WEAPON SYSTEMS 1990

UNITED STATES ARMY

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DEPARTMENT OF THE ARMY

WASHINGTON, D.C. 20310

March 1, 1990

To the Reader:

The Army's mission is to deter, and if deterrence fails, to fight and win. We have been successful in deterrence through the strength, capability and diversity of our weapon systems.

This handbook contains an overview of the major sytems within the Army. Many of the systems shown are in production, and have proven their capabilities in the field. Others are in different stages of development with new technologies being evaluated in prototypes, while others are items procurred directly through the nondevelopmental process.

The weapon systems and other equipment shown are categorized by specific Army mission area as follows: Close Combat; Air Defense; Fire Support; Combat Support; Combat Service Support; Command, Control and Communications; Soldier Support; and Strategic Defense. Each is described by its mission, characteristics, program status, and any Soviet Counterparts.

This handbook depicts our efforts to maintain a well trained, well equipped force, capable of fulfilling the Army mission of deterrence through strength, and if deterrence fails, to be prepared to fight and win.

Donald S. Pihl
Lieutenant General, GS
Military Deputy to ASA(RDA)

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Acting Assistant Secretary of The Army
(Research, Development and Acquisition)

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SOLDIER SUPPORT

STRATEGIC CONFLICT

RESEARCH AND DEVELOPMENT

TECHNOLOGY BASE

The weapon systems capabilities presented in this handbook benefited from past investments in the Army technology base. Just as they were shaped by previous investment decisions and technological progress over the last two decades, today's vision of the future battlefield, our resultant investment strategy and technology base plan and program will shape our Army of the future. Our vision is one of a well trained, well equipped and ready Army, today and tomorrow, capable of executing its role as America's strategic land force, anywhere in the world, anytime. This includes special operations, low intensity conflict, light & heavy forces.

The Army technology base represents an indispensable corporate investment to counter the threat and maintain our technological superiority on the battlefield. The technology base is divided into three areas, each designed to bring technology to various stages of maturity. The Basic Research (6.1) program exploits and identifies technological opportunities and provides an important interface with university and industry research. The Exploratory Development (6.2) program matures technology opportunities and evaluates technical feasibility for increased warfighting capability, and the non-system specific Advanced Development (6.3A) program demonstrates technologies to speed the transition of matured technology into Full Scale Development. The stability of the technology base program is directly affected by the stability of the associated funding.

ARMY TECHNOLOGY BASE MASTER PLAN

In 1989, the Army published the first Army Technology Base Master Plan (ATBMP) which includes our resource-constrained Technology Base Investment Strategy. The ATBMP provides thorough, top-down guidance and focus to Army research and development activities.

THE STRATEGIC ENVIRONMENT

U.S. A GLOBAL POWER ... WITH GLOBAL INTERESTS

THE NEW REALITY

- EVOLVING SUPERPOWER RELATIONS, BUT SOVIET THREAT REMAINS
- POTENTIAL IMPACT OF ARMS CONTROL AGREEMENTS
- INCREASING THIRD WORLD MILITARY CAPABILITY
- NATIONAL PRIORITIES IN TRANSITION

NATIONAL STRATEGY REQUIRES MODERN, READY LAND FORCES FOR DETERRENCE AND DEFENSE - HEAVY, LIGHT AND SOF

ARMY TECHNOLOGY BASE INVESTMENT STRATEGY

- SUPPORT ARMY'S WARFIGHTING CAPABILITY NEEDS
- BALANCE TECHNOLOGY BASE: (1) NEAR, MID, AND FAR TERM NEEDS; (2) TECHNOLOGY PUSH/REQUIREMENTS PULL; (3) BALANCE BETWEEN WEAPONS SYSTEMS AND OTHER REQUIREMENTS TO SUSTAIN ARMY ON BATTLEFIELD
- DISTRIBUTE TECHNOLOGY BASE RESOURCES IN FOUR AREAS: (1) FUTURE SYSTEMS; (2) SUPPORTING CAPABILITIES; (3) SYSTEMIC ISSUES; (4) KEY EMERGING TECHNOLOGIES
- SEIZE AND RETAIN TECHNOLOGY INITIATIVE
- ENHANCE RETURN ON INVESTMENT BY LEVERAGING R&D OUTSIDE THE ARMY
- SPEED FIELDING THROUGH FOCUSED ADVANCED TECHNOLOGY TRANSITION DEMOS
- RESTORE STABILITY TO THE TECHNOLOGY BASE
- PROVIDE TOP-DOWN GUIDANCE

To achieve our vision of the future we must continue to modernize. This requires integration of new concepts, designs, training and technologies with new equipment. To guide this modernization we have initiated functional area modernization plans that link requirements to development, acquisition, fielding and sustainment over time within fiscal constraints. One of the most important strategies outlined in the Army Technology Base Master Plan (ATBMP) is technology transition for force modernization. Force modernization requires anticipation of the threat and the design of a defense long before the threat actually appears. It is therefore imperative that the technology base deliver timely and affordable technologies in support of advanced systems and concepts. This requires a close linkage between the technology base and Army Force Modernization Plans. These modernization plans greatly improve the focus of the technology base since they provide definite windows of opportunity for technology insertion into next generation and future Army weapon systems.

