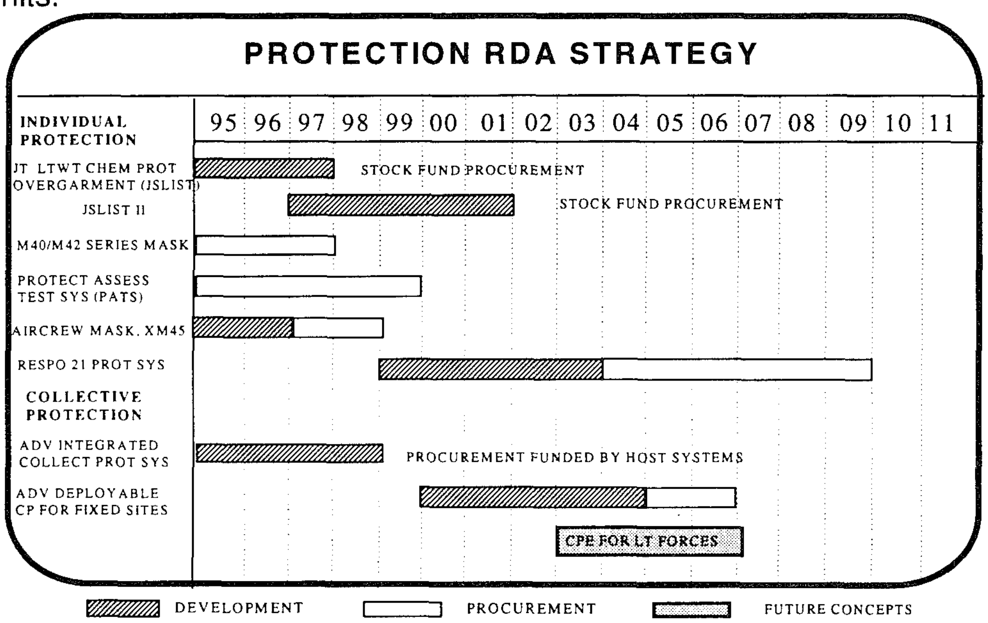


Figure K-8

Decontamination. Sustaining mission operations by reducing decontamination "downtime" and reducing the manpower burden is the focus of the NBC decontamination strategy. Emphasis will be on non-corrosive, environmentally safe, all-agent decontaminants for combat systems, personal equipment and sensitive electronics.

Currently, soldiers are able to rapidly perform basic decontamination on their individual equipment. Thorough decontamination is time consuming and requires mission downtime. Near-term and mid-term equipment improvements are focused on fielding the Modular Decon System (MDS) by FY99. A reactive sorbent decon system to decontaminate personal equipment and vehicle interiors is under development.

Far-term development will focus on enzyme technology to provide a non-corrosive, environmentally safe, stable, and cost-effective decontaminate for vehicles, aircraft, and equipment. These decontaminants will reduce the logistical problems of bulk storage and transportation, and would be reconstituted with any available water supply. International interest in enzyme technology has culminated in the formation of NATO Project Group 31, "Aqueous Decontaminants for Nerve Agents and Mustard."

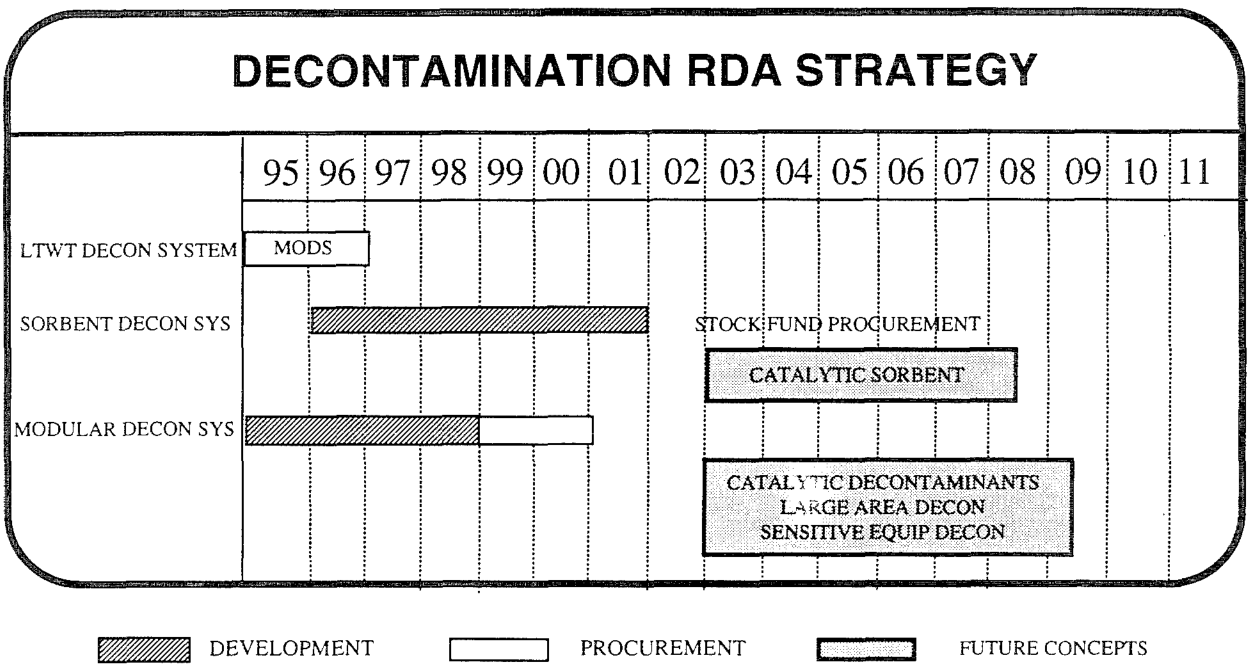


Figure K-9

Smoke and Obscurants. In response to the proliferation of increasingly sophisticated enemy RSTA capabilities throughout the electromagnetic spectrum, the Smoke and Obscurant RDA strategy capitalizes on technologies capable of providing multi-spectral screening capabilities.

The M56 wheeled vehicle and the M58 tracked vehicle mounted smoke generators can dispense smokes capable of defeating current and future threat RSTA systems operating in the visual through IR frequencies. MMW obscuration is a preplanned product improvement to these generators and will provide the Army's first large area radar obscuration capability.

The XM81 multi-spectral smoke grenade provides IR and MMW obscuration for armored vehicles. This system significantly enhances armored forces survivability on current and future battlefields. The Light Vehicle Obscuration Smoke System (LVOSS) will provide visual obscuration for wheeled vehicles. Its grenade is non-flammable with no fragmentation hazard, making it suitable for MOOTW. These technologies translate into 21st Century operational capabilities and modernized equipment that reduce the effectiveness of enemy RSTA systems.

Flame, Incendiary and Nonlethal Weapons. FINL munitions can provide additional weapons capabilities not currently available. Antimateriel concepts can provide mission defeating capabilities against armored vehicles or other equipment without killing personnel. Due to funding constraints, research is minimal and focused on future concepts.

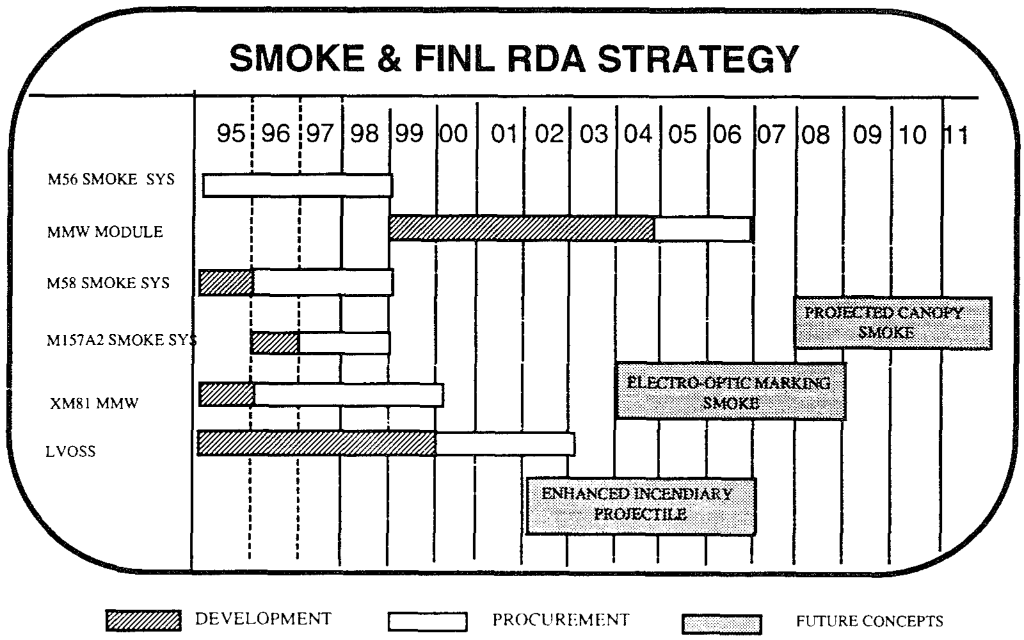


Figure K-10

Modeling and Simulation

The Services have made significant Modeling and Simulation (M&S) advancements in the joint effort to integrate both the battlefield effects of NBC weapons and modernized NBC defense capabilities into simulations and war games. Emphasis is on developing common underlying CB models for integration into Service specific applications. This capability will allow constructive or virtual assessment of weapon systems survivability and effectiveness in an NBC environment, and provide cost/benefit data for NBC defense materiel. M&S will be an integral part of every developmental program and phase of the acquisition cycle. Incorporation of an

NBC/SMOKE environment into the three-dimensional, virtual, distributed interactive simulation has allowed development of a "man-in-the-loop" simulator for FOX NBCRS and demonstration of a CB SCUD and PATRIOT missile intercept scenario. Future plans include: analyzing high altitude CB effects for TMD in both virtual and constructive simulations; establishing "virtual prototypes" of CB standoff and point detectors, obscurant systems, and antimateriel devices; and adding an NBC/SMOKE environment to other wargames.

Summary

The NBC Mission Area RDA strategy provides capabilities to counter the NBC threat and protect the force while reducing the number of different end items and the manpower and logistics requirements to support this equipment. The program emphasizes solutions to multi-Service requirements by joint RDA efforts. This strategy focuses on improvements which will provide versatility, deployability, and survivability; all contributing to battlespace dominance into the 21st Century. **Although NBC equipment modernization continues along a deliberate path, significant additional funding is needed to provide the robust NBC defense capability required to implement the U.S. deterrence policy.**

SECTION 4

CONCLUSION

> *Potential adversaries should recognize our capability to dominate any escalation of conflict should weapons of mass destruction be employed against us. In addition, we will maintain and strengthen our defensive capabilities against such weapons. We continue efforts to prevent the use of mass destruction weapons and make preparations to operate effectively in environments marked by biological, chemical or radioactive contamination.*
>
> National Military Strategy of the United States of America 1995

The National Military Strategy mandates that U.S. military forces be capable of deterring, preventing, and defending against the effective use of WMD against U.S. forces and U.S. allies. NBC modernization must correct existing deficiencies and support Force XXI operations. In order to implement the National Military Strategy, military forces must be able to:

- Deny an adversary any military advantage from NBC weapons;
- Preserve operational tempo on an NBC battlefield;
- Restore combat power quickly and effectively after NBC weapons attack;
- Enhance preemptive actions through improved information operations; and
- Protect the force from NBC contamination.

NBC modernization is essential to force readiness. Joint NBC Defense Program resources are not adequate to fully meet all planning guidance, goals, and objectives. In order to achieve these modernization goals and objectives, resources must be focused on areas that contribute to joint force NBC defense readiness. The NBC modernization plan will enhance NBC deterrence by providing an improved defensive capability and ensuring force survivability after an enemy NBC attack. However, continued emphasis and increased priority are necessary to achieve the required robust NBC defensive capability.

ANNEX L

COMBAT HEALTH SUPPORT

SECTION 1

INTRODUCTION

The Army Medical Department (AMEDD) modernization program is driven by a number of imperatives that are based on the AMEDD battlefield rules (Figure L-1). The AMEDD modernization imperatives are depicted in Figure L-2. The culmination of these imperatives is to provide an integrated Combat Health Support (CHS) system for the soldier from the foxhole to the sustainment base in the Continental United States (CONUS).

AMEDD BATTLEFIELD RULES

Maintain medical presence with soldier

Maintain health of command

Save lives

Clear battlefield

Provide state-of-the-art care

Ensure early return to duty

Figure L-1

AMEDD MODERNIZATION IMPERATIVES

Healthy, Trained, Ready, Deployable Force

Medical Research and Development

Health Care in the Continental United States for All Beneficiaries

Nation and Humanitarian Assistance

Civil Disturbance and Natural Disasters

Figure L-2

The dynamics of our changing world, in terms of economics, the National Military Strategy, and possible threats, create unique challenges for battlefield health care delivery. These challenges must address the requirements for strategic force projection, rapid operational deployment, and lightning quick military tactical operations as well as, the requirements for MOOTW. The design criteria for the CHS system of the future should mirror the evolutionary characteristics of Force XXI. This system must provide flexible, versatile, modular medical units to support the rapid deployment of a force projection Army, yet be capable of supporting forward deployed forces. These units will be capable of operating in a split-base mode to support contingency operations and MOOTW. The medical Force XXI will ensure a medical presence with the soldier and at the same time provide state-of-the-art CHS.

CHS requires the practice of preventive medicine (PVNTMED) to sustain the health of the force as well as the capabilities to deliver prompt medical/surgical treatment of life-threatening injuries far forward via standardized modular medical units and organizations throughout the division, corps, and echelons above corps. This system must also provide standardized medical evacuation (MEDEVAC) units with air transport as the primary means of evacuation; responsive, deployable hospitals designed and structured with functional modules; and enhanced ancillary and functional support systems with state-of-the-art technology. The system must simultaneously provide CHS to deploying forces, provide health services within CONUS, and establish a medical support system within the theater of operations that provides essential care to the soldier. At the conclusion of the military operations, there is a requirement to provide postcrisis/war CHS reconstitution, redeployment, and demobilization. Equally important, the system must provide health support during MOOTW e.g., disaster relief, assistance to foreign nations, and peacekeeping and peace enforcement activities.

The type of CHS organizations and services in the theater is contingent upon the number of ground forces deployed and the theater evacuation policy. The system is tailored in consonance with the joint planning responsibilities of other Services and of host nations. CHS organizations must synchronize and coordinate their capabilities in order to sustain the force. Advanced technology and communications are essential for the success of the CHS system. They will reduce mortality and morbidity rates, and increase battlefield survivability. These characteristics of CHS, appropriately modernized, ensure the delivery of the best medical care in the world to our soldiers.

MEDICAL THREAT

A medical threat exists in addition to the overall military threat from potential adversaries. Medical threat is the composite of all ongoing or potential enemy actions and environmental conditions that reduce the performance effectiveness of the soldier. The soldier's reduced effectiveness results in sustained wounds, injuries, or diseases. Elements of medical threat are provided in Figure L-3.

ELEMENTS OF MEDICAL THREAT	
Naturally occurring infectious diseases (endemic diseases)	Environmental extremes and occupational hazards
Battle injuries	Biological warfare
Chemical warfare	Directed energy weapons
Blast effect munitions	Combat stress and sustained operations
Flame and incendiary weapons	Nuclear weapons

Figure L-3

TRAINING

The AMEDD training plan supports the vision to implement the training and leader development program characterized by a center for medical excellence from which training requirements are identified, training strategies are developed, and training is conducted and distributed to individuals and units in the active Army and Reserve Components at distant locations. The design employs a total training system capable of integrating institutional training, operational assignments, and self-development initiatives into a seamless experience enhanced by information connectivity, automation, and leveraging technology. Future AMEDD training will continue to be task based, reaching all components, and training to the same standard while allowing the use of multimedia and virtual reality (VR). CHS training under the Total Army School System concept will provide training with an emphasis on joint/combined scenarios. All medical training will be more multi-Service in scope and location and will employ distance learning concepts. Training strategies will be heavily dependent on the integration and use of multimedia technology.

Army Executive Skills Technology Center (AESTC)

Ongoing AMEDD teletraining initiatives include participation in a 2-year pilot project using the Training and Doctrine Command's Teletraining Network and teletraining capability in the new AMEDD AESTC located at the U.S. Army Medical Department Center and School (AMEDDC&S). The AESTC was designed and built to employ state-of-the-art technology to economically facilitate the transfer and use of information and knowledge for medical planning and for training CHS personnel. This is accomplished at 21 computer workstations with audio-visual, computing, telecommunications, and television capabilities configured within a local-area network. Installation of Ventana Group Systems Decision Software facilitates the electronic planning and conduct of local decision making sessions and distance learning by transmitting information to and from Army-wide external sites, drastically reducing travel costs and accelerating the information transmission process.

Electronic Performance Support Systems

The AMEDDC&S has contracted for the design and development of the Computer-assisted Response Expert for Medical Emergency Decisions (CAREMED) prototype. CAREMED is a Compact Disk - Read-only Memory based program that will provide voice-activated, digitized information to the isolated combat medic faced with evaluating and treating a casualty. The combat medic will carry a compact computer with voice-activated headset display, permitting immediate, hands-free treatment assistance in a combat setting. The system also will provide a dynamic training track for use during peacetime situations. Prototype delivery was in December 1995.

Battle Simulations Center

The AMEDD Battle Simulations Center and Training Park is located at Camp Bullis, Texas. The simulations center provides the AMEDD with an automated command post exercise system to conduct institutional training. The simulations center permits personnel to practice command and staff techniques and manage resources for CHS during combat operations. It also provides a centralized area for battle simulations and joint medical training. The simulations center enhances training with TRADOC institutions, reserve component homestation training, Regional Training Sites (medical), and combat training centers.

JOINT OPERATIONS

All functional areas will continue to emphasize joint planning and joint use of assets during the current drawdown of resources. While the Army will retain its Service-specific tasks, it must closely plan joint use of assets to ensure accomplishment of the assigned mission. The AMEDD is forging ahead to comply with this requirement. Joint medical planning has progressed from the rudimentary efforts of the 1980s. There is now a medical annex in each operational plan which is forwarded to the Joint Staff for review and approval. The approved operational plan is then the basis for the supporting plans prepared by the Service components and supporting Unified Commanders.

Defense Medical Standardization Board (DMSB)

DMSB is a joint activity serving as the focal point for the standardization of medical materiel within the Department of Defense (DoD). DMSB directs the development of Deployable Medical Systems (DEPMEDS) that are standardized to the maximum extent consistent with the distinct missions of the Services.

Theater Medical Information Program (TMIP)

TMIP integrates information systems to ensure consistent Military Health Services Systems practices. The TMIP goal is to provide a seamless global network of communications systems linking information data bases and integration centers that are always accessible to the soldier.

Medical Logistics and Blood Management

Single Integrated Medical Logistics Management (SIMLM)

SIMLM is designed to provide efficient, effective, responsive theater peacetime and wartime medical logistics support by establishing single medical logistics systems. The Army is the designated executive agent for SIMLM in Europe and Korea and provides logistics support to the Services and federal organizations.

Quadservice Satellite Transmitting and Receiving System (Q-STARS)

Q-STARS is a medical logistics initiative intended to alleviate interoperability problems like those experienced during Operation Desert Storm. Q-STARS consists of commercial off-the-shelf hardware coupled with a worldwide satellite network. Class VIII requisitions are transmitted from medical logistics units in the field to the Defense Automated Addressing System Office in CONUS, where they are relayed to the appropriate National Inventory Control Point. System interfaces are still being refined to accommodate software differences between the Services.

Defense Medical Logistics Support System (DMLSS)

DMLSS is a joint-Service medical logistics management system that provides a common management and communication system to simplify the ordering and receiving process while reducing the order and ship time for medical supplies.

Defense Blood Standard System (DBSS)

DBSS is a joint blood management program developed by DoD Health Affairs that manages blood program operations such as manufacturing, testing, processing, freezing, storing, shipping, distributing, and issuing blood and blood products for infusion or destruction. DBSS completed a 2-year (FY94 and FY95) deployment to all peacetime medical treatment facilities worldwide. Beginning in FY96 and continuing through FY97, under the direction of DoD Health Affairs, DBSS is being deployed to all field medical treatment facilities and all organizations in the Armed Forces that are responsible for managing blood and blood products.

Joint Health Service Support Doctrine

The AMEDD has the only CHS joint doctrine center that has a staff dedicated to writing and reviewing joint doctrine. It is the technical review authority for Echelons I and II for the Joint Publication 4-02.2, *Joint Tactics, Techniques and Procedures for Patient Evacuation and Medical Regulating in Joint Operations.* It also has been designated lead agent for the following:

- Joint Publication 4-02, *Doctrine for Health Service Support in Joint Operations*, which was published in November 1994.
- Joint Tactics, Techniques and Procedures Publication 4-02.1, *Health Services Logistics Support in Joint Operations*, which is in the final staffing process with projected completion in FY96.

Conclusion

Over the next 10 years, the AMEDD will modify the way it does business to better support Force XXI objectives. The mission remains the same -- to provide America's military with world-class combat casualty care. We are challenged to accomplish this mission more creatively with significantly fewer resources. The AMEDD will capitalize on advanced technologies, streamlined management, and innovative business practices to successfully move into the 21st Century.

SECTION 2

CURRENT PROGRAM ASSESSMENT

Medical Operational Capability Requirements

To support the CHS concept, the following prioritized Operational Capability Requirements, assessments, and rationales for those assessments are listed. The parameters of the analysis were constrained to address battlefield CHS needs in doctrine, training, leader development, organizations, and materiel. These capabilities are required in all military environments, from MOOTW through war, with or without the use of weapons of mass destruction.

Treatment of Battlefield Wounds, Injuries, and Diseases

Rapid casualty location and acquisition combined with prompt effective resuscitation and early surgical management will provide a focus on reducing the killed in action and died of wounds rates. Improved methods of resuscitation, improved diagnostic and treatment capabilities at Echelon I and II treatment facilities, and enhanced en route medical care during evacuation will reduce lost duty time for disease and nonbattle injury (DNBI) or improve survival for the severely wounded. The impact of ocular laser exposure strategies to minimize the performance degradation from such injuries and the benefits of devices designed to protect against laser effects on the eyes must be evaluated. Integration of Medical Communications for Combat Casualty Care (MC4) and patient-specific data readily transferable to and from automated medical records will aid in the reduction of mortality and morbidity.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is rated **AMBER** in the near-, mid-, and far-terms due to an inability to rapidly locate the casualty, lack of voice and data communication and integration of technologies associated with MC4, inadequate technological advances in the protection and treatment of directed energy injuries, and insufficient equipment that monitors diagnostic and resuscitative capabilities at Echelons I and II. Currently, there are no resuscitative oxygen-providing fluids far forward; therefore, profound shock in hemorrhagic casualties equates with a high mortality. Immediate trauma treatment suffers due to insufficient sustainment training of combat medics, poor availability of training packages, and a limited number of medical corps officers with training and experience at the brigade level. Echelon I and II facilities lack diagnostic capabilities, sufficient medical provider training, and access to medical intelligence about the area of operations. Continued research is required to fully characterize the effects of directed energy exposure, including laser, microwave, and particle beam, on the cells and organs. Current paper medical records are inadequate. Essential medical information for deploying soldiers is frequently not available.

Patient Evacuation

The AMEDD must be able to provide a seamless MEDEVAC system throughout the operational spectrum, including the evolving missions of MOOTW, combat search and rescue, and shore-to-ship MEDEVAC. Ground and air evacuation platforms must have the capability to provide continuous MEDEVAC support in all environmental conditions. Ground and air evacuation platforms must be able to communicate with supported and supporting units as well as with the medical infrastructure. They must possess the ability to maintain situational awareness on the future, digitized battlefield. MEDEVAC organizations must be modular in design. These units must provide state-of-the-art medical care compatible with the medical structure on the battlefield and must provide aviation medicine support to attached units. Ground and air evacuation platforms require increased patient transport capability and enhanced en route monitoring and treatment capability through integration of MC4 and appropriate providers. **Patient evacuation is the Army's number one medical readiness shortfall and the AMEDD's first priority.**

Near-term: **RED** Mid-term: **RED** Far-term: **RED**

Rationale: Air and ground evacuation capabilities are rated **RED** in the near-, mid-, and far-terms because limited resources currently exist to provide evacuation to the force. The capability is eroding as the air and ground evacuation fleets become outdated and lose their ability to keep pace with combat units. Aeromedical evacuation units continue to use aging platforms such as UH-1s and other platforms such as UH-60As that lack enhanced medical, navigation, and communication capabilities. Ground evacuation units continue to use outdated ground ambulances that cannot keep pace with supported ground units and that do not have an on-board medical treatment capability under the protection of the armor. The result is significant degradation of medical support to units on the extended battlefield and unacceptable risk to soldiers. The situation exacerbates itself in the mid- and far-terms as lack of funding to modernize the fleets forces the Army to maintain an increasingly obsolete evacuation capability while placing soldiers at an even more unacceptable risk. It is critical that air and ground evacuation fleets be modernized so casualties can be evacuated in a timely manner while receiving enhanced treatment, thus reducing morbidity and mortality rates. For contingencies that may require extended-range aircraft, the Army is pursuing a joint doctrinal solution with the U.S. Air Force rather than a materiel solution.

Far-forward Surgical Support

The requirement to project surgery forward increases as a result of the extended battlefield. Highly mobile forward surgical teams will provide care to casualties who require surgical stabilization prior to further evacuation. Forward surgical teams require improved shelter systems that allow for strategic deployability and quick set-up and that provide a rapid-response surgical capability under environmentally controlled conditions. Forward surgical teams require future technology insertion, including MC4 and communications.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: Far-forward surgery is rated **AMBER** in the near-term due to a lack of far-forward surgery in all force packages. Far-forward surgery is rated **AMBER** in the mid- and far-terms due to a lack of suitable shelter systems in the force packages. If funded, force structure actions and adequate shelters will eventually improve the availability of far-forward surgical support. Fielding standardized forward surgical teams will begin in FY97. They will locate within the brigade support area and provide urgent resuscitative surgery for approximately 10 to 15 percent of casualties prior to further evacuation. Far-forward resuscitative surgery will require continued research and development of combat casualty care technology to reduce both killed in action rates and the morbidity associated with critical wounds. Currently, no capability exists to provide rapidly set-up, environmentally controlled shelter systems for the team. Employment of MC4 would project specialty expertise to the team and provide seamless communications between all echelons of care.

Preventive Medicine

The PVNTMED system must improve soldier sustainability through the prevention of endemic disease or injury from environmental, occupational, and nuclear/biological/chemical (NBC) warfare agent hazards and directed energy hazards. The PVNTMED system must be modular in design to provide a comprehensive support package adaptable to a full continuum of operations. It must conduct disease surveillance from the forward line of troops to CONUS, using state-of-the-art automation and communication systems to produce a real-time, tactically significant disease profile. PVNTMED must be capable of providing versatile, mobile, and enhanced disease vector control support to reduce vector-borne diseases in a theater of operations. It must possess the ability to provide rapid and comprehensive environmental monitoring to assess acute and chronic health risks encountered during military operations.

Infectious Diseases/Environmental Injury/Occupational Hazards

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is rated **AMBER** in the near-, mid-, and far-terms due to limited standardized automated disease and injury surveillance programs. Organizational redesign into modules will provide only a limited increase in unit capabilities. Testing equipment is limited in scope. Vector surveillance and control equipment is cumbersome and requires excessive airframe space.

Development of Biological/Chemical Agent Preventive Measures

Biological Assessment

Near-term: **RED** Mid-term: **RED** Far-term: **AMBER**

Rationale: Biological defense is rated **RED** in the near- and mid-terms because of the low rate of vaccine production, the size of the current vaccine inventory, and the long delay between identification of the threat, development of a vaccine, and Food and Drug Administration (FDA) approval. Far-term improvement is expected with continued DoD emphasis.

Chemical Assessment

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: Chemical defense is rated **AMBER** in the near-, mid-, and far-terms because limited drugs exist to protect the soldier from the effects of chemical agents. Currently, the only field chemical agent pretreatment is pyridostigmine bromide, a nerve agent pretreatment. No effective prophylactic currently exists for other chemical intoxicants, although research continues.

Command, Control, Communications, Computers, and Intelligence (C4I)

A requirement exists to provide a seamless state-of-the-art system of CHS command and control across the operational continuum supporting joint and combined forces and MOOTW. This system must support split-base operations on a continual operational basis and must be strategically deployable. Appropriate CHS staff representation must be available at all Army command levels. C4I must provide for and manage horizontal and vertical technology insertion into all organizational designs, including MC4.

Near-term: **RED** Mid-term: **RED** Far-term: **RED**

Rationale: This capability is rated **RED** in the near-term because of the increased need for communications and split-base capability for CHS command and control elements. Current medical command and control organizations are redundant in terms of battlefield functions. Current staffing levels of selected medical command and control units are inadequate, although changes resulting from the medical reengineering initiative will alleviate redundancy and staffing level inadequacies. The capability is rated **RED** in the mid- and far-terms because no funds have been identified for state-of-the-art communication and information management equipment.

Battlefield Hospitalization

Hospital care must be provided across the operational continuum, including MOOTW. Inpatient medical and surgical services and outpatient clinic and consultant services on an area support basis are required. Hospitals must be capable of organizing as fully functional increments. This will support the requirement for smaller, more mobile hospital modules to deploy and operate independently of the main hospital. The requirement exists for state-of-the-art health care systems to interface with all echelons of care, including fixed medical treatment facilities within CONUS. The hospital will utilize advanced internal and external communications and information management systems to allow the transmission of voice, data, and digital images. Medical records will be digitized, and the systems used in the hospital will interface with the systems used forward on the battlefield as well as within the CONUS base. Continued development is required to reduce the weight, cube, and logistic requirements of Tables of Organization and Equipment (TOE) hospitals.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is rated **AMBER** in the near-, mid-, and far-terms because state-of-the-art health care requires medical equipment housed in controlled environments that reduce mobility. High-technology medical equipment, digital information management systems, and communication systems increase cost, weight, and maintenance requirements. Rapid developments in physiologic intensive care monitoring of the patient provide the earliest warning of impending complications, but require additional staff and training. These factors adversely affect rapid strategic deployability and tactical mobility. The weight and cube of current transportable medical treatment facilities consume significant strategic lift assets and virtually preclude rapid deployment and tactical mobility of hospital structure to and within areas of operations. With the early deployment and use of forward surgical teams, the requirement for early deployment of hospitals into areas of operations is still crucial. Absent such capabilities, soldiers with battlefield wounds and injuries may be subjected to evacuation delays and require lengthy stabilizing surgery. Currently, the deployment of hospital modules that are tailored to support diverse missions, including MOOTW, leaves the remaining hospital structure ineffective.

Combat Health Logistics System and Blood Management

The Combat Health Logistics System must provide the necessary flexibility, mobility, and increased capabilities to support a force projection Army and must anticipate and project support across multiple locations through split-base operations. The Combat Health Logistics System must centrally manage critical Class VIII items, patient movement equipment, blood products, medical maintenance, and Class VIII contracting. It must coordinate logistics and transportation support with non-medical logistics organizations for all medical logistics activities within an area of operations. It must support reception operations for prepositioned afloat medical materiel at ports of debarkation. The Combat Health Logistics System must employ state-of-the-art standardized medical logistics information management and communication systems. These systems must be compatible with and connected to all Services to accomplish the single integrated medical logistics management mission of the AMEDD.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This required capability is rated **AMBER** in the near-, mid-, and far-terms because resourcing remains unresolved. The lack of total asset and in-transit visibility continues to hamper the ability of the Combat Health Logistics System to efficiently distribute medical logistics support on the battlefield. The continued reliance on limited external transportation assets to support unit distribution, a lack of global positioning system equipment, and a lack of fully integrated automated information technology and advanced cargo handling systems degrade the overall performance of the system.

Medical Laboratory Support

Medical laboratory capabilities must be modular in design and retain the adaptability and flexibility to support split-base operations, MOOTW, and force projection. CHS within the division requires additional limited laboratory capabilities, including analytical procedures and blood products resuscitation. At corps and echelons above corps, laboratory support must provide appropriate capabilities to diagnose and minimize the effects of endemic diseases. The Area Medical Laboratory is an independent laboratory that provides the capability to identify and evaluate health hazards within the area of operations through the use of unique medical laboratory analyses and rapid assessments of endemic disease, including animal diseases of military significance, environmental and occupational health threats, and NBC warfare agents. The Area Medical Laboratory's analytical, investigative, and consultative capabilities must provide responsive medical assessment and field confirmation of medical threats, infectious agents, and other hazardous substances. The medical laboratory support system must exploit state-of-the-art science and technology to provide a tailored package of analytical capabilities in a multidisciplined array of services and professional consultation to sustain the health of the command.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: The medical laboratory is rated **AMBER** in the near-, mid-, and far-terms because of the inadequate capability to perform the NBC and endemic disease requirements. The **AMBER** rating through the mid-term and into the far-term is based on anticipated limitations in the development and transition of technologies that fully satisfy the biological warfare and endemic disease capability requirements. The medical laboratory system lacks a deployable capability to provide for the identification and field confirmation of NBC threat agents, toxins, or other agents of biological origin. The system is inadequately equipped to rapidly diagnose endemic diseases in deployed forces. Microbiology capabilities in current DEPMEDS hospital laboratories are inadequate to provide required clinical bacteriology, epidemiology, or disease surveillance data. Analytical technologies for the identification and assessment of occupational and environmental health hazards are not currently fielded.

CHS in an NBC Environment

The CHS system must be capable of operating in an NBC-contaminated environment. The NBC environment markedly inhibits CHS operations, which seriously degrades the ability to triage, diagnose, and treat casualties while in protective equipment. Contamination renders medical equipment and supplies unusable. Collective protection shelters are not available to provide patient protection and treatment. Decontamination of patients by present methods is labor intensive, slow, and prone to aggravating injuries.

Near-term: **RED** Mid-term: **RED** Far-term: **RED**

Rationale: CHS in an NBC environment is rated **RED** in the near-, mid-, and far-terms because insufficient funds are programmed to procure necessary collective protection for all medical units. Protective clothing continues to contribute to reductions in performance and can cause unintended illness or injury. Current capabilities do not provide adequate protection without a significant degradation in combat effectiveness. Protective clothing and equipment often contribute to reductions in performance and may cause unintended illness or injury. Unprotected hospitals subjected to NBC warfare would be incapable of continued performance.

Dental Services

Dental units must provide oral health care across the operational continuum, including joint and combined operations and MOOTW. They must prepare soldiers for deployment and ensure that they are at the highest level of dental fitness. Dental units augment medical assets during combat and mass casualty situations. These units will be modular in design to enable task organization, strategic deployability, and tactical mobility, and must be capable of split-base operations. Dental Corps officers in the medical brigade headquarters will provide technical supervision of all dental assets assigned to the brigade. Dental units require state-of-the-art information management, computer, and communication systems.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **RED**

Rationale: Dental capability is rated **AMBER** in the near- and mid-terms due to the age of field dental equipment, which renders it maintenance intensive. The dental materials found in the dental equipment sets do not meet current standards of care. The allocation of Distribution Illumination System Electric systems does not meet the unique electrical requirements of dental organizations. The far-term is **RED** due to the age of the current dental equipment and the lack of resources committed to modernize field dental equipment sets. Appropriate communication and electrical systems must be incorporated into the TOE. The weight and cube of existing field dental equipment is excessive. The power demands of the air compressor, surgical sink, sterilizer, and dental x-ray need to be reduced. Existing restorative materials need to be replaced by modern, light-activated composite and glass ionomer materials. Dental organizations lack appropriate power distribution systems to operate equipment. Communication capabilities are inadequate.

Veterinary Services

The Army Veterinary Corps is the DoD executive agent for all theater-level veterinary services and support. Veterinary services are required in food safety and sanitation for subsistence at the point of origin and for DoD operational rations; inspections of commercial food, water, and ice establishments; and surveillance of biologically/chemically contaminated subsistence. Ensuring the safety and usability of all types of rations in the theater will greatly reduce the nonbattle losses due to food and water-borne diseases. Comprehensive veterinary medical, surgical, PVNTMED, and biological/chemical injury treatment programs are required to maintain the health of government animals.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: This capability is rated **AMBER** in the near-, mid-, and far-terms due to a lack of resources for modernization and support of wartime executive agency requirements. Communication capabilities do not allow for intra-theater tri-Service mission dispersion or split-base operations. NBC detection for animals and food, as well as treatment for animals, is inadequate. Diversity of international source capabilities and standards and product assessment requirements dictate subject matter expertise for food and facilities inspection. Food assessment laboratory equipment is inadequate.

Combat Stress Control

Combat stress control requires far-forward prevention and intervention over the continuum of operations. Prevention of stress-induced error, disability, and misconduct during and after war and MOOTW requires ongoing command consultation, company-level stress monitoring, unit debriefings, and immediate far-forward intervention and treatment for stress cases. Stress control teams require tactical mobility, telecommunications, and advanced biofeedback capability. Effective combat stress control requires that stress control activities be conducted routinely with supported units in training and in garrison, including assistance to unit family support groups.

Near-term: **AMBER** Mid-term: **AMBER** Far-term: **AMBER**

Rationale: Combat stress control is rated **AMBER** in the near-, mid-, and far-terms because of the continued lack of communication capability and appropriate medical equipment sets coupled with the necessary organizational changes to enable combat stress control units to operate effectively in the full range of military operations, including MOOTW. Organization and joint doctrine do not fully exploit combat stress control unit capabilities in joint force projection and MOOTW. Combat stress control field training lacks interaction with supported field units.

Conclusion

Figure L-4 provides an assessment of CHS capabilities.

COMBAT HEALTH SUPPORT CAPABILITIES AND ASSESSMENTS				
Modernization Objective	**Operational Capability Requirement**	**NEAR-TERM (FY96-98)**	**MID-TERM (FY99-01)**	**FAR-TERM (FY02-11)**
Project and sustain	Treatment of battlefield wounds, injuries, and diseases	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Patient evacuation	RED	RED	RED
Project and sustain	Far-forward surgical support	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Preventive medicine			
	Infectious diseases/environmental injury/occupational hazards	AMBER	AMBER	AMBER
	Biological/chemical agent preventive measures			
	Biological	RED	RED	AMBER
	Chemical	AMBER	AMBER	AMBER
Project and sustain	Command, control, communications, computers, and intelligence	RED	RED	RED
Project and sustain	Battlefield hospitalization	AMBER	AMBER	AMBER
Project and sustain	Combat Health Logistics System and Blood Management	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Medical laboratory support	AMBER	AMBER	AMBER
Project and sustain/ protect the force	CHS in an NBC environment	RED	RED	RED
Project and sustain/ protect the force	Dental services	AMBER	AMBER	RED
Project and sustain/ protect the force	Veterinary services	AMBER	AMBER	AMBER
Project and sustain/ protect the force	Combat stress control	AMBER	AMBER	AMBER

Figure L-4

SECTION 3

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

Military medical research, development, and acquisition (RDA) programs are designed to protect and sustain the health and performance of soldiers during both war and MOOTW in order to enhance readiness. Revolutionary technologies are being evaluated, and products will be developed that have a significant impact on reducing DNBI and provide the most effective combat casualty care far forward. These technologies will project increased medical expertise to all echelons of medical treatment and will provide initial capabilities to protect soldiers from infectious diseases, NBC weapons, and the effects of environmental and operational extremes.

Medical Science and Technology

The strategic plan for the Army's medical science and technology (S&T) program is described in the *Army Science and Technology Master Plan*. The medical S&T research program is divided into four functional areas. These areas provide comprehensive research programs in infectious diseases, medical biological/chemical defense, soldier protection and sustainment, and combat casualty care.

Infectious Diseases of Military Significance

The goals of this research program are to protect soldiers from infectious diseases through the development of vaccines and prophylactic drugs and to return soldiers to duty through the development of effective drug treatment. The focus of private industry pharmaceutical development has been on diseases of importance in the industrial world. Infections prominent in many strategically significant areas of the world do not receive attention comparable to the extent of the populations affected. Thus, insight into the biology of the infectious organism and human response to infection must be developed through Army-supported research.

Soldier Protection, Sustainment, and Enhancement

The goals of this research program are to protect soldiers from the health hazards associated with military operations and to sustain and enhance their performance across the spectrum of military operations. The focus is on uniquely military health hazards and stressors that adversely affect the health and abilities of soldiers to complete their missions. Research must provide methods to prevent environmental injury; methods to prevent injury due to non-ionizing radiation, toxic contaminants, and other weapon/materiel system operational health hazards; nutritional strategies to counter mental and physical fatigue; strategies to reduce operational stress; and devices to quantify soldier effectiveness.

Combat Casualty Care

The mission of this research program is to improve methods of and to develop products for resuscitation, stabilization, evacuation, and treatment of battlefield casualties. The specific objectives are to enhance trauma care far forward on the battlefield; to minimize lost duty time due to battle and non-battle injuries; and to decrease the resupply requirements. Future devices must apply intelligent systems and VR technologies to rapidly locate, triage, diagnose, evacuate, and treat casualties.

Medical Nuclear/Biological/Chemical Defense

As a result of U.S. congressional action, effective FY96, the medical chemical and biological defense programs were transferred to the Office of the Secretary of Defense. The Army will remain as Executive Agent for these programs. The mission of medical NBC defense research programs is to ensure the sustained effectiveness of personnel operating in an NBC environment. Research efforts are focused on evaluating threats and developing countermeasures through individual prevention and protection, rapid diagnostic capabilities to identify NBC agent exposure, and medical management of NBC casualties. Developing pretreatments, protectants, and antidotes that do not have performance-degrading side-effects, are safe, and are effective is essential to preserving combat effectiveness.

Medical Materiel Products

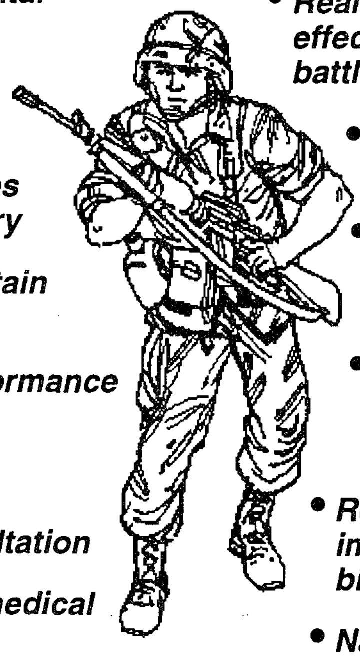
Figure L-5 provides examples of how future medical developments will sustain the soldier. Products of the medical research process include information and materiel. Information products include documents such as preventive medicine guidance, environmental exposure guidelines, and health hazard protection standards. Materiel products include drugs, vaccines, and medical devices. Materiel that requires FDA licensure may take 10 or more years to complete the cycle of development from basic research to fielding. Figures L-6 through L-8 list near-term, mid-term, and far-term materiel products within each advanced development project management system and S&T functional area.

Medical Modernization Issues

Many of the materiel systems that the combat medic and other medical personnel rely on are developed in a partnership with non-AMEDD materiel developers. The medical combat developer and medical RDA community work collaboratively on these systems, with attention also given to jointness and interoperability. Key initiatives, which rely upon development or co-development by non-AMEDD materiel developers, are outlined here in order to provide a complete picture of the medical modernization strategy.

FUTURE MEDICAL TECHNOLOGIES

- *Hormones to reduce mental fatigue*
- *Compounds to enhance memory*
- *Thermoregulation devices to prevent heat/cold injury*
- *Immune boosters to sustain health during stress*
- *Rations to enhance performance*
- *Training to prevent musculoskeletal injury*
- *Real-time medical consultation*
- *Miniature non-invasive medical sensors*
- *Blood substitutes*



- *Real-time soldier effectiveness models for battlefield visualization*
- *Topical compounds to protect against parasites*
- *Wound dressings to prevent blood loss and accelerate healing*
- *Single-dose oral vaccines to prevent infectious disease*
- *Receptor targeted immunization against biological agents*
- *Natural antibodies against chemical agents*

Figure L-5

NEAR-TERM PRODUCT AVAILABILITY (FISCAL YEARS 1996-1998)

Applied Medical Systems

<u>Infectious Diseases of Military Significance</u>
- Sprayer, Electric, Liquid Pesticide
- Aerosol Generator, Ultra-low Volume, Electric

<u>Combat Casualty Care</u>
- Field Medical Oxygen Generating and Distribution System
- Liquid Oxygen Generation, Production, and Distribution System
- Computed Tomography (CT) Scanner
- X-ray System, Dental, Miniature
- Combat Medical Vest
- Chemically/Biologically Protected Shelter (Light Force)
- Chemically/Biologically Protected DEPMEDS

Biological Systems

<u>Infectious Diseases of Military Significance</u>
- Whole Cell Plus B Subunit Cholera Vaccine
- Argentine Hemorrhagic Fever Live Vaccine

<u>Medical Biological Defense</u>
- Botulism Immune Globulin
- Tularemia Live Vaccine

Pharmaceutical Systems

<u>Medical Chemical Defense</u>
- Nerve Agent Antidote, Multichambered Autoinjector

Figure L-6

MID-TERM PRODUCT AVAILABILITY (FISCAL YEARS 1999-2001)

Applied Medical Systems
Combat Casualty Care
- Field Anesthesia Machine
- Thawed Blood Processing System
- Armored Ambulance Suite

Biological Systems
Infectious Diseases of Military Significance
- Chikungunya Live Vaccine
- Rift Valley Fever Live Vaccine
- Campylobacter Vaccine
- Detoxified LPS-OMP Meningococcal Group B Vaccine
- ETEC Whole Cell, Recombinant B Subunit Vaccine
- Shigella Vaccine, *E. coli* Vectored *S. flexneri*
- Hantaan M-S (Vaccinia-vectored) Vaccine
- Shigella Sonnei Dysentery Vaccine
- Tick-borne Encephalitis Vaccine

Medical Biological Defense
- Botulinum Polyvalent Toxoid, Pentavalent (A-E)
- Botulinum Immune Globulin F(ab')2 Heptavalent (Equine)
- Q Fever CMR Extract Vaccine
- Cell Culture Derived Smallpox Vaccine (Vaccinia)
- Ricin Toxoid Vaccine

Pharmaceutical Systems
Infectious Diseases of Military Significance
- Antimalarial Drug, WR238,605
- Antimalarial Drug, Halofantrine, Prophylactic
- Antimalarial Drug, Azithromycin
- Schistosome Topical Antipenetrant

Medical Chemical Defense
- Cyanide Pretreatment
- Topical Skin Protectant

Combat Casualty Care
- Hypertonic Saline Dextran

Figure L-7

FAR-TERM PRODUCT AVAILABILITY (FISCAL YEARS 2002-2011)

Applied Medical Systems
- Chemically/Biologically Protected Shelter (Heavy, Airborne/Air Assault)

Biological Systems
Infectious Diseases of Military Significance
- Insect/Arthropod Repellent Lotion
- Plasmodium Falciparum Malaria Vaccine

Medical Biological Defense
- Botulinum Toxoid, Type F
- Botulinum Toxoid, Type G
- Staphylococcal Enterotoxin B Toxoid

Pharmaceutical Systems
Infectious Diseases of Military Significance
- Antileishmanial Drug, WR6026
- Antimalarial Drug, Arteether

Combat Casualty Care
- Hemoglobin Solutions
- Microencapsulated Antibiotic/Cephalosporin Hibernation Inducing Drug
- Silver Nylon Burn Dressing

Medical Chemical Defense
- Advanced Anticonvulsant

Figure L-8

Disease and Nonbattle Injury Surveillance System

The Army is currently developing a concept for a comprehensive DNBI surveillance system to provide commanders with a profile of deployed forces. Such a system will give "real time" knowledge of the health of U.S. Service members, estimates of the health status of enemy and indigenous peoples, the current health threat conditions, and early identification of disease occurrence from biological warfare agents. The system employs advanced technology in computers, communications equipment, environmental sampling, and patient devices to assemble the disease profile of the battlefield. The DNBI surveillance system will function in military operations of every level of intensity.

Patient Evacuation

The UH60-Q MEDEVAC helicopter will provide the Army with greater **projection and sustainment, protection, and maneuverability**. Enhancements over the current systems include the following:

- Communications equipment allows situational awareness and communications within nets on the future battlefield, facilitating mission acquisition, patient care, and regulation;
- Navigation equipment adds the ability to support joint maneuver forces at night and in adverse weather, allowing first-pass identification and recovery of casualties and isolated personnel;
- Improved on-board medical equipment adds the ability to sustain casualties over longer evacuation routes; and
- Evacuation capacity is expanded.

The modernized Armored Ambulance and Armored Battalion Aid Station **project and sustain** the force through:

- Enhanced en route medical care during a tactical MEDEVAC;
- Decreased mortality and morbidity through faster evacuation;
- Ballistic protection for medical personnel and casualties during tactical evacuation; and
- Tactical mobility commensurate with supported forces.

Soldier (Medic) Modernization

The Combat Medic Vest System, with an availability date of FY97, is designed to enhance the medical capabilities of the combat medic. The Combat Medical Vest System is compatible with the Load Bearing Vest and includes a rear pack that functions independently or in conjunction with the Vest System.

Chemically and Biologically Protected Shelter Modernization

The Chemically and Biologically Protected Shelter will replace the M51 shelter as well as other tentage. A limited production contract was awarded in FY95, with 152 systems to be produced by the first quarter of FY97 (partial fielding of Force Package 1). The remainder of Force Package 1 requirements will be obtained through a production contract in FY97, with projected fielding beginning in FY98 and ending in FY00. There is a requirement for additional advanced development research funds in FY96 to allow full production in FY97. Fielding of this protective shelter system will provide:

- A chemically and biologically protected shelter area for forward medical treatment.
- Increased mobility of treatment elements, improving operational flexibility.

Chemically Protected DEPMEDS Modernization

DEPMEDS constitutes the AMEDD's field medical hospital equipping and modernization project. Fielding has been completed within the active force, and reserve component fielding will be completed in FY96. The project has been moved into the sustainment and modernization phase, utilizing depot refurbishment of existing DEPMEDS equipment and assemblages to retrofit Army hospitals. The chemically protected DEPMEDS protects personnel through the use of chemically hardened tent liners, hardened environmental control units, and international standardization organization shelters, and is designed to provide chemical protection to the medical treatment areas. A Milestone III decision is scheduled for the first quarter of FY96, and the system is scheduled for fielding in the fourth quarter of that fiscal year. The chemically protected DEPMEDS:

- Allows medical operations in a contaminated environment for up to 72 hours.
- Provides a contamination-free working area in which medical personnel can work unencumbered by protective clothing.

Medical Communications for Combat Casualty Care

MC4 is a key **unfunded** medical program that will allow health care personnel at all echelons of care to communicate with one another by audio, video, and/or other electronic media so maximum utilization of expert consultant skills, diagnostic capability, and treatment regimens can be quickly implemented to provide state-of-the-art resuscitation, care, and enhanced evacuation. MC4 will exploit advanced technology to unite patient care from the battlefield to CONUS. MC4 will allow valuable and critically short clinical specialty resources to be dually resourced against deployed and fixed facility patient loads. MC4 technology is the medical support complement to the Army's force projection strategy and will fully integrate with digitization of the battlefield effort.

MC4: Far-forward Telemedics.

This will optimize time-critical casualty care. Medics within the combat battalion will have the capability to communicate with primary care physicians. The focus will be on enhanced resuscitative care as well as enhanced medical situational awareness for medical decision support. The materiel package includes:

- Hands-free two-way radio;
- Global positioning system and stylus-based computing; and
- Text and facsimile data devices at the battalion aid station.

MC4: Mobile Medical Mentoring Vehicle (M^3V).

This materiel package will provide critical flexibility to meet operational needs as a sending unit, a receiving unit, or a retransmission unit. As a sending unit, it will allow continuous contact with division forces as they move into areas of conflict. As a receiver, it will assist in the management of patients far forward. Additionally, M^3V will serve a retransmission capability if needed. This vehicle will provide medical telecommunications with specialty care physicians at field or fixed hospital levels. On-site live video and still diagnostic medical images can be transmitted and received to support more detailed diagnosis and treatment. The materiel package includes:

- Medical imaging workstations;
- Satellite transmission and reception capability;
- Independent communications ports; and
- Full motion medical video and multimedia transmitter/receiver.

MC4: Digital Field Medical Treatment Facility.

This will include a telecommunication package providing full motion video telemedicine capability, enabling the expert within CONUS to project expertise forward to the battlefield. Communication ports for audio, video, and digital modalities using satellite or land lines will provide direct interfaces. Additionally, an electronic archive for all patient data will allow instantaneous storage, retrieval, and display of patient medical data.

Advanced Research Projects Agency Technology Insertions.

Currently, over 20 medical advanced technology projects with potential Army medical use are undergoing research. Advanced technologies with high medical payoff that are being considered for transition include:

- The personal status monitor, which provides individual physiological monitoring data and telemetry capabilities.
- The smart litter, with built-in patient monitoring, patient stabilization, support capabilities, and telemetry systems.

SECTION 4

CONCLUSION

This annex describes the AMEDD's force modernization strategy and goals, efforts, and major shortfalls.

Shortcomings still exist despite our modernization effort. For example, funding is not available:

- To replace the obsolete UH-1 aircraft with a pure fleet of UH-60 aircraft.

  To support further modernization of UH-60 aeromedical evacuation aircraft in the form of UH-60Qs.

- To adequately investigate newly emerging infectious disease threats.
- To maintain a capability for aerosol testing of medical countermeasures against biological agents.
- To support advanced clinical testing of antimalarial and antileishmanial drugs or vaccines against ETEC, Chikungunya, Tick-borne Encephalitis, and Argentine Hemorrhagic Fever.
- To sustain or modernize 26 percent of field medical units in Force Package 1.
- To develop and/or test materiel-associated MC^4.
- To procure biological and chemical collective protection shelters.

ANNEX M

TRAINING

SECTION 1

INTRODUCTION

Army Training XXI (AT XXI) provides the framework for the Army to train from individual to Joint Task Force (JTF) level. As we implement the imperatives of Force XXI, the Army's training goal remains to execute tough, realistic field exercises as our primary means of training. However, decreasing resources, increasing weapons systems range and lethality, and environmental constraints limit the Army's ability to train. These factors, coupled with the broad force projection mission, the need for mission rehearsal capabilities, and the digitization of future forces, point out a need to leverage the rapid growth in technology to improve training proficiency with the smart use of Training Aids, Devices, Simulators, and Simulations (TADSS) and automated command and control (C2) systems.

TADSS enhance the training of soldiers at all levels. TADSS consist of four elements. Training aids are items that assist in the conduct of training and the process of learning. Training devices are three-dimensional objects that improve training. They are substitutes for actual equipment. Simulators are devices that replicate all or most of a system's functions. Simulations provide leaders effective training alternatives when maneuver and gunnery training opportunities are limited or restricted. System TADSS support training for a specific weapon or equipment system. Nonsystem TADSS support general military training. The Army's goal is to fund, develop, and field system TADSS as part of a total system package. Ideally, these TADSS are embedded into, or "appliquéd" onto the systems to enhance and maintain skill proficiency.

While today's TADSS supplement live training, tomorrow's TADSS must provide the trainer with mission rehearsal capabilities and options to train segments of the force to standard before entering into a crucial, high resource or safety constrained training environment. The vision is to build this synthetic environment (SE) battlefield, integrate it with today's live training, and use automated training management tools to provide trainers with a flexible, mission essential task list (METL)-driven menu of structured exercises. "Digitizing the battlefield" to provide seamless, digital C2 capabilities for the entire fighting force is one of the Army's top priorities. To meet this requirement, multiple initiatives are underway to harness the power of the microprocessor and information technology for warfighters. The goal is to use digital technology to maintain a continuous edge in projecting and employing combat power on future battlefields. Mirroring this effort are initiatives to embed the complex, combined arms, structured training of the future into the digitized force.

Training and Doctrine Command (TRADOC) (Deputy Chief of Staff for Training) is providing a structured training development strategy to assist in the planning, execution, and assessment of training. AT XXI includes **three axes** which rely heavily on information technologies to conduct unit and institutional training, and to develop strategies for self-development, modernized classrooms, distance learning, training development, automated testing, Army modernization training, and New Equipment Training (NET) for Force XXI:

Warfighter XXI focuses on the unit training pillar and is the model for Combat Training Center (CTC) and home station training. It describes a training system and strategy that uses the best combination of live, virtual, and constructive environments to create a SE battlefield for training at individual through joint task force level. The goals are to: (1) develop a system that Army units will use to manage and execute training in the 21st Century; (2) address the spectrum of Army training programs as they relate to training in units; and (3) provide the conceptual construct that synchronizes ongoing initiatives into a coherent, fully integrated training system. TADSS are a key component of Warfighter XXI, as well as WARNET XXI, and compete for Research, Development, and Acquisition (RD&A) resources as training materiel systems.

WARNET XXI provides for the linkage of training acquisition, NET, and digitization of training support products. The goals are to: (1) integrate training needs into system/hardware materiel requirements documents to ensure a complete training subsystem is fielded, (2) develop and provide NET packages the proponent will use to develop institutional training programs and exportable training products for units, and (3) ensure that contractor developed training products are digitized in accordance with Army standards and are integrated in the Army Training Digital Library.

Warrior XXI focuses on the development of the institutional and self-development pillars of training, and defines those future activities in the Table of Distribution and Allowance (TDA) Army and the institutional axis of Force XXI required to train the Army of the future. It provides a strategic vision for the development of a Land Warfare University to meet the institutional and self-development training needs of Force XXI and an integral plan to achieve the vision. When combined with Warfighter XXI and WARNET XXI, Warrior XXI will provide the architectural foundation for the Army training system of the future.

At the Department of the Army (DA) level, the Deputy Chief of Staff for Operations and Plans (DCSOPS) has overall responsibility for training. Specifically, the Director of Training (DOT) is the single Army point of contact for TADSS. The DOT utilizes the Training Mission Area (TMA) to assist in training management. The TMA is governed by AR 350-38 and provides oversight and management of TADSS. Both a Council of Colonels and a General Officer Steering Committee prioritize programs based on an approved training strategy. TADSS support the major objective of Army training: the establishment of policy, supported by resources that impart enduring, comprehensive job skill (task proficiency) quickly, with the fewest resources, to America's Army. Training transforms people, equipment, and doctrine into capability.

From a modernization viewpoint, this objective is supported by the effective and efficient integration of systems and nonsystems training technologies and development within the three simulation environments: **live, virtual, and constructive**.

- **Live** simulation training is executed under battlefield conditions using tactical equipment. It includes individual and collective field training performed at training institutions, homestation, CTCs, live fire ranges, and while deployed in support of military operations. Live training emphasizes the fidelity of field training under battlefield conditions and standards and is supported by a toolbox of TADSS, instrumentation systems, targetry, and training unique ammunition. Aside from gunnery training, live maneuver training normally incorporates Tactical Engagement Systems (TES) to simulate combat conditions. TES training methodology is characterized by free interplay of forces, using a real time casualty assessment system that reinforces training tasks through immediate feedback response to correct and incorrect individual and collective task accomplishment. Live training is the most resource intensive form of training and is used to reinforce skills previously trained during the crawl and walk stages of the crawl-walk-run training progression. While live training can never be replaced, the application of technology can provide live simulations to enhance traditional field/range training and offset restrictions imposed on live training by high technology weapons systems, safety, environmental sensitivities, and higher training costs.

Capabilities required for modernizing the live training environment for the mid-term period are: integrate new/upgraded systems, weapons, and Opposing Force (OPFOR) into the current collective training battlefield; collect C2 digital data to realistically simulate exchanges of digital information between higher/adjacent units and joint elements; conduct force-on-force and precision military operations in urban terrain; and optimize individual/collective skills to synchronize and employ combined arms assets through realistic live fire training exercises. Capabilities required for modernizing the live training environment for the far-term period are: integrate new/upgraded systems and weapons into the future collective training battlefield; export lessons learned through interactive systems and weapons into future collective training battlefields; export lessons learned through interactive systems to units at home station; tie-in units undergoing a CTC rotation with parent and live units training at home station; and instrument training ranges for analyzing and providing feedback on exercises at home station.

- **Virtual** simulation training is executed using computer generated battlefields in simulators which approximate the physical layout of tactical weapons systems and vehicles. In the virtual environment, simulators take the place of terrain and weapons systems and can be linked together to expand the scope of the training event. Virtual training also has the advantage of allowing soldiers to perform tasks too dangerous for the live environment (such as calling for artillery fires on or near an occupied friendly position), as well as providing the capability for rapid changes to scenario and retraining specific tasks. Virtual training is relatively new, and current technology is both expensive (initial investment) and limited to individual and small unit training.

Capabilities required for modernizing the virtual training environment in the mid-term period are: repeatedly train and sustain combined arms tasks unrestricted by ecological concerns, safety issues, and resources (e.g., budget, property/terrain, etc.); repeatedly conduct mission rehearsal during deployment and while equipment is in deployment-ready status or in transit; and integrate system and nonsystem training requirements into an aggregate virtual simulation environment. Capabilities required for modernizing the virtual training environment in the far-term period are: provide affordable training in a combined arms environment (Armor, Infantry, Artillery, Aviation, Air Defense, and Engineers) while economizing time by combining precision gunnery with maneuver training and integrate follow-on systems training requirements into an aggregate virtual system environment.

- **Constructive** simulation training is the use of computer models and simulations to exercise the command and staff functions of units from platoon through joint task force. Constructive simulations permit multiple echelons of command and staff to execute their normal warfighting tasks in extensive exercise without the resource constraints of large bodies of troops. Each constructive simulation requires supporting resources in the form of personnel in response cells with appropriate work stations.

Capabilities required for modernizing the constructive training environment for the mid-term period are: repeatedly conduct realistic commander and staff C2 training and train in a SE where constructive and virtual simulations are linked seamlessly so that the interface is transparent to the user. Commanders from platoon through theater level will actively participate. Capabilities required for modernizing the constructive training environment for the far-term period are: link to Command, Control, Communications, Computers & Intelligence (C4I) for enhanced mission rehearsal capability; affordably conduct realistic commander and staff C2 training in a combined arms environment by embedding constructive simulations into combat systems; export lessons learned through interactive media to units at home-station; and help form a synthetic environment where live, virtual, and constructive simulations are seamless and transparent to the training audience.

The objective Force XXI training system will feature a robust SE that integrates live, virtual, and constructive simulations. The SE will provide commanders the ability to simultaneously train all battlefield operating systems, in real time, on the terrain of choice, and under all operating conditions demanded of a force projection Army conducting military operations in a joint environment. Using Distributed Interactive Simulation (DIS) protocols, geographically separate and split-based units will be able to train as a force package prior to deployment. The SE will also allow combat, materiel and force developers, and analytic communities to test, evaluate, and refine new doctrine, weapons systems, and organizations in compressed time schedules, prior to "bending metal".

SECTION 2

CURRENT PROGRAM ASSESSMENT

General

The assessment addresses the following Battlefield Operating System (BOS) and TMA components. Each provides training support to the soldier:

- Battle Command
- Intelligence
- Maneuver
- Aviation
- Fire Support
- Mobility/Survivability
- Air Defense
- Logistics
- Combat Training Centers
- Land, Ranges, Targets, and Environment
- Other Programs

The assessments are based on the following criteria:

GREEN - TADSS are identified and fully funded.

AMBER - TADSS are identified but not fully funded.

RED - TADSS are not identified or not funded.

Battle Command BOS

Battle command is the art of battle decision-making, leading, and motivating soldiers and their organizations into action to accomplish given and implied missions. Figure M-1 summarizes major system and nonsystem TADSS in the near- mid- and far-term for the Battle Command BOS.

BATTLE COMMAND BOS PROGRAM ASSESSMENT

TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
BRIGADE/BATTALION BATTLE SIMULATION	AMBER	AMBER	AMBER
CORPS BATTLE SIMULATION	AMBER	AMBER	AMBER
BATTLE FOCUS TRAINER/JANUS	AMBER	AMBER	AMBER
WARFIGHTERS' SIMULATION 2000	AMBER	GREEN	GREEN

Figure M-1

Brigade/Battalion Battle Simulation (BBS) Program: AMBER. BBS is a computer-based simulation that supports Active Component (AC) and Reserve Component (RC) brigade/battalion commander and staff training. BBS trains command and control procedures and decision making skills. The core BBS is fully funded at sustainment levels. Additional enhancements are not planned or funded after FY96.

Corps Battle Simulation (CBS) Program: AMBER. CBS supports training in the command and control skills needed to conduct operations for commanders and staffs at levels from brigade through theater. It also supports training for joint operations. Funded at sustainment levels only. Additional enhancements are not planned or funded after FY96.

Battle Focus Trainer (BFT)/Janus Program: AMBER. BFT/Janus is a computer-based simulation which supports training in synchronization and planning skills at the crew/squad through brigade level. Development funded through FY96. Funded at sustainment levels only after FY96.

Warfighters' Simulation (WARSIM) 2000: AMBER. WARSIM 2000 will support training for commanders and staffs at levels from battalion through theater. It will replace BBS and CBS. It will provide the land warfare functionality to the Joint Simulation System (JSIMS). JSIMS will provide the capability to train at JTF level. Partially funded.

Intelligence BOS

Intelligence encompasses the process of gathering, analyzing, and disseminating information on the environment of operations and the enemy. Figure M-2 summarizes major system and nonsystems TADSS in the near- mid- and far-term for the Intelligence BOS.

INTELLIGENCE BOS PROGRAM ASSESSMENT

TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
TACSIM\WARSIM INTEL MODULE	AMBER	AMBER	AMBER
IEWTPT	AMBER	AMBER	AMBER

Figure M-2

Tactical Simulation (TACSIM): AMBER. TACSIM is the intelligence driver for CBS. It can replicate division through national intelligence collection sources. TACSIM supports training of corps & division command posts and their associated Military Intelligence (MI) staffs. TACSIM enhancements for CBS are not funded. WARSIM Intel

Module is the follow-on to TACSIM for use with WARSIM. Fully funded for RDA through the far-term.

Intelligence/Electronic Warfare Tactical Proficiency Trainer (IEWTPT): AMBER. IEWTPT is the cornerstone of the MI Combined Arms Training Strategy (CATS). It is designed to be embedded in or strapped on individual MI tactical collection systems. It will provide signature level details in the contingency language and provide training from the operator/crew level through the corps MI battle staff. Partially funded through the far-term.

Maneuver BOS

Maneuver refers to the employment of forces through offensive or defensive operations to achieve relative positional advantage over a threat force so as to achieve tactical, operational, or strategic objectives. The TADSS in this BOS train and prepare soldiers for direct fire close combat by adding realism of force-on-force training while improving crew gunnery skills. Figure M-3 summarizes major system and nonsystems TADSS in the near- mid- and far-terms for the Maneuver BOS.

MANEUVER BOS PROGRAM ASSESSMENT

TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
ABRAMS TANK TADSS	GREEN	GREEN	GREEN
ARMORED GUN SYSTEM (AGS) TADSS	GREEN	GREEN	GREEN
BRADLEY TADSS	AMBER	AMBER	AMBER
JAVELIN TADSS	GREEN	GREEN	GREEN
CLOSE COMBAT TACTICAL TRAINER	GREEN	GREEN	GREEN
MILES REPLACEMENT	GREEN	GREEN	GREEN
TWGSS/PGS	GREEN	GREEN	GREEN
GUARDFIST I	AMBER	AMBER	AMBER
MILES HAND GRENADE	RED	RED	RED
THRU-SIGHT VIDEO	RED	RED	RED

Figure M-3

Abrams Tank : GREEN. The Abrams is the Army's main battle tank and provides heavy armor superiority on the battlefield. System training devices for the M1A2 currently programmed include a wide range of TADSS. The Conduct of Fire Trainer (COFT) which supports the M1 and M1A1 tanks, both the Institutional COFT (ICOFT) and the Mobile COFT (MCOFT) which is used by the RC, provide precision gunnery training for commanders and gunners over a variety of combat situations using simulation. The Advanced Gunnery Training System (AGTS), is an enhanced COFT which provides a target acquisition, identification and engagement capability using fire control and sighting equipment. The Crew Station Trainer provides an interactive training tool for the display panels (commander, gunner, and driver) in the M1A2 tank. A family of Maintenance Trainers provides training in the critical unit and direct support/general support tasks required by the Abrams. System training devices are funded in the near-and mid-terms.

Armored Gun System (AGS): GREEN. The AGS is a lightweight armored vehicle capable of supporting early entry forces in the absence of heavy armor. System training devices for the AGS currently programmed include: the COFT and the AGTS, both similar to those supporting the Abrams Tank, and the Thru-Sight Video (TSV). TSV provides a video recording of the gunner's acquisition, tracking and firing skills. System training devices are funded in the near-and mid-terms.

Bradley Fighting Vehicle: AMBER. The Bradley is a lightly armored, full-track fighting vehicle that provides cross-country mobility, mounted firepower and support to dismounted combat operations. System training devices for the Bradley currently programmed include: the AGTS, the COFT, and the Bradley Maintenance Trainers. Not all system training devices are fully funded.

Javelin: GREEN. The Javelin is a manportable, multi-Service system designed to provide medium antitank capability to the infantry, scouts, and combat engineers. The Field Tactical Trainer (FTT), the Basic Skills Trainer (BST), and the Missile Simulation Round (MSR) are three programmed system training devices for the Javelin. They are currently fully funded through the far-term.

Close Combat Tactical Trainer (CCTT): GREEN. Is the core of the Combined Arms Tactical Trainer (CATT) program, the future family of virtual simulators. CCTT will replace Simulations Networking (SIMNET). It is a training simulation system which uses various simulators, emulators, and semi-automated forces replicating combat vehicles, weapons systems, dismounted forces, combat support, combat service support, command and control, and opposing forces networked to provide fully interactive unit task training, on a computer generated terrain. It will be fielded in mobile/transportable configuration (platoon level) and at fixed (company/team level) sites to support armor and mechanized infantry training. CATT core, while not precisely defined, will be the common architecture and framework which follow-on CATTs will link into. Nonsystem TADSS that are part of CATT will be developed by Simulation Training and Instrumentation Command (STRICOM) and funded through the TMA process. System components will be developed and funded by the respective system Program Manager/Program Executive Officer (PM/PEO). Fully funded through the far-term.

Multiple Integrated Laser Systems (MILES): GREEN. Live simulation to train individual and collective maneuver skills on the force-on-force battlefield. Current replacements amount to approximately 5-7% per year. Losses amount to approximately 10%. MILES 2000 will begin replacing MILES I in FY98-FY03 and will eliminate this shortfall. MILES 2000 provides real-time casualty effects necessary for a force-on-force training scenario. Enhancements include: discrete player identification for all participants, enhanced audio-visual cueing effects, event recording and display, increased programmability of weapon characteristics, and increased ability to account for side, flank, corner and rear shots. Fully funded.

Tank Weapons Gunnery Simulation System/Precision Gunnery System (TWGSS/PGS): GREEN. Vehicle appended two-way laser gunnery training systems to simulate main gun and coaxial machine gun firing for M1-series tanks, M2/M3 Bradley Fighting Vehicles (whose system also includes TOW), and the Armored Gun System. They provide a precision gunnery capability for gunnery training. Fully funded for the revised fielding plan.

Guard Unit Armory Device Full Crew Interactive Simulation Trainer (GUARDFIST) I: AMBER. Installed on a static tank at a Reserve Component unit's armory, it uses high quality computer graphics and scenarios through color monitors linked to the sights of the gunner, driver, and tank commander. It provides real time crew interaction allowing crews to simulate firing and full crew drills. It supplements the MCOFT. Partial funding does not fulfill all requirements.

MILES Hand Grenade: RED. Simulates grenade effects in a tactical engagement simulation exercise. Unfunded.

Thru-Sight Video (TSV): RED. It attaches to the weapon systems' sights and provides a video recording of the gunner's acquisition, tracking and firing skills on the Abrams Tank, the Bradley Fighting Vehicle, and the Armored Gun System. Partially fielded, it is unfunded for additional fielding.

Aviation BOS

Aviation's mission is to find, fix, and destroy the enemy through fire and maneuver, and to provide Combat Support (CS) and Combat Service Support (CSS) in coordinated operations. While *FM 100-5* does not address aviation as a separate BOS, for program accountability purposes it is addressed separately here. Figure M-4 summarizes major system and nonsystems TADSS in the near- mid- and far-term for the Aviation BOS.

AVIATION BOS PROGRAM ASSESSMENT

TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
AH-64 APACHE	AMBER	AMBER	AMBER
AH-64D LONGBOW APACHE	GREEN	GREEN	GREEN
COMMANCHE RAH-66	AMBER	AMBER	AMBER
AVCATT	RED	RED	RED
MILES AGES II	AMBER	RED	RED
ASET IV	GREEN	GREEN	GREEN

Figure M-4

AH-64 Apache: AMBER. The AH-64 Apache is the Army's primary attack helicopter and provides day, night, and adverse weather attack helicopter capability. Its principal mission is the destruction of high-value targets with the HELLFIRE missile. There are a number of system training devices for the AH-64 currently programmed. The Combat Mission Simulator, which utilizes visual systems, provides realistic weapons, combat skills and flight emergency procedure training to both the pilot and co-pilot/gunner (CPG). The Tactical Engagement Simulation System (TESS), simulates weapons fire in force-on-force collective training. The Apache Crew Trainer (ACT), provides pilot and co-pilot/gunner training in normal flight, emergency, and weapons systems skills under all weather conditions. The Apache Crew Training System (ACTS) trains the AH-64A team in a combined arms environment. The Airframe & Engine Drive System Trainer enhances the removal and installation critical skills to maintain the AH-64A weapon system. The Armament/Electrical Trainer (AET-A7) provides a platform for developing the skills for the armament/electrical repairer. System training devices are partially funded in the mid-term only.

AH-64D Longbow Apache: GREEN. The AH-64D Longbow Apache (LBA) is a significant modernization of the AH-64A Apache and adds greater target acquisition, true fire-and-forget, multiple target engagement, digital communications, situational awareness, and battlefield management capabilities. The currently programmed LBA training devices include the Longbow Crew Trainer (LCT), which uses advanced computers, image generators, and visual display systems to provide pilot and CPG procedural training in cockpit sensors for normal and emergency flight; Target Acquisition Designation Sight (TADS); and Fire Control Radar (FCR) operations. Weapons (including Semi-active Laser (SAL) and Radar Frequency (RF) HELLFIRE missiles) employment as well as air crew and team training under simulated battlefield conditions in a combined arms environment is also trained. The Longbow Crew Trainer System (LCTS) provides team, unit, and staff training/mission rehearsal under simulated battlefield conditions using combined arms scenarios. TESS simulates all on-board weapons fire (line-of-sight (LOS) and non-line-of-sight (NLOS)) in live force-on-force collective training. The Longbow Airframe & Engine Drivetrain Systems Trainer (AEDST) trains the removal and installation critical skills to maintain the LBA weapon system. The Multiplex, Armament, Visionics, Weapons, Electrical Systems Trainer (MAVWEST) develops skills for the armament/electrical/avionics repairer. The LCT, LCTS, LBA AEDST, and MAVWEST are integrated and use much of the actual aircraft software. The LCT and LCTS are DIS compliant and can network with CATT systems on the Defense Simulation Internet (DSI). TESS is partially funded; other LBA devices are fully funded.

Commanche RAH-66: AMBER. The Commanche is the Army's next generation armed reconnaissance helicopter. The currently programmed RAH-66 training devices include the Cockpit Procedures Trainer (CPT) which trains individual aviators in normal operational and emergency procedures. The Cockpit/Sensor/Turret Gun (CSTG) Trainer trains the Commanche crew on airframe, cockpit, and gun turret tasks. The Integrated Composite Maintenance Trainer, is a full size, fully integrated replica of the Commanche which trains maintenance personnel on all aspects of the aircraft. Partially funded.

Aviation Combined Arms Tactical Trainer (AVCATT): RED. The aviation variant of the Army's CATT program. Unfunded.

MILES Air to Ground Engagement System (AGES) II: AMBER. The AGES II system is an addition to the MILES force-on-force training system, integrating the AH-64A, CH-47D, UH-60 Hellfire Ground Support System (HGSS), OH-58D, and a controller device. AGES II augments the MILES training capability by incorporating additional Corps/Division aviation assets into the training environment. The CH-47D, the UH-60, and the HGSS systems will be fielded both to units and to the CTCs. The AH-64A will be fielded to the CTCs only. The OH-58D will be fielded at reduced quantities only at the National Training Center. Funded in the near-term only.

Aircraft Survivability Equipment Trainer (ASET) IV: GREEN. ASET IV is a group of ground-based emitters which replicate a threat air defense battery. These emitters simulate infrared and radar frequency defense systems. ASET IV tests the pilots ability to employ aircraft survivability equipment and tactics to survive. It has been integrated into the OPFOR at the Combat Training Centers. Fully funded.

Fire Support BOS

Fire support is the collective and coordinated employment of the fires of indirect fire systems and electronic warfare systems against ground targets to support land combat operations. Figure M-5 summarizes major system and nonsystems TADSS in the near- mid- and far-terms for the Fire Support BOS.

FIRE SUPPORT BOS PROGRAM ASSESSMENT

TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
ATACMS	AMBER	AMBER	AMBER
MLRS	AMBER	AMBER	AMBER
FSCATT	AMBER	AMBER	AMBER
SAWE-RF	AMBER	AMBER	AMBER
GUARDFIST II	AMBER	RED	RED

Figure M-5

Army Tactical Missile System (ATACMS): AMBER. ATACMS is a semi-ballistic surface-to-surface missile which provides indirect fire support at ranges beyond the capability of existing cannon and rocket systems. There are a number of system TADSS being fielded with the ATACMS. The Explosive Ordnance Device (EOD) is a dummy missile and pod container which provides theory training for location and identification of internal components of the ATACMS missile. The Missile Monitor Test Device (MMTD) allows operators to perform surveillance testing of the ATACMS missile. Both are partially funded.

Multiple Launch Rocket System (MLRS): AMBER. MLRS is a free flight, area fire, artillery rocket system that delivers large volumes of firepower in a short time. It provides counter battery fire and suppression of enemy air defenses, light materiel, and personnel targets. The Fire Control Panel (FCP) Trainer, Maintenance Trainer, and Launch Pod Assembly Trainer are programmed system training devices for the MLRS and are partially funded.

Fire Support Combined Arms Tactical Trainer (FSCATT): AMBER. A two phased system. Phase I trains the entire field artillery team, from forward observer to gun crew on required tasks. Phase I consists of a target acquisition subsystem, a fire direction subsystem, a weapons delivery subsystem, and a FSCATT controller station, all linked into GUARDFIST II. Phase II adds other CATT modules providing a "full-up" CATT artillery trainer. Phase I is partially funded through the far-term. Phase II is unfunded.

Simulation of Area Weapons Effects-Radio Frequency (SAWE-RF): AMBER. SAWE-RF accurately simulates in real time the effects of direct and indirect fire and surface area weapons. It ties in with MILES II and will only be fielded at the CTCs. Partially funded.

Guard Unit Armory Device Full Crew Interactive Simulation Trainer II Field Artillery (GUARDFIST II): RED. GUARDFIST II uses computer-generated graphics and an audio system to simulate the sights and sounds of the battlefield. It also provides a record of student performance for After Action Reviews (AAR)s. It supports both the AC and RC. There are two versions. GUARDFIST II, which is a one-on-one trainer, and GUARDFIST IIA, which is a thirty-to-one trainer. It replaces the Training Set Fire Observation (TSFO). Partially funded in near-term, unfunded in mid- and far-term.

Mobility/Survivability BOS

Mobility operations preserve the freedom of maneuver of friendly forces. Survivability operations protect friendly forces from the effects of enemy weapons systems. Figure M-6 summarizes major system and nonsystems TADSS in the near-mid- and far-term for the Mobility/Survivability BOS.

MOBILITY/SURVIVABILITY BOS PROGRAM ASSESSMENT			
TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
GRIZZLY	RED	RED	RED
WOLVERINE	RED	RED	RED
HORNET (WAM)	AMBER	AMBER	AMBER
ENCATT	RED	RED	RED
BAS/BADS	AMBER	AMBER	AMBER
PSS	AMBER	AMBER	AMBER

Figure M-6

Grizzly: RED. The Grizzly is an M1 Abrams chassis-based system which provides an in-stride capability to overcome simple and complex obstacles. The stand alone training device simulates driving and obstacle breaching. The TADSS portion is unfunded.

Wolverine: RED. The Wolverine is a Class 70 bridge mounted on an M1 Abrams chassis which provides assault bridging support for forward, heavy-maneuver forces. The stand alone device simulates assault gap crossing for the HAB. The TADSS portion is unfunded.

Hornet (WAM): AMBER. Hornet (WAM) is a smart munition with a long-term, loitering, anti-armor capability. It provides the basis for the Intelligent Minefield (IMF). The WAM Collective Trainer, and the WAM Individual Trainer provide training capability for force-on-force training. Both systems training devices are partially funded.

Engineer Combined Arms Tactical Trainer (ENCATT): RED. ENCATT is the engineer variant of the Army's CATT program. Unfunded.

Biological Agent Simulate/Biological Agent Decontamination Simulant (BAS/BADS): AMBER. BAS/BADS simulates threat biological agents and provides a realistic means to train in a biologically contaminated area. Partially funded.

Projected Smoke Simulator (PSS): AMBER. PSS replicates projected smoke (indirect fire) during force-on-force exercises and incorporates a whistle/bang device to simulate the sound of incoming artillery rounds. Partially funded.

<u>Air Defense BOS</u>

Air defense provides the force protection from enemy air attack. Figure M-7 summarizes major system and nonsystems TADSS in the near- mid- and far-term for the Air Defense BOS.

AIR DEFENSE BOS PROGRAM ASSESSMENT

TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
AVENGER	AMBER	AMBER	AMBER
STINGER	AMBER	AMBER	AMBER
PATRIOT	AMBER	AMBER	AMBER
ADCATT	RED	RED	RED
BRADLEY STINGER FIGHTING VEHICLE	AMBER	AMBER	AMBER

Figure M-7

Avenger: AMBER. A lightweight, highly mobile surface-to-air missile mounted on a HMMWV. It provides mobile, short-range air defense protection. The Force-on-Force Trainer (FOFT) provides tactical simulation of missile and gun firings, weapons effect signature simulation, and is integrated with a real time casualty assessment capability. The Troop Proficiency Trainer (TPT) provides real time, free play and interactive simulation of stationary and remote operations. The ICOFT provides full training of operator engagement tasks through the use of computer generated battlefield scenarios. Partially funded.

Stinger: AMBER. Shoulder fired, infrared missile system which homes in on the heat source of the target. Provides short range air defense protection. The Manportable FOFT provides tactical simulation of missile firing, weapons effect signature simulation, integrated with a real time casualty assessment. The TPT is used at unit level to train and sustain crew member engagement skills. The ICOFT provides full training of operator engagement tasks through the use of computer generated battlefield scenarios. System TADSS currently fielded, future upgrades unfunded.

PATRIOT: AMBER. A surface-to-air missile which provides protection against Short Range Ballistic Missiles (SRBM) to Medium Range Ballistic Missiles (MRBM), aircraft, and Cruise Missiles (CM) in the Corps and Theater area. The TPT is a software program which allows Patriot operator training in the field. The Patriot Conduct of Fire Trainer Post Deployment Build IV Upgrade (PCOFT PDB IV) is a computer driven battlefield system which allows one instructor to assist eight students on operation of the tactical system operator consoles. The Patriot Organizational Maintenance Trainer Post Deployment Build IV Upgrade (POMT PDB IV) provides a realistic trainer for Patriot Missile maintenance personnel. The Patriot Intermediate Maintenance Training Device (PIMIT) simulates realistic system faults which require the application of maintenance concepts, tools, and techniques. Partially funded through the far-term.

Air Defense Combined Arms Tactical Trainer (ADCATT): RED. ADCATT is the air defense variant of the Army's CATT program. Unfunded through the far-term.

Bradley Stinger Fighting Vehicle (BSFV): AMBER. Stinger system mounted on a M2 Bradley Fighting Vehicle. The Conduct of Fire Trainer Upgrade, a gunnery trainer for the BSFV commander/squad leader and gunner, and the Enhanced Force on Force Trainer, an integrated laser engagement simulator used in conducting force on force training at the CTCs, are the programmed system training devices. Partial funding does not begin until far-term. BSFV crews may use the standard COFT to train with the Bradley weapons.

Logistics BOS

Logistics is the process of planning and executing the sustainment of forces in support of military operations. Figure M-8 summarizes major system and nonsystems TADSS in the near- mid- and far-term for the Logistics BOS.

LOGISTICS BOS PROGRAM ASSESSMENT			
TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
CSSTSS 2.0	GREEN	GREEN	GREEN
CRANESIM	RED	RED	RED
BRIDGESIM	RED	RED	RED

Figure M-8

Combat Service Support Training Simulation System (CSSTSS) Version 2.0: GREEN. CSSTSS is a constructive simulation which simulates CSS command and control activities in a realistic, stressful environment representative of the modern battlefield. It will operate in both stand alone and linked modes (to CBS then WARSIM). Fully funded.

Crane Simulator (CRANESIM): RED. CRANESIM is a computerized, full-mission trainer that simulates the operating controls and handling characteristics of three cargo handling cranes. The simulator will provide training scenarios that require crane operators to onload/offload equipment and material during deployment/mobilization operations. Unfunded.

Bridge Simulator (BRIDGESIM): RED. BRIDGESIM is a computerized, full mission trainer that simulates the operational and performance characteristics of Army watercraft. Unfunded.

Combat Training Center (CTC) Program: AMBER.

The CTC Program is the centerpiece of the Army's collective training. It includes the National Training Center (NTC), the Joint Readiness Training Center (JRTC), the Combat Maneuver Training Center (CMTC), and the Battle Command Training Program (BCTP). Army training needs are inextricably supported by the instrumented battlefields of the CTCs. NTC, CMTC, and JRTC integrate advanced technology, instrumented maneuver areas with observers/controllers, and a dedicated and highly skilled OPFOR, to exercise units in realistic force-on-force engagements, Military Operations in Urban Terrain (MOUT), and live fire exercises. Modernized systems must continue to be delivered with the components needed for them to be fully integrated into the CTC battlefield. Instrumenting the CTC battlefield provides the ability to record, assess, and replay through AARs, the complex battlefield dynamics. Figure M-9 summarizes major system and nonsystems TADSS in the near- mid- and far-term for the CTCs.

COMBAT TRAINING CENTERS PROGRAM ASSESSMENT			
TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
JRTC OBJECTIVE INSTRUMENTATION	AMBER	AMBER	AMBER
JRTC LIVE FIRE OBJECTIVE	RED	RED	RED
JRTC MOUT FORCE-ON-FORCE	GREEN	AMBER	AMBER
NTC OBJECTIVE INSTRUMENTATION	GREEN	GREEN	GREEN
NTC RDMS	AMBER	AMBER	AMBER
NTC RMCS	AMBER	AMBER	AMBER
OSV	AMBER	GREEN	GREEN
OPFOR AVIATION	RED	RED	RED
OPFOR GROUND	RED	RED	RED
OPFOR WHEEL	RED	RED	RED
CMTC	GREEN	GREEN	GREEN
BCTP	GREEN	GREEN	GREEN

Figure M-9

Joint Readiness Training Center (JRTC) Program: AMBER.

JRTC is sponsored by Forces Command (FORSCOM). The training focus is on light battalion task force on a light brigade battlefield. The scope of training is low-to mid-intensity combat including peace-enforcement. Special Operations Forces, and Air Force combat and airlift units are also trained. JRTC is located at Fort Polk, LA. TADSS for JRTC include:

JRTC Objective Instrumentation System: AMBER. It is a computer-controlled training system which provides a full data collection and feedback capability to units training at JRTC. This system is partially funded (minus integration of the Single Channel Ground/Airborne Radar System (SINCGARS) and Army Battle Command System (ABCS)).

Live Fire Objective: RED. It is designed to provide full instrumentation and integration of ground targetry systems in support of company and platoon level force-on-force exercises. Unfunded through the far-term.

Military Operations in Urbanized Terrain (MOUT) Force-on-Force: AMBER. Phase I is funded and provides stand alone basic instrumentation capabilities to parts of the MOUT complex. Phase II is unfunded.

National Training Center (NTC): AMBER.

NTC is sponsored by FORSCOM. The training focus is on armor/mechanized battalion task force on an armor/mechanized brigade battlefield. The scope of training includes mid- to high-intensity combat. NTC is located at Fort Irwin, CA.

NTC Objective Instrumentation System: GREEN. The NTC Objective Instrumentation System will provide a full brigade instrumentation system. Development is scheduled to start in FY00. Fully funded starting in mid-term.

Range Data Measurement Subsystem (RDMS): AMBER. The RDMS is a communications system used to collect data generated by the players. It is passed along with position location data to the core instrumentation system for processing and display. The current 650 player monitoring capability will be expanded to a 2000 player capability. Partially funded.

Range Monitoring and Control Subsystem (RMCS): AMBER. Serves as the backbone of the communications system at the NTC. It allows for the integration of numerous data collection systems and SINCGARS. Baseline exists, upgrades are currently unfunded.

OPFOR Surrogate Vehicle (OSV): AMBER. System designed to replicate threat armored vehicles (primarily BMPs). NTC requirements are partially funded in the near-term. Requirements at the other CTCs are unfunded.

NTC OPFOR Aviation: RED. Provide OPFOR aircraft to be used in force-on-force training at NTC. Unfunded.

NTC OPFOR Ground Systems: RED. Provides functionally correct main battle tanks and self-propelled cannons for the opposing forces at the NTC. Unfunded.

NTC OPFOR Wheeled Vehicle: RED. Provides visually modified reconnaissance vehicles, towed cannon decoys, and anti-tank guided missile and rocket artillery devices for NTC. Unfunded.

Combat Maneuver Training Center (CMTC): GREEN.

CMTC is sponsored by U.S. Army, Europe (USAREUR). The training focus is on armor/mechanized battalion task force on an armor/mechanized brigade battlefield. The scope of training includes low-to high-intensity combat. Both conventional operations and regional response scenarios are replicated. CMTC is located at Hohenfels Major Training Area (MTA), Germany. It is the only U.S. training area in Europe capable of supporting battalion level maneuvers. Fully funded except for SINCGARS integration and ABCS integration which are not funded.

Battle Command Training Program (BCTP): GREEN.

The BCTP is based at Fort Leavenworth, KS, is fully funded, and uses advanced simulations to train Army Corps and Division commanders and their battle staffs in mid to high intensity conflict scenarios. It is AMBER until FY99, when it will start to use WARSIM. GREEN in mid- and far-term.

Land, Ranges, Targets and Environment: AMBER.

This program provides procurement and installation of targetry, instrumentation, devices, and other range related hardware. It supports Army range modernization requirements in accordance with the Army Range and Training Land Master Plan. The components of this program enhance training efficiency and effectiveness, and conserve Operational Tempo (OPTEMPO), ammunition, and personnel resources.

RANGES, LAND, TARGETS, AND ENVIRONMENT PROGRAM ASSESSMENT			
TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
REMOTED TARGET SYSTEM	AMBER	AMBER	AMBER
PRIME	RED	RED	RED

Figure M-10

Remoted Target System (RETS): AMBER. RETS is a standard marksmanship and gunnery range targetry system, including target lifting mechanisms, target moving devices, controlling devices/computer system, simulators, and interfacing devices. Partially funded through far-term.

Precision Range Integrated Maneuver Exercise (PRIME): RED. PRIME is an appended live simulation to train collective maneuver skills up to tank/mechanized infantry company/team level. Components include MILES, a ground position location system, and TSV. It provides detailed AARs for both force-on-force and force-on-target events. One company set is fielded at Ft. Hood, TX. Partial set funded in the mid-term only.

Other Programs: These include Training Ammunition, Distributed Interactive Simulation (DIS), Synthetic Theater of War - Architecture (STOW-A), Regional Training Sites (RTS), Battle Simulation Centers (BSC), and Battle Projection Centers (BPC).

OTHER PROGRAMS ASSESSMENT			
TADSS	NEAR-TERM 96-98	MID-TERM 99-01	FAR-TERM 02-11
TRAINING AMMUNITION	GREEN	AMBER	AMBER
DIS	AMBER	AMBER	AMBER
STOW-A	AMBER	RED	RED
RTS	GREEN	GREEN	GREEN
BSC	GREEN	GREEN	GREEN
BPC	GREEN	GREEN	GREEN

Figure M-11

Training Ammunition: AMBER. Training ammunition provides units the ability to meet the training standards outlined in the CATS. Over the Program Objective Memorandum (POM) 97-01 period, tank ammunition is fully supported through a cost effective multiyear procurement program. Training ammunition for Apache, Bradley, and MK-19 is at 85-95%. Other training ammunition items are supported at approximately 80%. To offset training ammunition procurement shortfalls, the Army adopted a risk strategy of drawing down selected war reserve items (those pre-stocked for use under war-time conditions). FY96 is fully funded. FY 97-01 are funded at approximately 80%.

Near-term: GREEN. Congressional increases to ammunition procurement combined with contributions from the ammunition war reserve account support ammunition requirements 100%.

Mid-term and Far-term: AMBER. Declining contributions from the war reserve account, increasing costs of training ammunition items resulting from weapon systems modernization, and budget constraints throughout the Army continue to limit the ability to support training ammunition in the outyears. Funding levels in the mid-term and far-term do not fully support requirements for training ammunition.

DIS: AMBER. This program develops software and buys hardware to create a synthetic, virtual representation of warfare environments by connecting separate, dissimilar simulations distributed over a large area for interacting in team efforts, field training mission planning and mission rehearsal. Allows practice of warfighting skills when cost, safety, environmental, and political constraints will not permit the field training required to maintain readiness. In addition to its training capabilities, DIS is intended to provide a synthetic environment in which to test and evaluate new and existing weapons systems performance, tactical deployment, and logistical support. It will also provide combat developers with opportunities to test new weapons systems under varied battlefield conditions to improve and shorten the acquisition cycle. Partially funded through the far-term.

STOW-A: RED. Program buys hardware, software, and training development products required to link fielded and planned live, virtual, and constructive simulation systems into a synthetic environment training battlefield. This will allow the Army to field a comprehensive and validated training program for training and mission rehearsals, operational analysis, and experimentation within networked, DIS-compliant simulations. It will provide frequent, low-cost training opportunities for soldiers from individuals to joint task force level and headquarters staff elements from battalion/task force to echelons above corps level. STOW-A will also provide enhanced capabilities to exploit potential uses of linked simulations, specifically, training large unit/joint service formations, test and evaluation, and prototyping.

RTS: GREEN. Provides support for facilities, equipment, system components, and RC training. The RTS program enables the Army to mobilize and deploy RC maintenance units capable of supporting current and force modernization systems on the battlefield, thus providing centralized locations to concentrate equipment, training devices, technical manuals, test sets, and special tools to train RC maintenance soldiers in military occupational specialties sustainment and transition. Twenty one RTSs are planned, including two high tech RTSs, one of which is already operational at Fort Dix, NJ. Fully funded through the far-term.

BSC: GREEN. Supports the CATS by providing commanders and their units the ability to train critical skills in simulation. There are currently five Corps, eight Division, and four small BSCs. BSCs include: Janus suites for crew/squad through Brigade staff training; BBS, designed to support training for commanders and battle staffs at battalion through brigade level; and CBS, which supports Army training at brigade through theater Army and also supports Joint, Combined, and Commander in Chief (CINC) training. Fully funded though mid-term. Partially funded in far-term.

BPC: GREEN. BPCs primary mission is to provide support to the 15 Army National Guard (ARNG) Enhanced Brigades and the U.S. Army Reserve Command's (USARC) Contingency Force Pool units. They also provide training support to the rest of the ARNG and USARC structure on a limited basis. USARC's five BPCs are a cornerstone of the Ground Force Readiness Enhancement (GFRE). They use Janus and BBS. Fully funded thru mid-term. Partially funded in the far-term.

SECTION 3

RESEARCH, DEVELOPMENT, AND ACQUISITION STRATEGY

TADSS developed and procured through the TMA remain critical to Army readiness. The primary method of acquiring TADSS is through the RDA process. However, more and more training equipment requirements can and have been met by procuring Commercial Off-the-Shelf (COTS) and Non-Developmental Items (NDI). The Army will leverage emerging technologies from civilian corporations, research agencies, and U.S. Army Battle Lab experiments. Modernization of the Army through horizontal integration of technologies will increase the lethality, versatility, deployability, survivability, and affordability of Army weapon systems. Technology exploitation will improve training and readiness to ensure our soldiers are the most capable, highly trained Army on the battlefield. TADSS contribute to an expanded range of training capabilities, including:

- Providing realistic force-on-force training opportunities by upgrading and fielding MILES Army-wide;
- Providing soldiers, leaders, and units improved training evaluations and feedback by fielding upgraded instrumentation systems to the Army's premier practice fields--the Combat Training Centers;
- Providing a network of vehicle and weapons simulators that allow units to conduct and sustain combined arms tactical training with crew through battalion/task force level simulation exercises;
- Providing battle simulations that depict realistic battlefield environments, allowing commanders and staffs to practice command and control, synchronize combat power and employ combined arms teams against a credible, thinking opponent;
- Providing devices that realistically train tasks that might otherwise be too costly, difficult, or unsafe to train with actual equipment.

Figures M-12 through M-22 depict the TMA's current RD&A strategy by BOS.

RDA STRATEGY

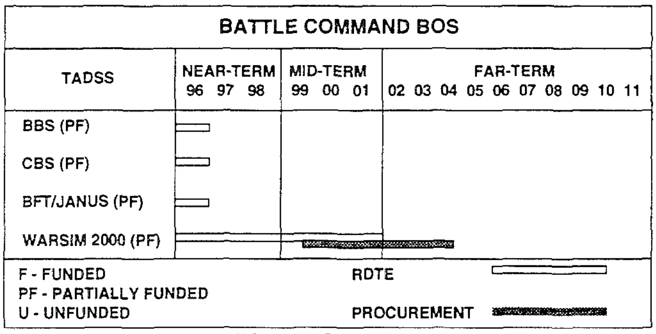
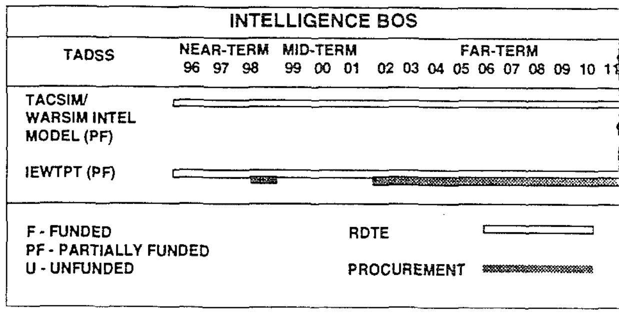


Figure M-12



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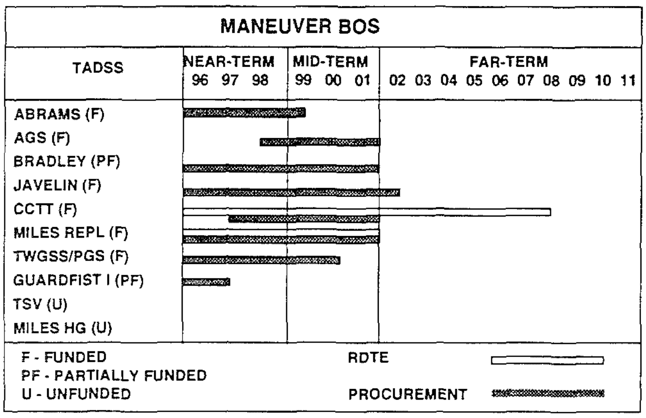

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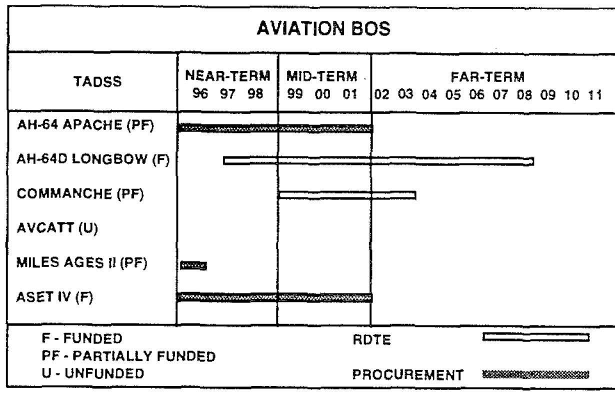

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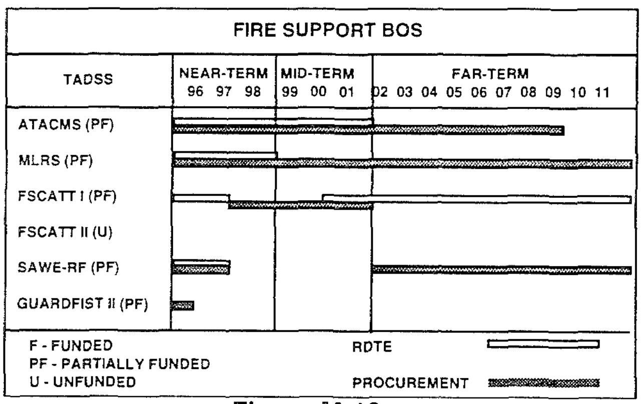

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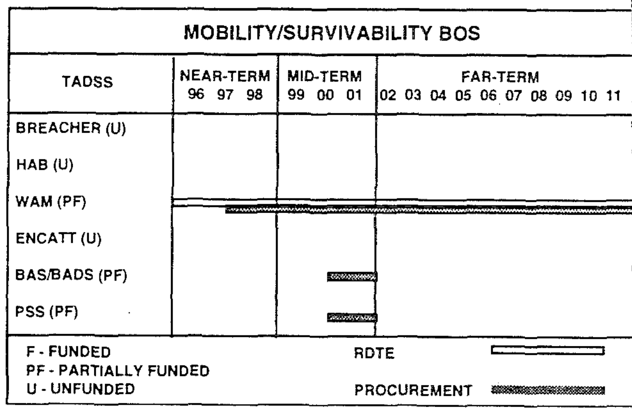

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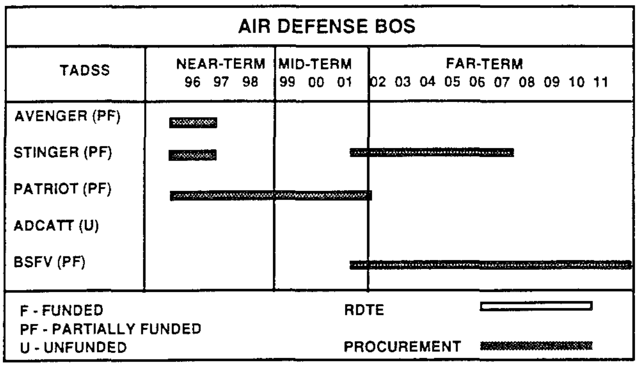

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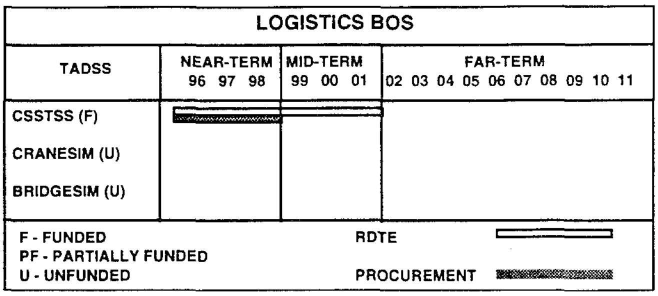

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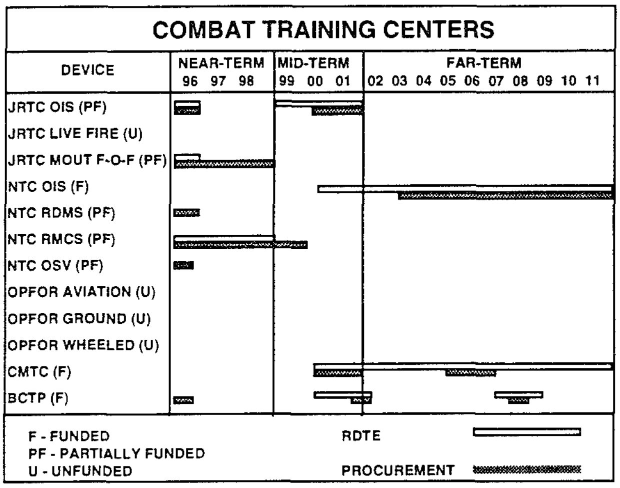

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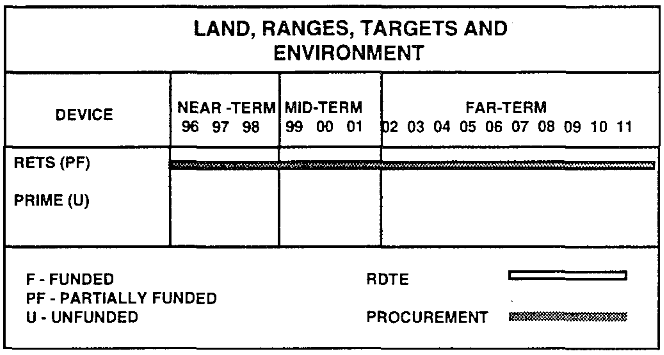

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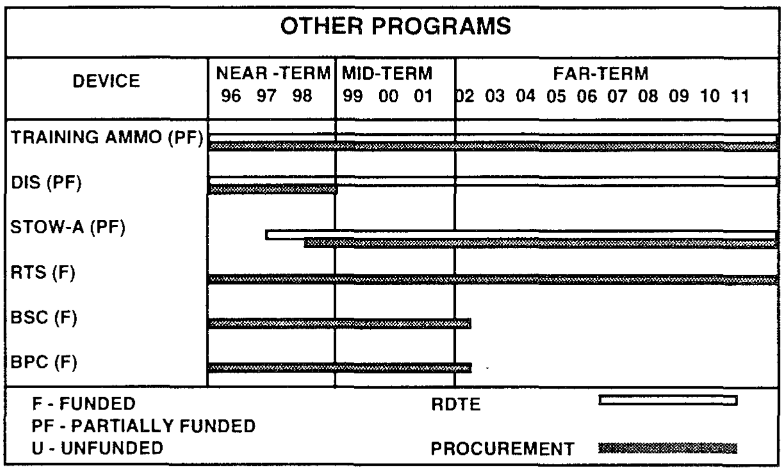


Figure M-22

Training Research and Development, Future Acquisition Azimuth

Incorporating training requirements early in the systems acquisition process benefits the Army; it streamlines the acquisition process for training systems, and training systems embedded within the combat system design reduce total system cost. The emphasis on value engineering, top-down training strategies, and Manpower and Personnel Integration (MANPRINT) requirements also reinforce the need to completely describe weapons and training systems up front. Technology challenges both weapons and training systems in common ways; thus, simultaneous, or at least concurrent, development of both can produce effective, timely training systems. Moreover, technology imposes a number of other challenges:

- Knowledge representation--Artificial intelligence that builds from a knowledge base by representing expert knowledge with a rule structure;

- Low cost computer image generation;

- Rapidly configurable and digitized terrain databases that allow development of geospecific terrain photo-based images;

- Re-configurable Simulators--Test beds use modular hardware and software simulator designs to rapidly construct prototype simulators and advance artificial intelligence technologies;

- Fiscal constraints and future force levels mean technologies with high payoff potential will receive funding priority. New system development will decrease. Technology insertions will modernize current combat and training systems; and

- Future training technology initiatives with high payoffs (i.e., those that reduce resource consumption) and provide training force multipliers will receive high priority for funding.

The Army will continue to examine methods to improve training. Future training will use innovative technologies to improve readiness. The challenge is to train and sustain the most combat ready and deployable force in the world. The Army must look to research and development initiatives to identify technology that may offset decreasing force structure and ensure the means of providing realistic, dynamic training to our soldiers--today and tomorrow.

Army Science and Technology (S&T) Training Program

Research has shown the effectiveness of TADSS to be largely a function of their appropriateness to the tasks that they train, and the adequacy of performance measurement and feedback techniques. The Army's Science and Technology training research program is striving to meet this need, with much of the work seeking to enhance the effectiveness of emerging training technologies, such as DIS. A complete description of the Army's training research program is provided in the Army Science and Technology Master Plan. To ensure full combat readiness and maximum cost-effectiveness on current and future TADDS, training research is needed in the following areas.

Unit Collective Training: Innovative unit training strategies based on empirical data are needed to permit commanders to build effective, within-budget, unit training programs. This includes the development and demonstration of training, mission rehearsal, performance measurement and design feedback technologies that take full advantage of current and emerging DIS systems. Also needed are prototype training strategies designed specifically to meet the special needs of RC units and training strategies that integrate live, virtual, and constructive simulations into seamless training environments for warfighting missions. Such research should support horizontal and vertical digital integration capabilities for Force XXI.

Land Warfare Training: Research is needed to develop guidelines for the cost-effective mix of field training with TADSS for individual and small unit training with a focus on dismounted operations. The research should build on recent advances in modeling the retraining needs of soldiers by developing distance learning and other techniques to enhance skill reacquisition. Other land warfare training research needs include: immersion training techniques for low intensity conflict command and control tasks, training techniques for night operations, accurate behavioral models of individual and unit warfighting performance for use in synthetic environments, and methods for the effective use of intelligent tutors for acquiring and sustaining foreign language skills.

Rotary Wing Training: Training technologies based on empirical data are needed to support the development of lower cost aviation training and combined arms training for aviation. The research should address training technologies that improve the cost-effectiveness of initial flight training and advanced aviator and air crew skills. Research is also needed to help define the simulator fidelity requirements for critical individual tasks and air crew skills training, and to provide guidelines for the optimal cost-effective mix of simulated and actual flight training for specific unit combat tasks.

Battle Command: Research is needed to improve the effectiveness of battle commanders and their staffs, with a focus on leader development and command staff training strategies. This includes the development and demonstration of tools for diagnostic assessment of battle staffs in live and virtual simulations, and for assessing, training, and maintaining the knowledge and skills commanders and their staffs need for successful command on the battlefield. New technologies are also needed to measure and assess leadership development across careers and organizational levels. The research supports the Battle Command Battle Lab.

SECTION 4

CONCLUSION

The National Military Strategy (NMS) calls for a Total Army that is deployable, lethal, versatile, and capable of deterrence. Only by maintaining a trained and ready total force can the Army meet expectations. Training brings into balance those functions which must be done well. Training is the imperative that bonds all other Army imperatives together in a coherent whole. Good training retains quality people; brings doctrine to life; melds new force structure into combat ready units; makes soldiers and units proficient on new equipment; and develops competent, confident leaders.

The Training Annex is a road map for future actions regarding training in the Total Army; its course is charted by the CATS. CATS provides guidance on how the total force trains and the resources required for training. CATS describes the transition from a TADSS supported, high OPTEMPO/live fire training program to a TADSS-based training program which **could use** significantly lower levels of OPTEMPO/live fire. CATS calls for a mix of field training and simulators for individual training, and simulations for unit training at company level through echelons above Corps. In accordance with CATS, units organize for training as they organize for combat. This strategy enhances combined arms and service support operations.

The TADSS programs support a holistic approach to AT XXI. Each program contributes a critical piece to the Army's integrated training system and offers necessary linkages to combat readiness. Additionally, these programs together have a synergistic effect; each interacts with other training programs to provide an exponential benefit. All Training Mission Area programs must be sufficiently resourced to ensure the training readiness of the Army. System TADSS must be procured and fielded with their respective systems. System and nonsystem TADSS must be completely integrated to avoid duplication and ensure all requirements are satisfied.

The Challenge: The Army faces significant changes in the future. These changes will challenge the Army's capability to train; it must train more effectively and efficiently. The maturing of current technologies and emergence of new concepts offer opportunities to improve the training of soldiers, leaders, and units. At the same time, constrained resources demand that the Army reshape the current training strategy to preserve the progress already made, take advantage of new opportunities, and reduce the strains on both dollars and manpower. This Training Annex describes the anticipated future training environment, a training strategy for that environment, and provides the plan to carry out this strategy.

ANNEX N

SPACE

SECTION 1

INTRODUCTION

The Army is becoming increasingly dependent on space capabilities in order to achieve its goals for the 21st Century. Space products enable us to see, shoot, and maneuver deep - critical elements of prompt and sustained operations on land. As illustrated in Figure N-1, space products serve as a combat multiplier, providing commanders the ability to control the battle space and its tempo, as well as allowing continuous operations, day and night and in all weather.

Space capabilities are divided into four military space functions; **force enhancement, force application, space control, and space forces support**. The Army's space investment is primarily focused on force enhancement, which exploits space assets that help the land force accomplish its terrestrial mission. The Army space modernization objectives are focused on enhancing current satellite systems through more effective use of equipment, influencing new satellite designs to provide significant value added for the warfighter, and developing new technologies to better integrate space products throughout the spectrum of Army operations. The Army goal is to develop space products that get the right information to the warfighter at the right time. Army Land Force Dominance in the information age cannot be achieved without the integration of space capabilities and products. As the Army continues to modernize, space systems offer increasing opportunities to meet Army modernization objectives.

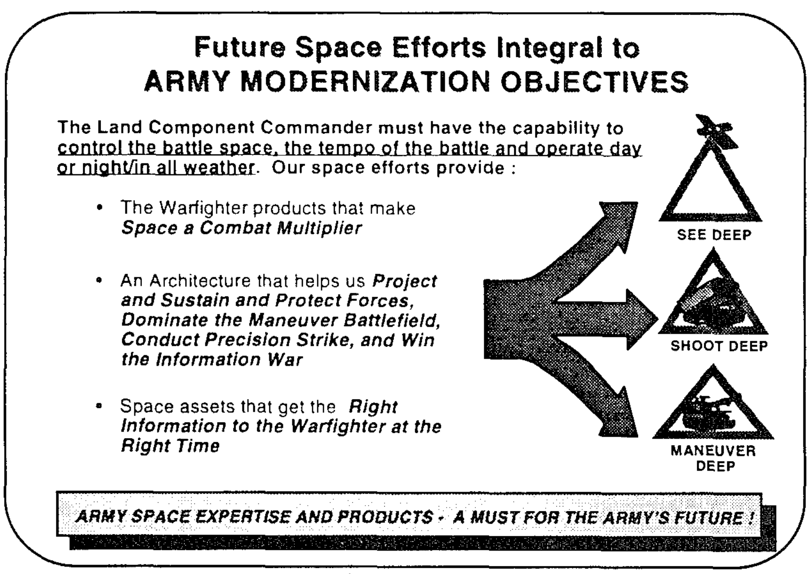


Figure N-1

Project the Force

In order to fight two nearly simultaneous Major Regional Contingencies (MRC), the majority of forces must be projected from CONUS. Intelligence Preparation of the Battlefield (IPB) will become more critical in the early stages of the planning process allowing commanders to tailor forces and support packages necessary to accomplish the mission in one MRC without siphoning off critical resources and detrimentally affecting the other MRC. The Army must have worldwide communications during all phases of the operations. Space assets provide the ability to communicate with commanders enroute to the area of operations, updating the changing tactical situation and providing current target images, in real time, directly to the commander's lap top. With space assets, logisticians will be able to respond to the changing situation and eliminate large holding yards of equipment and containers. Space assets will aid in accomplishing Total Asset Visibility . Space also provides near real-time weather, terrain data, and map updates crucial to IPB and mission rehearsals. Future Space products will be lighter, more flexible, durable, and smaller.

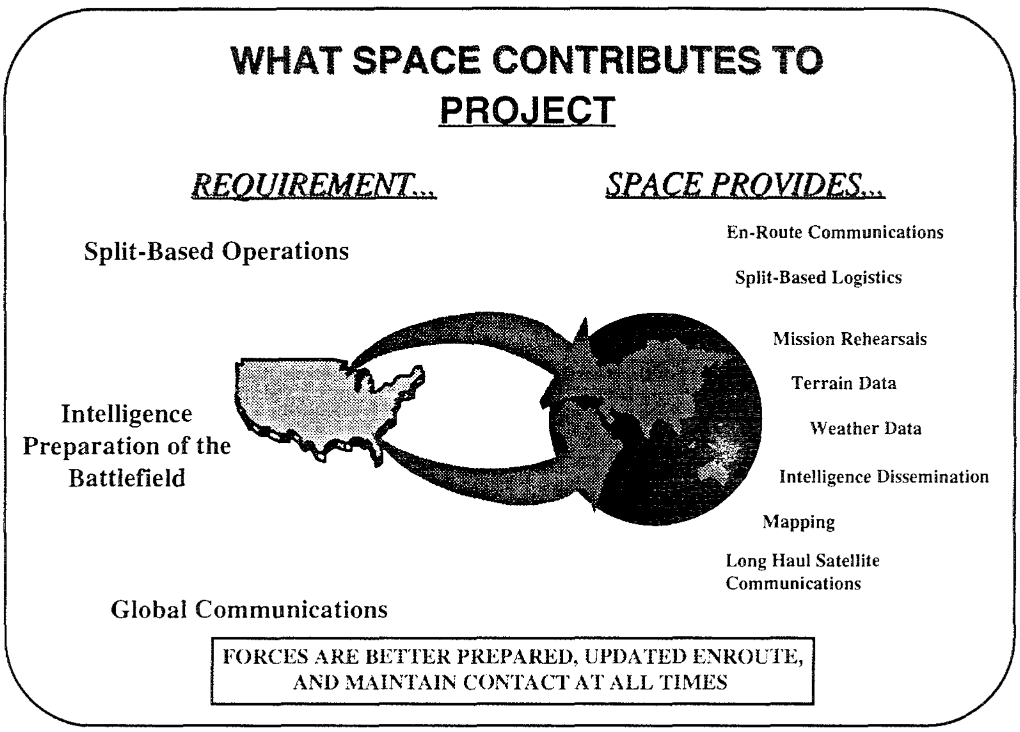


Figure N-2

Protect the Force

The Army must be able to protect its force during predeployment, deployment, operations, and reconstitution. While the force is being deployed and after its arrival, it is essential that troops be protected from hostile attack. Space based assets provide tactical warning of attacking forces in real-time, which provides critical information such as accurate launch point and impact point of tactical missile launches. This also includes tip off for weapons systems to provide counter fire. Space assets provide the communications to leverage all capabilities in order to minimize casualties and eliminate fratricide.

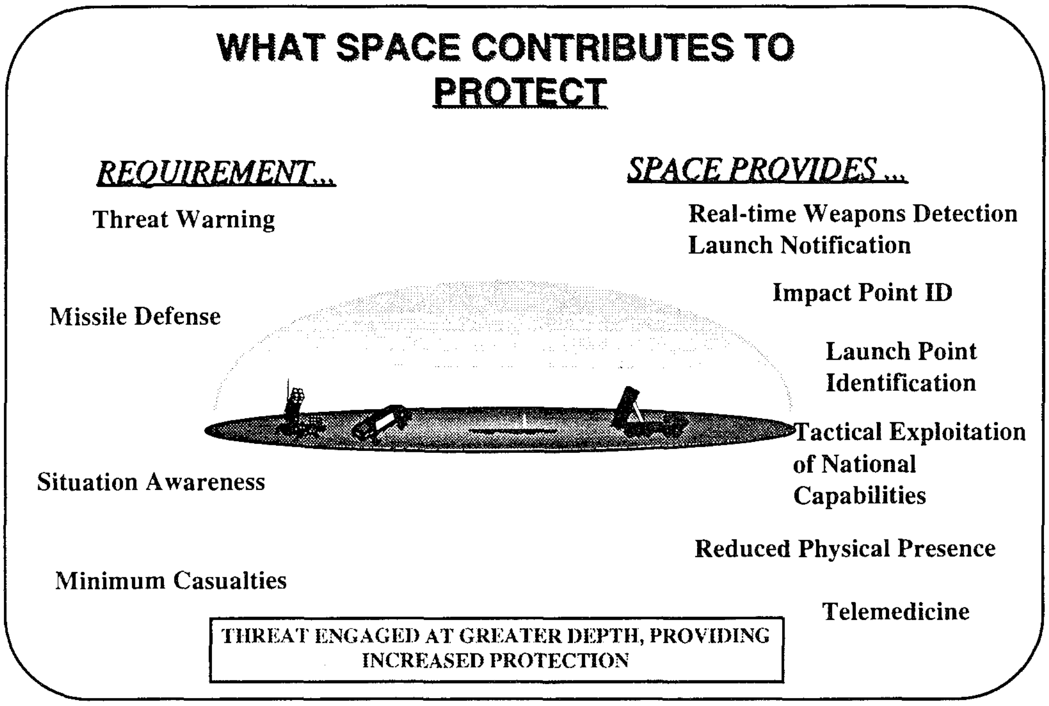


Figure N-3

Control the Force

Space products address the need for situational awareness to assist in force control. Army efforts to improve this awareness are in defining blue/red orientation, development of battlefield combat identification systems, and increased space linkage to the land warfighter's digitized battlefield. Space-based assets for navigation have already proven invaluable. During Operation Desert Storm they facilitated the execution of the "left hook", and enabled soldiers to know where they were in the featureless desert. Space based assets can take a picture of the battlefield and lay it in the commanders lap with the real-time data required to facilitate the control of friendly forces. Intelligence assets from space provide the commander with the knowledge that is necessary to defeat the opposing forces.

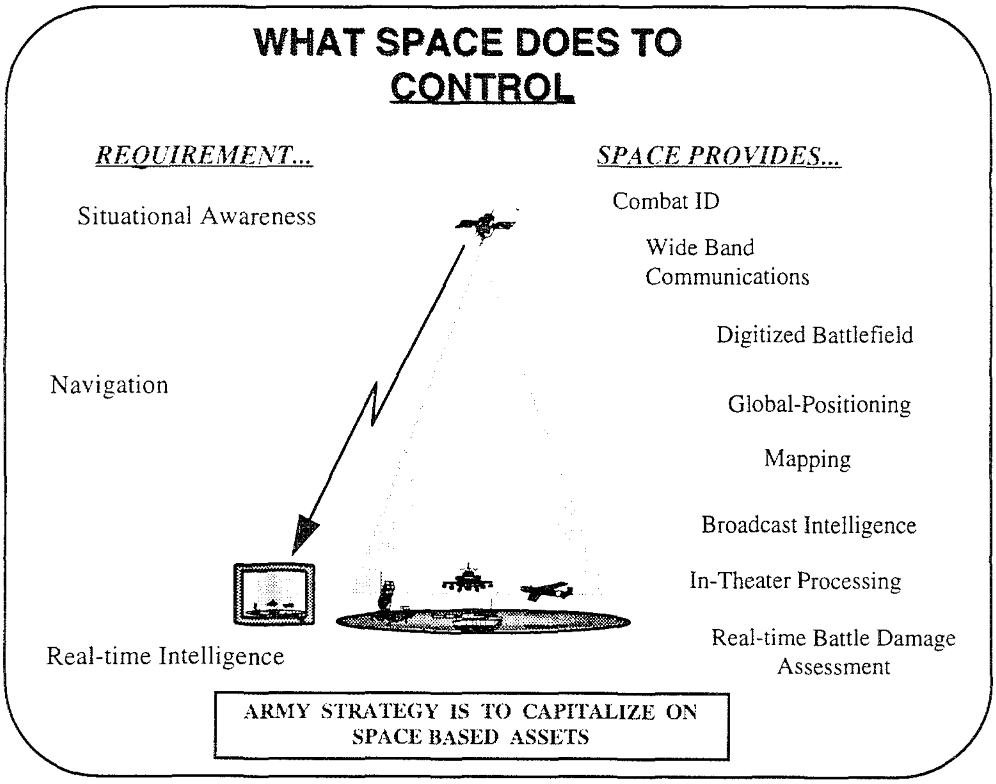


Figure N-4

Maneuver the Force

Space products also assist the Army in force maneuver. The Army uses space products to shorten the command and control timeline and the commander's decision cycle. The Army emphasizes bringing satellite information directly from the satellite to the theater commander, and we are striving towards continuous communications on the move. Space assets enable us to own the environment by not only knowing the weather and terrain in our Area of Responsibility, but also in the enemy's. This enables the commander to take advantage of weather and terrain during maneuver, and forces the enemy into a less advantageous position. Knowing where the enemy is, and isn't, is crucial to controlling the tempo, deployment of forces, and location and amount of supplies to support the operation. Commanders can maximize the principles of war by massing the required forces to quickly and decisively attack the enemy; accomplish the mission, and then disperse before counterattack.

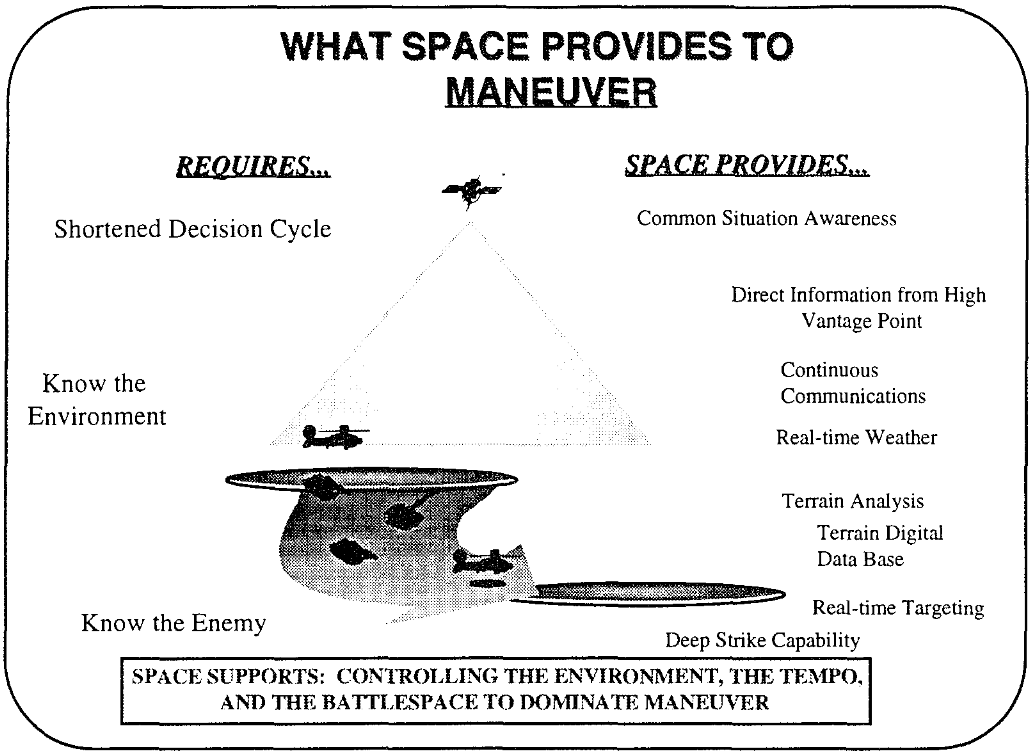


Figure N-5

Training Concept: Integration of space systems and space products in Army operations is a continuing process. Major doctrinal and procedural changes will occur as the result of digitizing the battlefield and integrating space capabilities. General space awareness training and education must be integrated in education and training programs for all members of the Army team. Army commanders and staff require knowledge of space systems and capabilities available to support military operations. They must also know how to exploit space systems and products. Additionally, development of a core of space literate personnel is critical to the Army's continued use of space and defining current and future space requirements and satellite specifications.

As the Army fields more capabilities that use space assets and achieves greater flexibility in meeting warfighter requirements, access to these assets will require more efficient planning and management. Technical knowledge of networks and satellite applications will be required by both providing and using units. Management of these networks will become critical as user requirements increase and more space assets are fielded to meet those requirements. This will be particularly true for short notice contingency operations to areas where previously deployed capabilities or host nation infrastructure do not exist. An effective organization and trained personnel must be available to provide the warfighter access to space products.

SECTION 2

CURRENT PROGRAM ASSESSMENT

The Army does not have a separate "Space" mission area. Space functions and products are integrated into other mission areas and battlefield operating systems. This annex addresses Army space related programs in the following functional application areas: Satellite Communications; Position and Navigation (POS/NAV); Reconnaissance, Intelligence, Surveillance and Target Acquisition (RISTA); Weather, Terrain and Environmental Monitoring; and Missile Warning. This assessment evaluates the satellite systems capabilities as well as the Army's user terminal programs, and provides an overall system (satellite and terminal) assessment. In general, detailed Army terminal assessments can be found in the functional annexes.

Satellite Communications

The Army uses military and commercial communications satellites to carry large portions of intercontinental, intertheater, and intratheater traffic at brigade level and above. Some tactical intratheater users are also supported. During a crisis, however, demand for satellite communications exceeds current capabilities. Access to channels in the Ultra High Frequency (UHF) range satellite communications system will be improved in 1996 when Demand Assigned Multiple Access (DAMA) provides improved satellite channel access through use of an automatic controller, which optimizes channel use. The Army, through DoD, is also exploring increased use of commercial communications through the Commercial Satellite Communications Initiatives (CSCI).

Initial entry operations are constrained by availability of sealift and airlift capabilities. Communications assets must be configured efficiently to provide the greatest capability in the smallest package. In the near-term, easily deployable Enhanced Manpack UHF Terminals (EMUT), commercial off-the-shelf terminals, and Trojan Spirit terminals will contribute to enhancing the warfighters' early entry capabilities. They will provide a readily deployable communication capability down to brigade level for every division and corps, the communication links for C2-on-the-move, and the Warfighter net, giving commanders a Single Channel Ground and Airborne Radio System (SINCGARS) combat net radio/SATCOM interface. In addition, Trojan Spirit provides communications support for early entry forces. The EMUT program is AMBER in the near and mid-term due to insufficient funds to procure required number of terminals.

In the Super High Frequency (SHF) range, the Defense Satellite Communications System (DSCS) supports tactical communications through the Ground Mobile Forces Satellite Communications (GMFSC) program. The Army has about 200 GMFSC terminals that interface with other Army communication systems such as Mobile Subscriber Equipment (MSE) to provide connectivity between dispersed units. The Army is the lead Service for DSCS ground terminal RDA, operations, and sustainment. Specifics on DSCS ground segment upgrades and assessment can be found in Annex C (Command, Control, Communications and Computers). The Army DSCS ground segment and control program is rated **AMBER** in the near- and mid-terms because the Universal Modem is not fully funded.

Prototype Tri-band (X, C, Ku) terminals that can directly access military and commercial transponders have been fielded. These will be modified, based on user experience, and fielded as SHF Tri-band Advanced Range-extension Terminals (STAR-T) beginning in 1998. Coupled with initiatives to lease/purchase commercial satellite capability, STAR-T will greatly enhance warfighter access to multi-channel SHF SATCOM. STAR-T will replace the Ground Mobile Forces Satellite Communications (GMFSC) terminals and Trojan Spirit terminals.

In the Extra high Frequency (EHF) range the Army Milstar program consists of the Secure Mobile Anti-Jam Reliable Tactical Terminal (SMART-T) and the Single Channel Anti-Jam Manportable (SCAMP) terminal. The SMART-T is not fully funded in the mid-term, creating an **AMBER** rating for EHF ground terminals.

Recent space segment failures in the near-term, and potential for gaps in capacity and coverage, are cause for concern and could lead to a gap in capability and availability in the future. The Army is concerned about the potential for significant decreases in satellite communications, space segment capability, and coverage in 2003 and beyond. Advanced EHF, Advanced SHF, and Global Broadcasting System (GBS) satellite systems have the potential to increase capacity of satellite communications in the far-term, yet warfighter communications requirements will not be entirely met with these new systems. The replenishment dates for these advanced systems will not mitigate the reduction of satellite communications to less than 90% availability in the 2003 time frame and beyond. These concerns on the satellite segment capacity and availability lead to an overall system rating for satellite communications as **AMBER** in the near-, mid-, and far-terms.

Figure N-6 shows the Army Satellite Communications ground terminal program timelines.

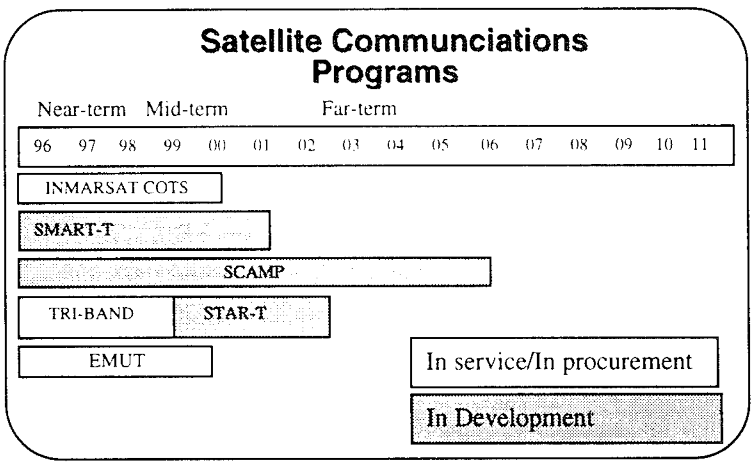


Figure N-6

National Intelligence Communications Systems

Through the Tactical Exploitation of National Capabilities Program (TENCAP), the Army has developed several SATCOM systems for receipt and dissemination of National, Theater, and Tactical intelligence.

Synthesized UHF Computer Controlled Encryption Sub-System (SUCCESS) is a fully automated, microprocessor based, computer controlled UHF band radio. It handles data over one transmit and three receive channels simultaneously. SUCCESS is interoperable with a wide range of UHF radios and meets JCS requirements for Fleet Satellite Communications (FLTSATCOM) interoperability.

CHARIOT, a tactical S-band Satellite Communications terminal, is designed to support the Army's tactical mission by receiving, processing, and disseminating intelligence data obtained from national sources. The Chariot supports both the receipt and dissemination of nationally derived data through immediate access to sources and satellite relay capabilities. Its reduced size and weight enhances deployability with highly mobile forces. The Chariot supports receipt and distribution of secondary imagery and other nationally collected information, and can act as alternate router of messages and files.

Tri-band SATCOM System (TSS) - is the primary means of receiving national imagery at the tactical level. It is a component of the Modernized Imagery Exploitation System (MIES). TSS can operate on any military or commercial satellite in the C , X, or Ku-bands. It is composed of a 20 ft dish and a 20 ft shelter. Future planned improvements are a downsizing of the shelter and a phased array antenna.

TENCAP ground communications segments are assessed as **GREEN** in the near-term and maintain **GREEN** through the mid- and far-terms with anticipated P^3I activities. The Army must ensure that the National intelligence dissemination architectures that will feed the ground systems meet tactical and operational requirements as previously documented in the Imagery Dissemination Mission Need Statements. The TENCAP ground communications segments are included in the overall satellite communications system assessment.

Position And Navigation (Pos/Nav) Programs

The Global Positioning System (GPS) constellation of NAVSTAR satellites is increasingly important to Army operations. Use of Small Lightweight GPS Receivers (SLGR) provided positional accuracy, speed, and flexibility in Desert Storm. GPS information is programmed to be incorporated into combat net radio communications and embedded in a wide variety of Army systems. Precision Lightweight GPS Receiver (PLGR) production funds will provide for fielding by FY97. Army aviation will receive the Miniature Airborne GPS Receiver (MAGR) required by the Federal Radio Navigation Plan by the year 2000. The user segment is rated **AMBER** in the near-term because of limited capability that exists for air applications. GPS receivers for all applications, air, ground and sea, provide adequate capability in the mid- and far-terms.

There is concern about the vulnerability of GPS receivers to jamming and Radio Frequency (RF) interference. The Army is participating in efforts to mitigate these concerns. Because of these concerns, overall Pos/Nav system near-term assessment is **AMBER.** GPS denial and protection effort will be implemented by mid-term. Overall assessment mid- and far-term is **GREEN.**

Figure N-7 shows the Army Position and Navigation Terminal Program Plan as currently funded.

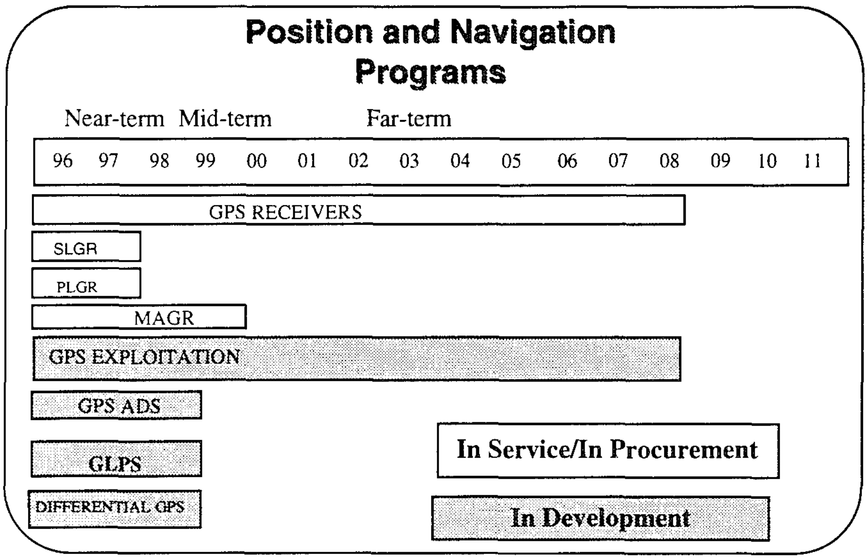


Figure N-7

Reconnaissance, Intelligence, Surveillance, And Target Acquisition (RISTA)

Army near- and mid-term capabilities are limited by sensor capabilities in the space segment. In the future, national space segment capabilities will be improved. Specifically, the space segment will provide improvements in satellite imagery, downlinking, and communications. Strike operations are currently limited by resolution and sensor capabilities but overall near-term, mid-term, and far-term rating for ground processing of intelligence derived from space systems through the Army's TENCAP is **GREEN**. Improvements in ground processing in the near-term include an upgrade to the Enhanced Tactical User Terminal (ETUT), and a combining of the functionality of the Electronic Processing and Dissemination System (EPDS) with ETUT. The resultant system will be called Advanced EPDS (A-EPDS). In the far-term, the Common Ground Station will be fielded to increase the capabilities of the warfighter to receive national products. Fielding of the Common Ground Station will enable the MITT and FAST systems to be replaced. In the far-term, Army space capabilities will further enable Joint Precision Strike by providing real time space data downlinks to the tactical level along with improved processing and dissemination capability. The Tactical Event

System (TES) fielding will provide an accurate threat picture (imagery, communications, and electronic signatures) during both planning and execution, ensuring the far-term assessment remains **GREEN**.

The overall assessment for space systems (satellites and Army ground processing and terminals) supporting RISTA is **AMBER** in the near-term, and because of increased sensor capabilities, **GREEN** in the mid and far-terms.

Figure N-8 shows the program timelines for the Army TENCAP systems.

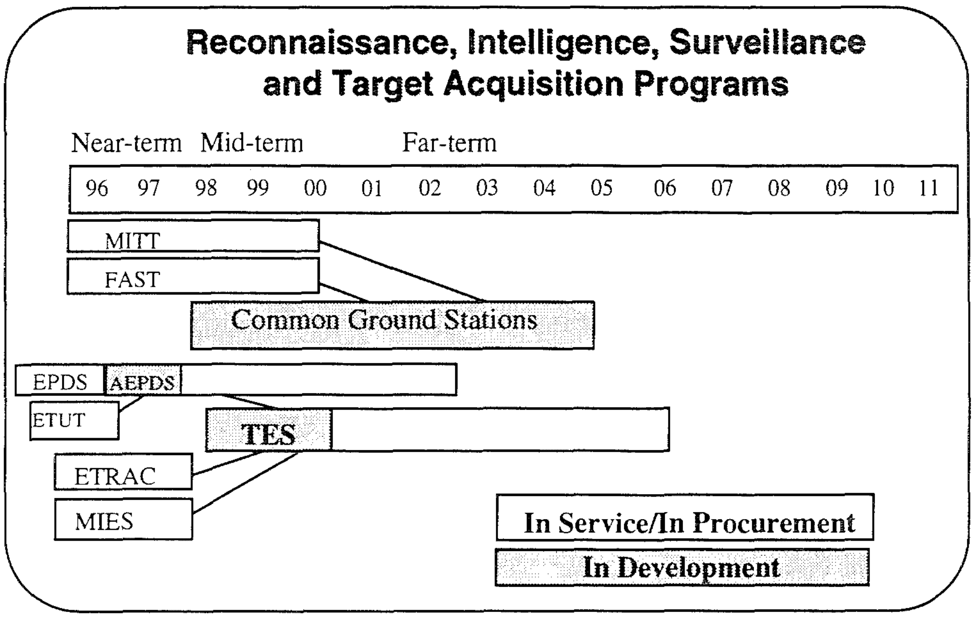


Figure N-8

Weather, Terrain And Environmental Monitoring

The Army is critically dependent on weather information to plan and conduct operations. The Defense Meteorological Satellite Program (DMSP) provides downlinking for accurate, near real time, theater level weather and meteorological data at target sites for long range engagements. Currently, commercial receivers provide data/imagery from civil and allied weather satellites. Fielding of small commercial weather terminals is providing improved capabilities to units. The addition of small tactical antennae will complement Chariot and/or DMSP Small Tactical Terminal System and make it more applicable to the Army's missions by providing an encrypted, assured source of weather data.

Although space-based imagery has proliferated over the last several years, the availability of imagery in the near-term is limited by the number of areas that have been mapped to date or that have the topographic data necessary to transfer images into mapping products. This availability should improve in the mid- and far-term with the various military and commercial efforts in remote earth sensing.

Long-term, Army requirements call for a High Resolution Multi-Spectral Sensor Imagery (HRMSI) capability on LANDSAT type satellites. This would reduce the need for a topographic database to produce mapping products. Continued support for broad area coverage capability is necessary. Without this capability, land and joint operations would be dependent on foreign sources for unclassified imagery. Continued increases in demand for imagery will also require dissemination systems. The distribution portion of the topographic engineering capability is not programmed to keep up with increased demand in the far-term.

Desired improvements in the far-term will provide tailored weather and environmental/ topographical products for tactical units. These improvements will augment IPB and aid in decision making. Integration of weather receivers into appropriate Army systems will provide a capability to merge DMSP data with terrain information, enhancing battle planning and execution. Lack of U. S. controlled assets and potential dependency upon foreign/commercial sources for higher resolution data, coupled with the inadequacy of projected dissemination systems will result in a system assessment **AMBER** in the mid- and far-terms.

Missile Warning

Army space capabilities to warn the force are a cost effective survivability enhancement for protecting the force. Space-based warning enhances all four pillars of the Army's Theater Missile Defense (TMD) capabilities (active and passive defense, attack operations, and BM/C4I). Overhead coverage allows surveillance of enemy missile systems, alerts active theater missile defenses and attack operations forces, and permits forces to take passive defense measures. Protection of the force is enhanced in the near- and mid-terms through the use of Defense Support Program (DSP) data processed by Joint Tactical Ground Station (JTAGS). JTAGS is a transportable system which provides in-theater stereo processing of DSP data. Limitations of sensor platforms in the near- and mid-terms, despite the Army's ground processing improvements, lead to an overall rating of **AMBER** in the near- and mid-terms.

Sensor capabilities will not be upgraded until the far-term, with the launching of the Space Based Infrared System (SBIRS). The Army position is that the SBIRS design should include direct downlink of this critical warning information into theater. If the Army missile warning ground processor is upgraded to accept SBIRS data when it is available (thereby providing a direct downlink of SBIRS missile warning data) the overall system rating for Missile Warning will become **GREEN** in the far-term.

Space Capabilities Assessment

Figure N-9 provides a summary of space system capabilities assessment by functional area as discussed in the above sections. This assessment evaluates the ability of both the satellite and Army terminal programs, as a system, to meet Army needs for space based assets. In the future, it is crucial for the Army to play a greater role in influencing what is placed in orbit to support the global force projection Army of Force XXI. The Army must increase efforts to influence the design and development of space-based intelligence, missile warning, and data dissemination systems through National and Service organizations.

As Army forces are modernized to take advantage of evolving data exploitation and information operations technologies, space system coverage, sensor capability, and data links must follow suit. Potential adversaries have, and will continue to acquire, technical capabilities equal to those of the United States. International development and deployment of space systems will give many potential adversaries the means to acquire space based imagery, global positioning data, and other space products for use in their own military planning in the near-, mid-, and far-terms.

Space Capabilities Assessment

Functional Area	NEAR-TERM (FY 96-98)	MID-TERM (FY 99-01)	FAR-TERM (FY 02-11)
Communications	AMBER	AMBER	AMBER
Pos/Nav	AMBER	GREEN	GREEN
RISTA	AMBER	GREEN	GREEN
Weather, Terrain And Environmental Monitoring	AMBER	AMBER	AMBER
Missile Warning	AMBER	AMBER	GREEN

Figure N-9

SECTION 3

RESEARCH, DEVELOPMENT, & ACQUISITION STRATEGY

Science and Technology Programs

It is of key importance to the Army to maintain a Research and Development base that influences the design of satellite sensors and processors, improves the land component commanders communications capabilities, and provides for the exploration of space control capabilities.

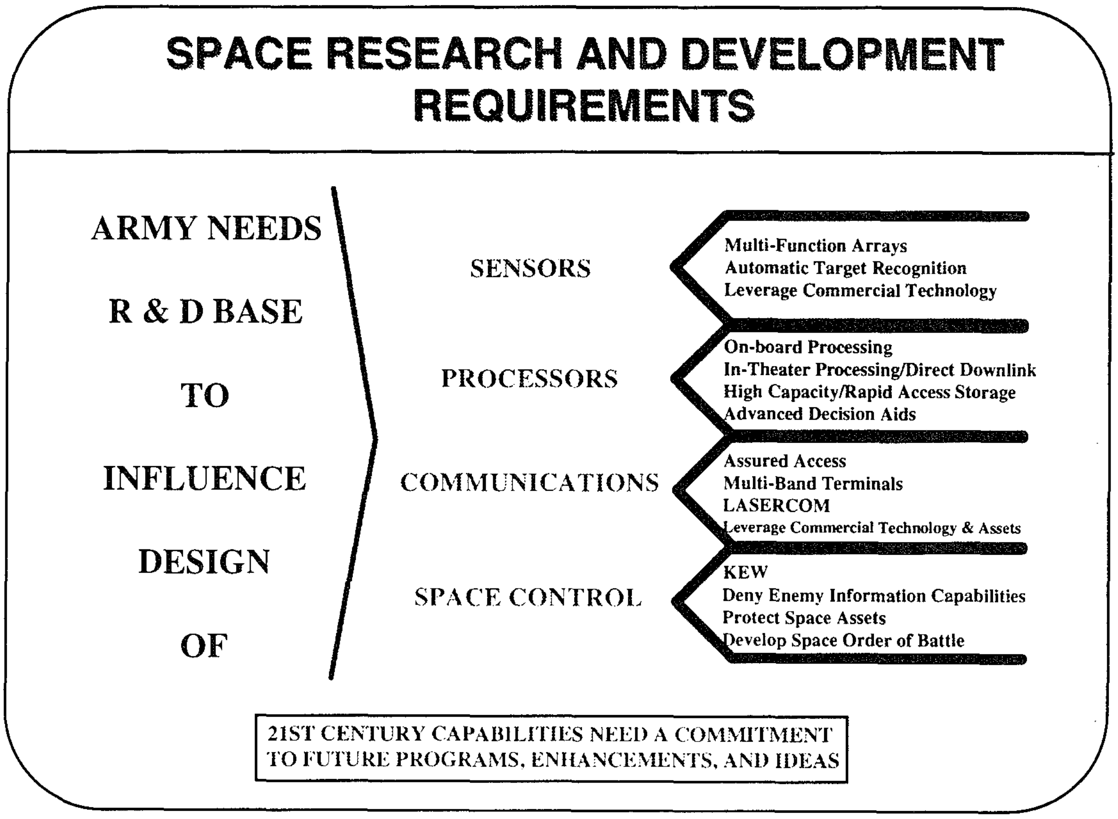


Figure N-10

The Army's focus for technology development in modernizing its space assets is to exploit space for the tactical commander (see the Army Science and Technology Master Plan and the Army TENCAP Master Plan). As shown in Figure N-10, the Army's space related research, development, and acquisition is focused on providing several capabilities to the warfighter:

- **Sensors** that are multi-functional and leverage commercial technology;

- **Processors** that serve to decrease the decision cycle, provide processing in-theater with rapid access to stored data, provide automatic target recognition and advanced decision aids;
- Assured access to medium and high data rate **satellite communications**;
- Multi-band terminals;
- **Space Control** efforts to deny enemy information on friendly capabilities while protecting our space assets;
- Obtaining target signatures of interest during day/night operations capable of penetrating weather and concealment;
- Accurately measure and predict environmental conditions over areas of interest;
- Identification of Friend, Foe, and Neutral forces;
- Providing Theater Missile Attack warning and cueing to friendly forces and allies;
- Providing real time, survey-quality pointing accuracy for directional systems, to include weapon systems;
- Real time direct down linking of raw data from space based assets to tactically deployed units which are equipped to process and exploit data;
- Accurately navigate across highly uniform terrain areas (jungle and desert);
- Providing technical and procedural applications derived from space assets and products for effective conduct of Information Operations; and
- Providing warning of hostile and friendly fires from artillery and tactical missiles in near real time to effect counterfire.

These capabilities support several TRADOC Battle Laboratory operational capability requirements and Army modernization objectives that have been integrated into the Force XXI process. They include exploratory and advanced technology development space applications that add value to Battlefield Operating Systems. This technological development process provides added value to the current Army Acquisition Strategy for space related materiel developments. The acquisition strategy includes leveraging science and technology from other Services and agencies, using Nondevelopmental Items (NDI), Commercial Off-The-Shelf (COTS) equipment, user prototype equipment, and commercial, civil, and tactically-oriented satellites to improve warfighting capabilities. Several Advanced Technology Demonstrations (ATDs) and Advanced Concept Technology Demonstrations (ACTDs) have incorporated space based capabilities. These include communications, position/navigation, intelligence, surveillance, target acquisition, and missile warning.

Satellite Communications

There are several system upgrades and capabilities in satellite communications terminals function to include digital battlefield communications terminals upgrades and satellite communications paging efforts. The Army advanced concept capabilities in satellite communications concentrate on satellite communications on the move and high capacity voice, data, and video transmission.

Broadband Communications on the Move: The applications of Extra High Frequency (EHF) communications on the move will be demonstrated using the NASA Advanced Communications Technology Satellite (ACTS). Demonstrations show high data rates up to 1.544 Mbps using a mechanically steered antenna.

Global or Direct Broadcast Satellite Terminal: This program will demonstrate Army exploitation of commercial Direct Broadcast Satellite communications technology. Commercial receivers will be procured and modified so that non-video, base-band data can be received and recovered.

Low Profile Ultra High Frequency SATCOM On-the-Move Antenna: The program develops an antenna that will have a reduced profile while possessing sufficient gain to permit voice and high data rate communications to geosynchronous satellites.

Laser Satellite Communications: A proof of concept demonstration will be conducted using ground-to-ground systems for laser communications. This technology has the potential to increase data capacity while decreasing weight, size, and power requirements.

Position and Navigation (POS/NAV)

The Army is currently fielding the Precision Location GPS Receiver (PLGR) with an error of less than 15 meters. Continued proliferation and use of these GPS devices will enhance the Army's overall combat, combat support, and combat service support capabilities in the mid-term. Advanced concepts will include a capability to target and locate with a one mill pointing accuracy using GPS.

Precision guided weapons systems are integrating GPS technology to improve accuracy, target location, and lethality. This provides added value by increasing weapons platform stand-off range and survivability, reduces munitions payload weight and logistics resupply, and reduces collateral damage to surroundings in the target area. As GPS accuracy improves from 7.5 meters to less than 2 meters, other applications to air and ground sensors will improve intelligence collection and dissemination of information.

Current Combat Identification initiatives to reduce fratricide depend on GPS data to determine friendly locations. GPS information is programmed to be incorporated into combat net radio communications, and an embedded capability will eventually be in all vehicles/individual equipment. The availability of this information on the battlefield will improve situational awareness and aid fratricide avoidance.

GPS and SATCOM provide logisticians an asset tracking capability (TRAC-3). This will make sustainment operations much more efficient by maintaining in transit visibility of key resupply items and enabling redirection of assets when situations change. Navigation assistance with GPS also assists planning of resupply transit routes and rendezvous points. A developmental model of the Total Distribution Advanced Technology Demonstration system has already shown its potential. It has tracked supplies aboard aircraft and ships, and redirected materiel to forces on the move. An Asset Management module for this system links strategic, operational, and tactical data with a Combat Service Support Control System. This enables commanders to know the overall status of reinforcing units and the location of critical items in the supply pipeline.

Reconnaissance, Intelligence, Surveillance, and Target Acquisition (RISTA)

For Corps and Army Components, the TENCAP program is focused on migrating existing capabilities to the Tactical Exploitation System (TES), the objective ground pre-processor for the future. TES will utilize advanced communications architectures for split base operations and product dissemination, automated exploitation tools, and new antenna technologies in a modular, interoperable configuration to support the range of information needs of the warfighter. This next generation system will serve as the preprocessor for national Signals Intelligence and Imagery data as well as select theater tactical forces.

Space exploitation efforts also include programs that are developing:

- **Graphic situation displays** that integrate information derived from imagery assessments and SIGINT and then overlay this information on a map background to provide a "picture" of the battlefield;

- **Workstations** that exploit multi-spectral imagery and add a new dimension to mapping, targeting, and situational awareness for the commander;

- **Multi-source digital mapping and display capabilities**, including all weather day/night sensors, camouflage and foliage penetrating sensors, and the potential for detection of minefields and NBC weapons.

TENCAP initiatives are described in detail in Annex D (Intelligence and Electronic Warfare).

Weather, Terrain, and Environmental Monitoring

Currently, commercial receivers provide data/imagery from civil and allied weather satellites for Army requirements. Meeting the objective of tailored real time weather and environmental/topographical products for tactical units requires: improved processing capabilities; the development of Army unique sensor suites; communications standards for space platforms; advanced ground stations/receivers capable of receiving, processing, fusing, and interpreting weather and environmental data; and better means of dissemination. Some improved capability can be achieved in the interim by fielding COTS laptop-based weather terminals to early entry contingency forces until forces with robust Integrated Meteorological System (IMETS) arrive. These systems may be deployed with the highest echelon. They will use dial-up capabilities to access central weather facilities for theater level information. The communication connectivity will be via SATCOM.

The far-term requirements for weather information will be satisfied by the integration of weather receivers into Army tactical systems. Far-term improvements include the capability to merge DMSP data with terrain information to produce environmental effects, models/simulation, and virtual reality displays that will enhance battle planning and execution.

The Army is also experimenting in hyperspectral imagery technology. The Army will demonstrate several technologies to be used in the collection of multispectral and hyperspectral imagery for remote earth sensing imagery. The collection sensors will be used to develop data bases required to identify spectral signatures for future exploitation.

Missile Warning

Sensor shortfalls are primarily related to the short-range ballistic missile threat and the increasing threat from "hard to see" cruise missiles. The Army is aggressively participating in the development of the follow-on Space-Based Infrared System. The ability of this replacement system to satisfy Army theater warning requirements will improve theater missile capabilities.

The USA Space and Strategic Defense Command conducts several technology programs related to Missile Warning. These address such areas as sensors, battle management, kinetic energy, directed energy, and survivability technologies in support of Army PEO Missile Defense elements.

Space exploitation is also key to our future capability to monitor critical areas of Weapons of Mass Destruction (WMD) proliferation and treaty compliance. Sensor improvements are being pursued to monitor and counter the proliferation of WMD and missile technology. New satellites are being developed to detect nuclear weapons production facilities and electromagnetic pulses produced by nuclear tests. New Multi-spectral Thermal Imaging (MTI) satellites will test ways to use future LANDSAT-type satellites by using imagery in various bandwidths to monitor weapons proliferation. Improved optical, signal, and radar intelligence satellites are also being tested to better track and counter proliferation.

Space Applications Technology Program (SATP)

In addition to its support of development programs across the space application mission areas, US Army Space and Strategic Defense Command (USASSDC) provides key research and development support via its management of the Army Space Applications Technology Program (SATP) and its implementation of the Army Space Exploitation Demonstration Program (ASEDP).

The SATP coordinates and integrates key technologies from various DoD and industry science and technology sources into user equipment to improve warfighting capabilities. Technologies focus primarily on force enhancement capabilities in the functional areas addressed throughout this annex. These technologies are used in the Army Space Exploitation Demonstration Program (ASEDP), transitioned to materiel developers and program offices through systems development and acquisition processes, or are integrated into the force as operational capabilities.

Army Space Exploitation Demonstrations

The Army Space Exploitation Demonstration Program (ASEDP) increases the Army's awareness and exploitation of space capabilities, and demonstrates value-added aspects of the Army's Space Modernization programs. The ASEDP incorporates new technologies, educates tactical commanders on the use of space assets to enhance Army operations, assists in defining/refining requirements for further documentation, and where appropriate supports subsequent materiel developments.

ASEDP has integrated products into the forces such as Precision Locations GPS Receivers (PLGR) for both mounted and dismounted soldier navigation; non-developmental Gun Laying Position System to provide azimuth for non-Paladin howitzers, mortars, radar, and missile systems; and several other capabilities that are contained in Force XXI efforts.

Investment Strategy

The Army's increasing dependency on space warrants expanded efforts to exploit space capabilities. The research, development, and acquisition programs exist because the Army leverages space capabilities and develops space products to support force projection operations. The Army will continue to leverage and participate substantively in investments made by other services and organizations to include Department of Energy, National Aeronautics and Space Administration, and the National intelligence community. However, land force unique applications such as tactical mapping and specialized land navigation will be aggressively pursued by the

Army and shared with other users. The Army's space R&D vision will be focused on developing sound requirements, test and evaluation programs, and needed products and ground systems for the warfighter.

Over the past twenty years, the Army has established organizational expertise to develop and field systems and applications that maximize the benefit of space systems in support of the land force commander. This knowledge base will continue to develop space applications in support of the force projection army in order to meet mission support requirements of Force XXI.

SECTION 4

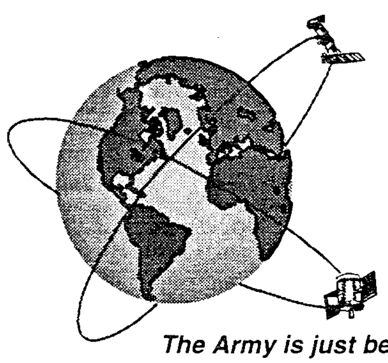
CONCLUSION

Space related capabilities provide unique combat advantages to the warfighter. A proven synergy exists on the battlefield in large part due to the aggregate of available space capabilities. Space systems provide the Army capabilities to manage information and time which are key resources in the 21st Century force. The Army has become dependent on capabilities provided by and via space assets. Critical to achieving victory are the following advantages: timely information; long haul, high capacity communications; precision navigation; deep surveillance; target acquisition; timely mapping; real time weather; and missile launch warning. The combination of national, civil, and commercial space systems provide the Army with the means to retain initiative, agility, depth, synchronization, and versatility. These space systems are critical capabilities that must be aggressively exploited. Assured direct access will grow in importance to the warfighter for future success.

To summarize the space system assessment, it is important for the DoD Space program to increasingly support the needs of the warfighter. It is critical that Satellite communications capabilities are sufficiently available throughout the spectrum to ensure that information needs are met. Additionally, battlefield visualization needs to be enhanced with weather, terrain, and environmental monitoring products from space.

The ultimate goal for Army space exploitation is to institutionalize space capabilities throughout the spectrum of Army operations. The value added by space capabilities provides the rationale for continued and aggressive exploitation of space.

ARMY VISION FOR SPACE



VISION

Provide the warfighter with timely, responsive and reliable Space capabilities & products that allow the Land Component Commander to dominate the battlefield of the XXI Century. Provide space based capabilities which are tailorable and deployable to meet the Army's force projection requirements.

The Army is just beginning to exploit the capabilities for land warfare that can be supported by space. The Army warfighter must be able to use space as a sanctuary from which to observe and direct operations while denying that capability to the enemy.

Figure N-11

1996 ARMY MODERNIZATION PLAN GLOSSARY

A

A2C2	Army Airspace Command and Control
A2C2S	Army Airborne Command and Control System
AAE	Army Acquisition Executive
AAFARS	Advanced Aviation Forward Area Refueling System
AALC	Advanced Airdrop for Land Combat
AAO	Army Acquisition Objective
AAPART	Annual Proficiency and Readiness Test
ABCS	Army Battle Command System
ABE	Advanced Boresight Equipment
ABM	Anti-Ballistic Missile
ABMOC	Air Battle Management Operation Center
ABN	Airborne
ABT	Air Breathing Threat
AC	Active Component
ACADA	Automatic Chemical Agent Detector Alarm
ACE	Armored Combat Earthmover
ACOE	Army Common Operating Environment
ACPM	Aircrew Protective Mask
ACR	Armored Calvary Regiment
ACS	Aerial Common Sensor
ACT	Advanced Cargo Transport
ACTD	Advanced Concepts Technology Demonstration
ACTS	Advanced Communications Technology Satellite
ACTS	Apache Crew Training System
ACUS	Area Common User System
ADA	Air Defense Artillery
ADCATT	Air Defense Combined Arms Tactical Trainer
ADCPE	Advanced Deployable Collective Protection Equipment
ADDS	Army Data Distribution System
ADO	Army Digitization Office
ADSS	ANVIS Display Symbology System
ADTOC	Air Defense Tactical Operations Center
AED	Advanced Expendable Dispenser
AEDST	Airframe & Engine Drivetrain Systems Trainer
AEI	Armament Enhancement Initiative
AEOCM	Advanced EO Countermeasures
AESTC	Army Executive Skills Technology Center

AET	Armament/ Electrical Trainer
AFATDS	Advanced Field Artillery Tactical Distribution System
AGCCS	Army Global Command and Control System
AGES	Air to Ground Engagement System
AGP	Army Gateway Program
AGPU	Aviation Ground Power Unit
AGS	Armored Gun System
AGSE	Aviation Ground Support Equipment
AGTS	Advanced Gunnery Training System
AHP	Advanced Helicopter Pilotage
AI	Artificial Intelligence
AICPS	Advanced Integrated Collective Protection
AIE	Aircrew Integrated Ensemble
AIS	Autonomous Intelligent Submunition
AIS	Automatic Information System
AJ	Anti Jam
ALSE	Aviation Life Support Equipment
AMC	Army Materiel Command
AMDC4	Advanced Medical Diagnostic Communications for Combat Casualty Care
AMEC	Army Management Engineering College
AMEDD	Army Medical Department
AMEDDC&S	Army Medical Department Center and School
AMIDS	Aircraft Maintenance Intermediate Diagnostics System
AMPS	Aviation Mission Planning System
AMS-H	Advanced Missile System - Heavy
ANBACIS	Automated Nuclear, Biological and Chemical Information System
ANG	Army National Guard
ANSO	Army Driver Standardization Office
ANVIS	Aviator's Night Vision Imaging System
AO	Area of Operations
APFSDS-T	Armor Piercing Fin Stabilized Discarding Sabot Tracer
APOBS	Anti-Personnel Obstacle Breaching System
APOD	Airport of Debarkation
AQF	Advanced QUICKFIX
ARES	Army Executives For Software
ARF	Airborne Relay Facility
ARH	Anti-Radiation Homing
ARI	Aviation Restructure Initiative

1996 ARMY MODERNIZATION PLAN GLOSSARY

ARL	Airborne Reconnaissance-Low
ARM	Anti-Radiation Missile
ARNG	Army National Guard
ARPA	Advanced Research Projects Agency
ARSO	Army Special Operations Forces
ART	Advanced Rotorcraft Transmission
ARTEP	Army Training and Evaluation Program
ASARS	Advanced Synthetic Aperture Radar System
ASAS	All Source Analysis System
ASAT	Anti-Satellite
ASE	Aircraft Survivability Equipment
ASEDP	Army Space Exploitation Demonstration Program
ASET	Aircraft Survivability Equipment Trainer
ASMP	Army Strategic Mobility Program
ASPO	Army Space Programs Office
ASRT	Autonomous Scout Rotorcraft Technology
ASSLT	Air Assault
ASST	Advanced Submunition Sensor Technology
ASTAMIDS	Airborne Standoff Mine Detection System
ASTMP	Army Science and Technology Master Plan
ASTRO	Army Space Technology and Research Office
AT XXI	Army Training XXI
ATA	Air-to-Air
ATACMS	Army Tactical Missile System
ATAM	Air-to-Air Missile
ATAS	Air-to-Air STINGER
ATAS	Advanced Tank Armament System
ATC	Air Traffic Control
ATCAS	Advanced Towed Cannon Artillery System
ATCCS	Army Tactical Command and Control System
ATD	Advanced Technology Demonstration
ATGM	Anti-Tank Guided Missile
ATGM	Air-to-Ground Missile
ATHS	Airborne Target Handover System
ATIMP	Army Training Information Management Program
ATIRCM	Advanced Threat IR Countermeasures
ATLAS	All-Terrain Lifter Articulated System
ATM	Anti-Tank Missile
ATM	Asynchronous Transfer Mode
ATMD	Advanced Threat Missile Detector
ATNAVICS	Air Traffic Navigation, Integration, and Coordination System
ATP	Allied Technical Publication
ATR	Aided Target Recognition

ATRJ	Advanced Threat Radar Jammer
ATS	Air Traffic Services
AVA	Aviation Vibration Analyzer
AVCATT	Aviation Combined Arms Tactical Trainer
AVIM	Aviation Intermediate Maintenance
AVLB	Armored Vehicle Launched Bridge
AVOAC	Aviation Officer's Advanced Course
AVTB	Aviation Test Bed
AVTOC	Aviation Tactical Operations Center
AW	Air Warrior
AWACS	Airborne Warning and Control System
AWD	Advanced Warfighting Demonstration
AWE	Advanced Warfighting Experiment
AWIS	Army WWMCCS Information System
AWMP	Army Watercraft Master Plan
AWSS	Area Weapon Scoring System

B

BADS	Biological Agent Decontamination System
BAI	Battlefield Air Interdiction
BAS	Biological Agent Simulant
BAS/BADS	Biological Agent Simulant/Biological Agent Decontamination
BAT	Brilliant Anti-Armor Technology
BBD	Battalion BM/C^3 Demonstrator
BBS	Brigade and Battalion Simulation
BCIS	Battlefield Combat Identification System
BDATS	Biological Detection and Alarm Training System
BDE	Brigade
BDM	Bunker Defeating Munition
BDS-D	Battlefield Distributed Simulation Developmental
BE	Brilliant Eyes (now SMTS)
BFA	Battlefield Functional Area
BFIST	Bradley Fire Support Team Vehicle
BFT	Battle Focus Trainer
BIDS	Biological Integrated Detection System
BIDSS	Biological Integrated System Simulator
BIPS	Battlefield Imaging Projectile System
BITE	Built in Test Equipment
BLRSI	Battle Lab Reconfigurable Simulator Initiative
BLWE	Battle Laboratory Warfighting Experiment
BM/C3	Battle Management/Command, Control, and Communications

1996 ARMY MODERNIZATION PLAN GLOSSARY

BM/C3I	Battle Management/Command, Control, Communications, and Intelligence
BM/C4	Battle Management/Command, Control, Communications, Computers, and Intelligence
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization
BN	Battalion
BOS	Battlefield Operating System
BPC	Battle Projection Centers
BRAC	Base Realignment and Closure
BRIDGESIM	Vessel Bridge Simulator
BRM	Bridge and Road Munition
BRWL	Bistatic Radar for Weapons Location
BSC	Battle Simulation Centers
BSC	Battle Simulation Centers
BSFV	Bradley STINGER Fighting Vehicle
BSM	Battlefield Spectrum Management
BST	Basic Skills Trainer
BUR	Bottom-Up Review
BW	Biological Warfare or Biological Weapon(s)

<u>C</u>

C/B	Chemical/ Biological
C2	Command and Control
C2V	Command and Control Vehicle
C3	Command, Control and Communications
C3I	Command, Control, Communication, and Intelligence
C4	Command, Control, Communications and Computers
C4I	Command, Control, Communications, Computers, and Intelligence
C4IFTW	Command, Control, Communications, Computers and Intelligence For The Warrior
CA	Civil Affairs
CAAD	Corps Area Air Defense
CAADCI	Common Air Defense Communications Interface
CAAMS	Computer Assisted Artillery Meteorological System
CABS	Crashworthy Air Bag System
CAC	Combined Arms Center
CAC2	Combined Arms Command and Control
CADS	Chemical Agent Detecting Solution
CAI	Combined Arms Initiative
CAI	Computer Assisted Instruction
CALFEX	Combined Arms Live Fire Exercise

CALL	Center for Army Lessons Learned
CAM	Chemical Agent Monitor
CAM	Commercial Assets Mobilization
CAREMED	Computer Assisted Response Expert for Medical Emergency Decisions
CAS	Close Air Support
CASCOM	Combined Arms Support Command
CATS	Combined Arms Training Strategy
CATT	Combined Arms Tactical Trainer
CAV	Composite Armored Vehicle
CBADS	Chemical/Biological Agent Delivery System
CBD	Chemical/Biological Defense
CBDCOM	Chemical and Biological Defense Command
CBPS	Chemically and Biologically Protected Shelter
CBS	Corps Battle Simulation
CBW	Chemical/Biological Warfare
CCF	CONUS Contingency Force
CCO	Close Combat Optics
CCTT	Close Combat Tactical Trainer
CD	Civil Defense
CD-ROM	Compact Disk - Real-only Memory
CDA	Cognitive Decision Aiding
CDATS	Chemical Detection and Alarm Training System
CDI	Classification, Discrimination, and Identification
CDRs	Commanders
CECOM	Communications Electronics Command
CENTCOM	Central Command
CEU	Cooling Equipment Unit
CFF	Central Funding and Fielding
CFT	Captive Flight Trainers
CGI	Computer Generated Imagery
CGS	Common Ground Station (JSTARS GSM Block II)
CH	Cargo Helicopter
CHALS-X	Communications High Accuracy Location System Exploitable
CHCS	Composite Health Care System
CHEMSIM	Chemical Simulation
CHI	Coastal, Harbor and Inland Waterway Boat
CHS	Common Hardware and Software
CHSS	Combat Health Support System
CIE	Clothing and Individual Equipment
CINC	Commander-in-Chief

CINCNORAD	Commander-in-Chief North American Defense Command
CINCSPACE	Commander-in-Chief U.S. Space Command
CITV	Commander's Independent Thermal Viewer
CLU	Command Launch Unit
CLW TLD	21st Century Land Warrior Top Level Demonstration
CM	Cruise Missile
CMI	Computer Managed Instruction
CMS	Combat Mission Simulator
CMST	Collection Management Support Tools
CMTC	Combat Maneuver Training Center
CNR	Combat Net Radios
COFT	Conduct of Fire Trainer
COMINT	Communications Intelligence
COMPUSEC	Computer Security, Computers, and Intelligence
COMSEC	Communications Security
CONUS	Continental United States
CORPS SAM	Corps Surface-to-Air Missile
COTS	Commercial-Off-The-Shelf
CP	Collective Protection
CPE	Collective Protection Equipment
CPG	Co-Pilot Gunners
CPT	Cockpit Procedures Trainer
CPU	Central Processing Unit
CPX	Command Post Exercise
CS	Combat Support
CSA	CINC Support Aircraft
CSAB	Combat Support Aviation Battalion
CSGTS	Commander's Second Generation Tank Sight
CSMET	Crew Station Mission Equipment Trainer
CSS	Combat Service Support
CSSCCS	Combat Service Support Command and Control System
CSSCS	Combat Service Support Control System
CSSTSS	Combat Service Support Training Simulation System
CSTG	Cockpit/ Sensor/Turret Gun
CT	Counter Terrorism
CTAPS	Contingency Theater Automated Planning System
CTC	Combat Training Center
CTIS	Combat Terrain Information System
CTT	Commander's Tactical Terminal
CTT-H	Commander's Tactical Terminal-Hybrid
CUCV	Commercial Utility Cargo Vehicle
CUITN	Common User Installation Transfer Network

CVDOS	Combat Vehicle Defensive Obscuration System
CW	Chemical Warfare or Chemical Weapon(s)
CWC	Chemical Weapons Convention

D

D/NAPS	Day/Night Adverse Weather Pilotage System
DA	Department of the Army
DAC	Department of the Army Civilian
DAM	Decontamination Agent, Multi-purpose
DAMA	Demand Assigned Multiple Access
DAMPL	Department of the Army Master Priority List
DBSS	Defense Blood Standard System
DCSLOG	Deputy Chief of Staff for Logistics
DCSOPS	Deputy Chief of Staff for Operations and Plans
DDN	Defense Data Network
DEM/VAL	Demonstration Validation
DEPEX	Deployment Exercise
DEPMEDS	Deployable Medical Systems
DEUCE	Deployable Universal Combat Earthmover
DF	Direction Finding
DFLP	Defense Foreign Language Program
DIS	Distributed Interactive Simulation
DISC4	Director of Information Systems Command, Control, Communications, and Computers
DISN	Defense Information Systems Network
DLEA	Drug Law Enforcement Program
DMFCS	Digitized Mortar Fire Control System
DMLSS	Defense Medical Logistics Support System
DMS	Defense Message System
DMSB	Defense Medical Standardization Board
DMSP	Defense Meteorological Satellite Program
DoD	Department of Defense
DOT	Director of Training
DOTLMS	Doctrine, Organization, Training, Leadership, Materiel, and Soldiers
DPG	Defense Planning Guidance
DPICM	Dual Purpose Improved Conventional Munition
DS-2	Decontamination Solution #2
DS/GS	Direct Support/General Support

1996 ARMY MODERNIZATION PLAN GLOSSARY

DSCS	Defense Satellite Communications System
DSI	Defense Simulation Internet
DSP	Defense Satellite Program
DST	Driver Skill Trainers
DTD	Digital Topographic Data
DTP	Distributed Training Packages
DTS	Data Transfer System
DTSS	Digital Topographic Support System
DTV	Driver's Thermal Viewer

E

E-O	Electro-Optic
EA	Electronic Attack
EAC	Echelons Above Corps
EADSIM	Extended Air Defense Simulation
EADTB	Extended Air Defense Test Bed
ECBRS	Enhanced Concept Based Requirements System
ECIT	Enhanced Communication Interface Terminal
ECM	Electronic Countermeasures
ECU	Environmental Control Unit
ECWSS	Extreme Cold Weather Sleep System
EEU	Electronics Equipment Unit
EFOG-M	Enhanced Fiber Optic Guided Missile
EHF	Extra High Frequency
EIP	Enterprise Implementation Plan
EISS	Executive Information Systems Seminar
EKV	Exoatmospheric Kill Vehicle
ELINT	Electronic Intelligence
ELRF	Eyesafe Laser Rangefinder
ELW	Enhanced Land Warrior
EM	Electromagnetic (Spectrum)
EMD	Engineering and Manufacturing Development
EME	Electromagnetic Environment
EMP	Electromagnetic Pulse
EMRO	Electromagnetic Radiation Operation
EMUT	Enhanced Manpack UHF Terminal
ENCATT	Engineer Combined Arms Tactical Trainer
EOD	Explosive Ordnance Device
EOTADS	Electro-Optical Target Acquisition Designation System
EP	Electronic Protection
EPA	Extended Planning Annex
EPA	Environmental Protection Agency

EPDS	Electronic Processing and Dissemination System
EPLRS	Enhanced Position Location Reporting System
EPP	Electric Power Plant
EPP	Extended Planning Period
ERA	Extended Range Artillery (Projectile)
ERINT	Extended Range Intercept Technology
ESP	Extended Service Program
ESSS	External Stores Support System
ETP	Exportable Training Packages
ETRAC	Enhanced Tactical Radar Correlator
ETUT	Enhanced Tactical Users Terminal
EW	Electronic Warfare
EWR	Early Warning Radar
ExFOR	Exercise Force
EXO	Exoatmospheric

F

F/I	Flame/Incendiary
FAA	Federal Aviation Administration
FAAD	Forward Area Air Defense
FAADC2	Forward Area Air Defense Command and Control
FAADS	Forward Area Air Defense System
FAASV	Field Artillery Ammunition Supply Vehicle
FACE	Forward Aviation Combat Engineering
FAMSIM	Family of Simulations
FARP	Forward Arming and Refueling Point
FARV	Future Armored Resupply Vehicle
FAST	Forward Area Support Terminal
FBCB2	Force XXI Battle Command Brigade and Below System
FCR	Fire Control Radar
FDA -	Food and Drug Administration
FDR	Future Digital Radar
FDR	Future Digital Radio
FFAR	Folding Fin Aerial Rocket
FHT	Field Handling Trainer
FID	Foreign Internal Defense
FINL	Flame/Incendiary and Non-Lethal
FIST-V	Fire Support Team Vehicle
FLIR	Forward Looking Infrared Radar
FLO/FLO	Float On Float Off
FM	Field Manual
FM	Frequency Modulation
FMTV	Family of Medium Tactical Vehicles
FMVSS	Federal Motor Vehicle Safety Standards
FO	Follow-on
FOA	Field Operating Agency
FOC	Full Operational Capability
FORSCOM	Forces Command
FOV	Family of Vehicles/Field Of View
FP	Force Package

1996 ARMY MODERNIZATION PLAN GLOSSARY

FP1	Force Package 1
FP2	Force Package 2
FP3	Force Package 3
FP4	Force Package 4
FPE	Fighting Position Excavator
FS	Fire Support
FSB	Forward Support Battalion
FSCATT	Fire Support Combined Arms Tactical Trainer
FSU	Former Soviet Union
FSV	Future Scout Vehicle
FTS	Full Time Support
FTT	Field Tactical Trainer
FTX	Field Training Exercise
FUE	First Unit Equipped
FW	Fixed Wing
FWIS	Fixed Wing Investment Strategy
FWS	Flight Weapons Simulator
FY	Fiscal Year
FYDP	Future Year Defense Program

G

GaAs	Gallium Arsenide
GBCS	Ground Based Common Sensor
GBCS-H	Ground Based Common Sensor-Heavy
GBCS-L	Ground Based Common Sensor-Light
GBI	Ground Based Interceptor
GBR	Ground Based Radar
GBS	Ground Based Sensor
GCCS	Global Command and Control System
GEM	Guidance Enhancement Missile
GEN II	Generation II
GFP	Government Furnished Property
GFRE	Ground Force Readiness Enhancement
GLPS	Gun Laying Positioning System
GMF	Ground Mobile Forces
GMFSC	Ground Mobile Forces Satellite Communications
GMG	Grenade Machine Gun
GPADS	Guided Parafoil Air Delivery System
GPALS	Global Protection Against Limited Strike
GPS	Global Positioning System
GRCS	Guardrail Common Sensor
GSAB	General Support Aviation Battalion
GSE	Ground Support Equipment
GSM	JSTARS Ground Station Module (Block I)
GTA	Graphic Training Aids
GUARDFIST	Guard Unit Armory Device Full Crew Interactive Simulation

H

HAB	Heavy Assault Bridge
HACT	Helicopter Active Control Technology
HAWK	Homing All the Way Killer

HCAA	High Capacity Air Ambulance
HDSB	Heavy Dry Support Bridge
HE	High Explosive
HEAT-MP-T	High Explosive Antitank-Multipurpose-Tracer
HEED	Helicopter Emergency Egress Device
HEMTT	Heavy Expanded Mobility Tactical Truck
HET	Heavy Equipment Transporter
HF	High Frequency
HGSS	Hellfire Ground Support System
HGST	Helicopter Gunnery Skills Test
HHV	Heavy High Mobility Multipurpose Wheeled Vehicle
HICAP	Hi-Capacity Ammunition
HIMAD	High/Medium Altitude Air Defense
HIMARS	High Mobility Artillery Rocket System
HIRSS	Hover IR Suppresser System
HMMWV	High Mobility Multipurpose Wheeled Vehicle
HMT	High Mobility Trailer
HQDA	Headquarters, Department of the Army
HTI	Horizontal Technology Integration
HUD	Heads-up Display
HUMINT	Human Intelligence
HV	Hunter Vehicle
HYEX	Hydraulic Excavator

I

IAW	In Accordance With
IBA	Integrated Battlefield Architecture
ICAM	Improved Chemical Agent Monitor
ICASE	Integrated Computer-aided Software Engineering
ICBM	Intercontinental Ballistic Missile
ICBT	Improved Common Bridge Transporter
ICC	Information and Coordination Central
ICNIA	Integrated Communications, Navigation, and Identification Avionics
ICOFT	Institutional Conduct of Fire Trainer
ID	Identification
IDL	Interoperable Data Link
IDM	Improved Data Modem
IDT	Institutional Training Device
IERW	Initial Entry Rotary Wing
IEW	Intelligence and Electronic Warfare
IEWTPT	Intelligence/ Electronic Warfare Tactical Proficiency Trainer
IFCS	Improved Fire Control System (MLRS)
IFF	Identification Friend or Foe
IFSAS	Interim Fire Support Automation System

1996 ARMY MODERNIZATION PLAN GLOSSARY

IHPTET	Integrated High Performance Turbine Engine Technology
ILMS	Improved Launcher Mechanical System (MLRS)
IMA	Information Mission Area
IMBC	Improved Mortar Ballistic Computer
IMC	Instrument Meteorological Conditions
IMF	Intelligent Minefield
IMINT	Imagery Intelligence
IMTS	Improved Moving Target Simulator
IMU	Inertial Measurement Unit
INFOSEC	Information Security
INMARSAT	International Maritime Satellite
INSCOM	Intelligence and Security Command
INU	Inertial Navigation Unit
IOC	Initial Operational Capability
IPB	Intelligence Preparation of the Battlefield
IPDS	Improved Positioning Determining System
IPE	Individual Protective Equipment
IPF	Integrated Processing Facility
IPPD	Integrated Product and Process Development
IPPS	Initial Preplanned Supply Support System
IR	Infrared
IR&D	Independent Research and Development
IR/VIS	Infrared/Visible
IRB	Improved Ribbon Bridge
IRB	Initial Ready Brigade
IRCM	Infrared Countermeasures
IRDSS	Infrared Defeating Smoke System
IRJH	Infrared Jammer Head
IRS&T	Infrared Search and Track
IRV	Improved Recovery Vehicle
ISE	Intermediate Support Equipment
ISM	Installation Support Module
ISR	Individual Soldier Radio
ISYSCON	Integrated System Control
ITAS	Improved Target Acquisition System
ITEM	Interactive Training Event Menu
ITV	In Transit Visibility
ITW/AA	Integrated Tactical Warning and Attack Assessment
IVIS	Intervehicular Information System
IVMMD	Interim Vehicle Mounted Mine Detector
IWC2W	Information Warfare/Command & Control Warfare
IWSD	Integrated Weapon System Display

J

JACG	Joint Aeronautical Commanders Group
JCALS	Joint Computer-Aided Acquisition and Logistics Support
JCS	Joint Chiefs of Staffs
JFC	Joint Force Commander
JP	Joint Publication
JPSD	Joint Precision Strike Demonstration
JRTC	Joint Readiness Training Center
JSIMS	Joint Simulations System
JSLIST	Joint Service Lightweight Integrated Suit Technology
JSSAP	Joint Service Small Arms Program
JSTARS	Joint Surveillance Target Attack Radar System
JTAGG	Joint Turbine Advanced Gas Generator
JTAGS	Joint Tactical Air to Ground Station
JTF	Joint Task Force
JTIDS	Joint Tactical Information Distribution System

K

KE	Kinetic Energy
Km	Kilometers
KMR	Kwajalein Missile Range

L

LAM	Louisiana Maneuvers
LAN	Local Area Network
LBA	Longbow Apache
LCC	Land Component Commander
LCLO	Low Cost, Low Observable
LCMS	Laser Counter Measure System
LCT	Longbow Crew Trainer
LCTS	Longbow Crew Trainer System
LCU	Landing Craft Unit
LCU	Lightweight Computer Unit
LDS	Laser Detecting Set
LDS	Lightweight Decontamination System
LDTOC	Lightweight Digital Tactical Operations Center
LEAP	Lightweight Exo-Atmospheric Projectile
LFED	Lightweight Forward Entry Device
LGH	Launched Grapnel Hook
LLADI	Low Level Air Defense Interface
LLC	Lightweight Leader Computer
LLDR	Lightweight LASER Designator Rangefinder
LMS	Lightweight Mortar System
LMTV	Light Medium Tactical Vehicle
LOC	Lines of Communication
LOS	Line-of-Sight
LOS-F-H	Line-of-Sight Forward Heavy
LOS-R	Line-of-Sight Rear
LOSAT	Line-of-Sight Anti-Tank

1996 ARMY MODERNIZATION PLAN GLOSSARY

LOTS	Logistics Over-The-Shore
LPI/LPD	Low Probability of Intercept/Low Probability of Detection
LR	Long Range
LRAS3	Long Range Advanced Scout Surveillance System
LRC	Lesser Regional Conflict
LRCS	Low Radar Cross Section
LRIP	Low Rate Initial Production
LRSBDS	Long Range Standoff Biological Detection System
LRU	Line Replaceable Unit
LSCAD	Lightweight Standoff Chemical Agent Detector
LSCD	Laser Standoff Chemical Detector
LSDIS	Light and Special Division Interim Sensor
LTL	Less Than Lethal
LTWT	Lightweight
LUH	Light Utility Helicopter
LVOSS	Light Vehicle Obscuration Screening System
LVRS	Lightweight Video Reconnaissance System
LW	Land Warrior

M

M&S	Modeling and Simulation
M3T2	Multi-Mission Medium Tactical Transport
M^3V	Mobile Medical Mentoring Vehicle
MACOM	Major Army Command
MANPADS	Man Portable Air Defense System
MAPEX	Map Exercise
MASTER	Manufacturing and Structures Technology for Efficient Rotorcraft
MAVWEST	Multiplex, Armament, Visionics, Weapons, Electrical
MBMMR	Multi-Band Multi-Mode Radio
MC^4	Medical Communications for Combat Casualty Care
MC^4I	Medical Command, Control, Communications, Computers, and Intelligence
MCD	Missile Countermeasure Device
MCOFT	Mobile Conduct of Fire Trainer
MCPE	Modular Collective Protection Equipment
MCS	Maneuver Control System
MDEP	Management Decision Package
MDI	Modernized Demolition Initiator
MDS	Modular Decon System
MEDEVAC	Medical Evacuation
MELIOS	Mini Eyesight Laser Infrared Observation Set
MES	Mine Effects Simulator

METL	Mission Essential Task List
MFOM	MLRS Family of Munitions
MHE	Material Handling Equipment
MHG	Meteorological Hydrogen Generator
MI	Military Intelligence
MICAD	Multipurpose Integrated Chemical Agent Alarm
MIES	Modernized Imagery Exploitation System
MILES	Multiple Integrated Laser Engagement System
MILSPEC	Military Specifications
MILSTAR	Military Strategic Tactical Relay
MILT	Military Intelligence Language Trainer
MIP	Meteorological Improvement Program
MIRV	Multiple Independently Targeted Re-Entry Vehicle
MISSI	Multilevel Information Systems Security Initiative
MITT	Mobile Imagery Tactical Terminal
MLC	Military Load Classification
MLRS	Multiple Launch Rocket System
MLS	Multilevel Security
MMC	Materiel Management Cell
MMR	Multi-Mode Radar
MMS	Meteorological Measuring System
MMTD	Missile Monitor Test Device
MMU	Medium Machinegun Upgrade
MMW	Millimeter Wave
MNS	Mission Need Statement
MNVD	Monocular Night Vision Device
MOADS	Maneuver Oriented Ammunition Distribution System
MOOTW	Military Operations Other Than War
MOPMS	Modular Pack Mine System
MOPP	Mission Oriented Protective Posture
MOS	Military Occupational Specialty
MOTS	Mobile Tower System
MOUT	Military Operations in Urban Terrain
MPIM	Multi-Purpose Individual Munition
MPRS	Mission Planning Rehearsal System
MPS	Mission Planning Station
MPT	Maintenance Panel Trainer
MR	Medium Range
MRBM	Medium Range Ballistic Missile
MRC	Major Regional Conflict
MRL	Multiple Rocket Launcher
MRT	Missile Round Trainer
MSAT-Air	Multi-Sensor Aided Targeting-Airborne
MSCS	Multi-Spectral Camouflage System

1996 ARMY MODERNIZATION PLAN GLOSSARY

MSE	Mobile Subscriber Equipment
MSI	Multi-Spectral Imaging
MSIP	Multi-Spectral Imagery Processor
MSR	Missile Simulation Round
MSTAR	MLRS Smart Tactical Rocket
MTA	Major Training Area
MTD	Mobility Technology Demonstration
MTI	Moving Target Indicator
MTI	Multi-spectral Thermal Imaging
MTMP	MACOM Telephone Modernization Program
MTP	Mission Training Plan
MVS	Muzzle Velocity System
MW	Mounted Warrior
MWS	Modular Weapon System

N

NAS	National Airspace System
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NATS	New Aircraft Tool System
NBC	Nuclear, Biological and Chemical
NBCRS	NBC Reconnaissance System (XM93 FOX)
NBCWRS	NBC Warning and Reporting System
NCA	National Command Authority
NCO	Non-Commissioned Officer
NDI	Non-Developmental Item
NDR	National Defense Radar
NDTE	Non-Destructive Test Equipment
NEISO	Non-Materiel Individual Enhancement of SOF Operators
NEO	Non-Combatant Evacuation Operation
NET	New Equipment Training
NG	National Guard
NLOS	Non-Line-Of-Sight
NMD	National Missile Defense
NMS	National Military Strategy
NOE	Nap-of-the-Earth
NORAD	North American Aerospace Defense
NRT	Near-Real Time
NRTC	National Rotorcraft Technology Center
NSTD	Non System Training Devices
NTC	National Training Center
NTH	New Training Helicopter (TH-67)
NTR	National Transport Rotorcraft
NUC	Nuclear
NVPS	Night Vision Pilotage System

O

O&M	Operations and Maintenance
O&O	Organization and Operations
O&S	Operations and Support

OBC	Officer Basic Course
OCONUS	Outside Continental United States
OCR	Operational Capability Requirement
OCSW	Objective Crew-Served Weapon
OCU	Operator Control Unit
ODS	Operation Desert Shield/ Desert Storm
OICW	Objective Individual Combat Weapon
OMA	Operations & Maintenance, Army
OPFOR	Opposing Forces
OPNS	Operations
OPSEC	Operational Security
OPTADS	Operations Technical Data System (Project Manager)
OPTEMPO	Operating Tempo
OPW	Objective Personal Weapon
ORD	Operational Requirements Document
OSA	Operational Support Aircraft
OSCAR	Outside Cable Rehabilitation
OSCR	Operations and Support Cost Reduction
OSD	Office of the Secretary of Defense
OSE	Open Systems Environment
OSV	OPFOR Surrogate Vehicle

P

P3I	Preplanned Product Improvement
PA	Procurement, Army
PAC-2	Patriot Anti-Tactical Missile (ATM) Capability-2
PAC-3	Patriot Advanced Capability-3
PADS	Position and Azimuth Determining System
PALADIN	M109A6 Howitzer
PAM	Penetration Augmentation Munition
PASGT	Personnel Armored System Ground Troops
PATRIOT	Phased Array Tracking To Intercept Of Target
PC	Personal Computer
PCAS	Persistent Chemical Agent Simulant
PCOFT PDB	Patriot Conduct of Fire Trainer Post Deployment Build
PENAIDS	Penetration Aids
PFASC	Patriot Field Army Support Center
PGMM	Precision Guided Mortar Munition
PIMIT	Patriot Intermediate Maintenance Training Device
PIP	Product Improvement Program
PK	Probability Of Kill
PLF	Popular Liberation Front
PLGR	Precision Locating GPS Receiver
PLS	Palletized Loading System
PLS	Personnel Locator System

PLV	Payload Launch Vehicle
PM	Program Manager or Project Manager
PM	Preventive Medicine
PNVS	Pilotage Night Vision System
POL	Petroleum, Oil, and Lubricants
POM	Program Objective Memorandum
POMCUS	Prepositioned Overseas Materiel Configured to Unit Sets
POMT PDB	Patriot Organizational Maintenance Trainer Post Deployment Build
POS/NAV	Positive Navigation System
POST	Passive Optical Seeker Technology
PPC4I	Power Projection Command, Control, Communications and Computer Infrastructure
PPU	Prime Power Unit
PREPO	Prepositioned
PRIME	Precision Range Integrated Maneuver Exercise
PSS	Projected Smoke System
PSS	Projected Smoke Simulator
PSYOPS	Psychological Operations

Q

Q-37 V.8 - Q-37	Radar Version 8 Upgrade
Q-STARS	Quadservice Satellite Transmitting and Receiving
QRMP	Quick Response Multipurpose Printer
QRP	Quick Response Program

R

R&D	Research and Development
RADINT	Radar Intelligence
RAH-66	Reconnaissance/ Attack Helicopter
RAM	Reliability, Maintainability and Availability
RAMEP	RAM and Enhanced Performance
RC	Reserve Component
RCAS	Reserve Component Automation System
RD&J	Radar Deception and Jamming
RDA	Research, Development and Acquisition
RDEC	Research, Development & Engineering Center
RDMS	Range Data Measurement Subsystem
RDT&E	Research, Development, Test & Evaluation
RETROEUR	Return from Europe
RETS	Remoted Target System
RF	Radio Frequency
RFI	Radio Frequency Interferometer
RFPI	Rapid Force Projection Initiative

RF/SAL	Radio Frequency Semi-Active Laser
RISE	Reliability Improvement Selected Equipment
RISTA	Reconnaissance, Intelligence, Surveillance, and Target Acquisition
RL	Readiness Level
RMCS	Range Monitoring and Control Subsystem
RMP	Reprogrammable Microprocessor
RO/RO	Roll On/Roll Off
ROC	Regional Operation Center
ROE	Rules of Engagement
ROW	Rest of the World
ROWPU	Reverse Osmosis Water Purification Unit
RPA	Rotorcraft Pilot's Associate
RPV	Remotely Piloted Vehicle
RRF	Ready Reserve Force
RTD	Radar Technology Demonstrator
RTOS	Reconfigurable Tactical Operations Simulator
RTS	Radiac Training System
RTS	Regional Training Sites
RV	Re-Entry Vehicle
RVT	Remote Video Terminals
RW	Rotary Wing

S

S&T	Science and Technology
SADARM	Search and Destroy Armor Munition
SAL	Semi-Active Laser
SAM	Surface to Air Missile
SAPLIC	Small Projected Line Charge
SAR	Synthetic Aperture Radar
SATCOM	Satellite Communications
SATP	Space Applications Technology Program
SATS	Standard Army Towing System
SAW	Squad Automatic Weapon
SAWE-RF	Simulated Area Weapons Effects-Radio Frequency
SBIR	Space Based Infra-Red
SBIS	Sustaining Base Information Services
SCAMP	Single Channel Anti-jam Manportable Terminal
SCPE	Simplified Collective Protection Equipment
SDI	Strategic Defense Initiative
SDIO	Strategic Defense Initiative Organization
SE	Synthetic Environment
SEAD	Suppression of Enemy Air Defense
SECM	Shop Equipment-Contact Maintenance
SEMA	Special Electronic Mission Aircraft

SEMT	Signals Intelligence/Electronic Warfare Equipment Maintenance Trainer
SEP	Soldier Enhancement Program
SF	Special Forces
SFC	Soldier Fighting Cover
SGI	Small Group Instruction
SHF	Super High Frequency
SHORAD	Short Range Air Defense
SHTU	Simplified Handheld Terminal Unit
SICPS	Standard Integrated Command Post System
SIGINT	Signals Intelligence
SIMLM	Single Integrated Medical Logistics Management
SIMNET	Simulation Networking
SINCGARS	Single Channel Ground and Airborne Radio System
SIP	System Improvement Program
SIPE	Soldier Integrated Protective Ensemble
SIRFC	Suite of Integrated Radar Frequency Countermeasures
SKO	Sets, Kits, and Outfits
SLAM	Selectable Lightweight Attack Munition
SLBM	Submarine Launched Ballistic Missile
SLEP	Service Life Extension Program
SMART-T	Secure, Mobile, Anti-jam, Reliable Tactical Terminal
SMB	Standoff Minefield Breacher
SMR	Simulated Missile Round
SMTS	Surveillance and Missile Tracking Satellites
SO	Special Operations
SOA	Special Operations Aviation
SOC	Special Operations Command
SOF	Special Operations Forces
SOFPREP	Special Operations Forces Planning and Rehearsal Procedures
SOFSA	Special Operations Forces Support Activity
SOMTC	Special Operations Medical Training Center
SOST	Special Operations Special Technology
SOTF	Special Operations Task Force
SPACE	Space Command
SPIRIT	Special Purpose Integrated Remote Intelligence Terminal
SPOD	Sea Port Of Debarkation
SPOT	System Probing Observation Terrain
SR	Short Range
SR	Special Reconnaissance
SRAW	Short Range Antitank Weapon
SR-UAV	Short Range-Unmanned Aerial Vehicle

SRBM	Short Range Ballistic Missile
SRSBDS	Short Range Standoff Biological Detection System
SS	Solid State
SSA	Service Support Aircraft
SSDC	Space and Strategic Defense Command
SSES	Suite of Survivability Enhancement Sensors
SSM	Surface-to-Surface Missiles
STA	System Threat Assessment
STAARS	Standard After Action Review System
STACCS	Standard Theater Army Command and Control
STAFF	Smart Target Acquisition Fire and Forget
STANAG	Standardization Agreement (NATO)
STAR-T	SHF Tri-Band Advanced Range Extension Terminal
STO	Science and Technology Objective
STOW	Synthetic Theater Of War
STP	Soldiers Training Publication
STPT	Stinger Troop Proficiency Trainer
STRATA	Simulator Training Research Advanced Testbed
STT	Small Tactical Terminal
SVLM	Standard Vehicle Mounted Launcher
SWOE	Smart Weapon Operability Enhancement

T

T/R	Transmit/Receive
TAA	Total Army Analysis
TAAD	Theater Area Air Defense
TACFIRE	Tactical Fire Direction and Control System
TACOM	U.S. Army Tank Automotive Command
TACSATCOM	Tactical Satellite Communications
TACSIM	Tactical Simulation
TADS	Target Acquisition Designation Sight
TADSS	Training Aids, Devices, Simulators and Simulations
TAIS	Tactical Airspace Integration System
TAMSS	Target Area Met Sensor System
TARDEC	U.S. Army Tank Automotive Research, Development, and Engineering Center
TARP	Target Acquisition and Reconnaissance Platoon
TASCS	Training and Audio-Visual Support Center
TASM	Tactical Air-To-Surface Missile
TASS	Total Army School System
TAV	Total Asset Visibility

1996 ARMY MODERNIZATION PLAN GLOSSARY

TBM	Theater Ballistic Missile
TD	Technology Demonstration
TDA	Table of Distribution and Allowance
TDAC	Target Data Acquisition and Correlation
TDATD	Total Distribution Advanced Technology Demonstration
TDI	Technology Demonstration Item
TDP	Total Distribution Program
TEISS	The Enhanced Integrated Soldier System
TENCAP	Tactical Exploitation of National Capabilities
TEP	Tactical Electronic Processor
TES	TENCAP Exploitation System
TES	Tactical Engagement System
TESS	Tactical Engagement Simulation System
TF/TA	Terrain Following/Terrain Avoidance
TGS	Thermal Gunner's Sight
THAAD	Theater High Altitude Area Defense
TLD	Top Level Demonstration
TM	Technical Manual
TM-V/V	Technical Manual Validation/Verification
TMA	Training Mission Area
TMD	Theater Missile Defense
TMIP	Theater Medical Information Program
TNET	Teletraining Network
TOA	Total Obligation Authority
TOC	Tactical Operations Center
TOE	Table of Organizations and Equipment
TPF	Total Package Fielding
TPT	Troop Proficiency Trainer
TRADOC	U.S. Army Training and Doctrine Command
TRITAC	Tri-service Tactical Communications
TSAM	Theater Surface-To-Air Missile
TSFO	Training Set Fire Observation
TSS	Topographic Support System
TSTT	TADS Selected Task Trainer
TSV	Thru-Sight Video
TTCS	Tactical Terminal Control System
TUG-V	Tactical Unmanned Ground Vehicle
TWGSS/PGS	Tank Weapons Gunnery Simulation System\Precision Gunnery System
TWS	Thermal Weapon Sight
TWV	Tactical Wheeled Vehicle(s)
TWVMP	Tactical Wheeled Vehicle Modernization Plan

1996 ARMY MODERNIZATION PLAN GLOSSARY

U

UAV	Unmanned Aerial Vehicle
UCOFT	Unit Conduct Of Fire Trainer
UCOFT/MCOFT	Unit Conduct of Fire Trainer/Mobile Conduct of Fire Trainer
UH	Utility Helicopter
UHF	Ultra High Frequency
ULCANS	Ultra Lightweight Camouflage Netting System
UMARK	Unit Maintenance Aerial Recovery Kit
UNAFF	Unified Action Armed Forces
UOES	User Operational Evaluation System
USAADASCH	United States Army Air Defense School
USAF	United States Air Force
USAFSPACOM	U.S. Air Force Space Command
USAKA	United States Army Kwajalein Atoll
USAR	U.S. Army Reserve
USARC	U.S. Army Reserve Command
USAREUR	U.S. Army, Europe
USASOC	U.S. Army Special Operations Command
USCINCSPACE	U.S. Commander in Chief of Space Command
USN	U.S. Navy
USSOCOM	U.S. Special Operations Command
UV	Ultraviolet
UW	Unconventional Warfare

V

VHF	Very High Frequency
VIDS	Vehicle Integrated Defense System
VMMD	Vehicle Mounted Mine Detector
VR	Virtual Reality
VSRTBM	Very Short-Range Theater Ballistic Missile

W

WAM	Wide Area Munition
WARSIM 2000	Warfighters' Simulation 2000
WBC	Warrant Officer Basic Course
WCC	Weapons Control Computer
WMD	Weapons of Mass Destruction
WWMCCS	World Wide Military Command and Control System

X

XM982	Extende