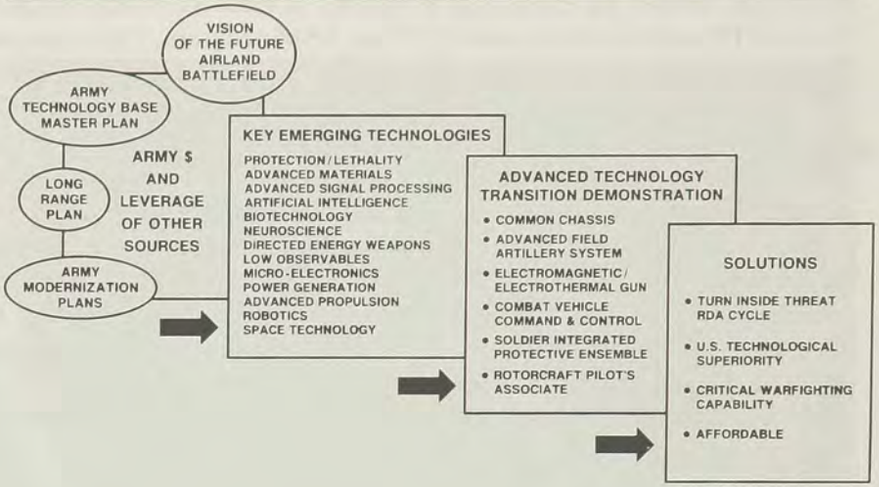
TECHNOLOGY ➡ BRIDGE TO THE FUTURE

LEGEND: ● MAJOR IMPACT ★ HIGHEST IMPACT

KEY EMERGING TECHNOLOGIES	MODERNIZATION PLANS							
	ARMOR ANTI-ARMOR	ARMORED SYSTEMS	FIRE SUPPORT	DEEP ATTACK	AIR DEFENSE	AVIATION	LIGHT FORCES	C3/ IEW
ADVANCED PROPULSION		★	●			★		
ADV SIGNAL PROCESSING & SENSORS		●	●	●	●	●	●	★
ARTIFICIAL INTELLIGENCE		●	●	●	●	●	●	★
BIOTECHNOLOGY							★	
DIRECTED ENERGY WARFARE	●	★			★	●	●	
LOW OBSERVABLES		●	●	●	★	★	●	●
MICRO-ELECTRONICS/ PHOTONICS/ACOUSTIC DEVICES		●	●	●	●	●	●	★
NEUROSCIENCE							★	●
POWER GENERATION/ STORAGE/CONDITIONING	●	★	●		●		●	●
PROTECTION/LETHALITY	★	●	●	●	●	●	●	
ROBOTICS		●	●			●	★	
SPACE TECHNOLOGY			●	●		●	●	★
ADVANCED MATERIALS	★	●	●	●	●	●	●	★

Our resource-constrained modernization plans enable the planning and execution of Advanced Technology Transition Demonstrations (ATTDs) which speed the maturing of advanced technologies needed by next generation and future systems. The Army has 13 ATTDs which account for approximately one-half of the Army 6.3A budget.

ARMY TECHNOLOGY BASE STRATEGIC PLANNING INITIATIVE



ADVANCED TECHNOLOGY TRANSITION DEMONSTRATIONS (ATTDs)

CRITERIA

- RISK REDUCING "PROOF OF PRINCIPLE" DEMONSTRATIONS CONDUCTED IN AN OPERATIONAL ENVIRONMENT RATHER THAN A LABORATORY ENVIRONMENT
- POTENTIAL FOR ENHANCED MILITARY OPERATIONAL CAPABILITY OR COST EFFECTIVENESS
- DURATION OF THREE YEARS (TYPICALLY)
- A TRANSITION PLAN IN PLACE (APPLICATIONS AND WINDOWS)
- ACTIVE PARTICIPATION BY THE USER COMMUNITY (PROPONENT)
- PARTICIPATION BY THE DEVELOPER (SERVE AS PROJECT MANAGER)

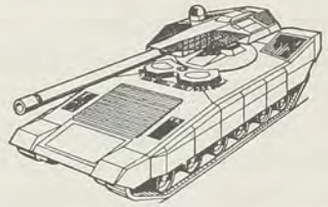
ARMORED SYSTEMS

The Armored Systems Modernization (ASM) program is an example of how the Army has focused its technology programs to meet its critical modernization needs. Two ATTDs are key to the success of the ASM program. The Component Advanced Technology Test Bed will demonstrate critical component technologies in time for Full Scale Development of the Block III tank. Technologies to be integrated and demonstrated on a surrogate M1 chassis include: Advanced Tank Cannon (ATAC) with autoloader, advanced propulsion, standard Army vetronics architecture, advanced sensors and advanced survivability techniques. The Common Chassis ATTD will, in a competitive environment, demonstrate technologies critical to achieving the required mobility for Block III tank, the Advanced Field Artillery System (AFAS), Combat Mobility Vehicle (CMV) and the Future Infantry Fighting Vehicle (FIFV). Competing advanced gun propulsion technologies for the AFAS will be demonstrated in FY91. Unicharge, liquid propulsion and electrothermal gun propulsion technologies promise increased range, increased rate of fire, improved survivability and reduced logistics burden.

BLOCK III ➡ ADVANCED TECHNOLOGY CONTRIBUTION

ADVANCED TECHNOLOGIES APPLIED

- ADVANCED TANK CANNON & AMMUNITION
- AUTOLOADER
- VHSIC FIRE CONTROL
- MODULAR ARMOR & COUNTERMEASURES
- ADVANCED PROPULSION SYSTEM
- HYDROPNEUMATIC IN-ARM SUSPENSION
- ADVANCED TRACK
- MULTIPLE TARGET ACQUISITION SYSTEM

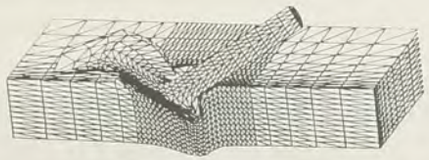


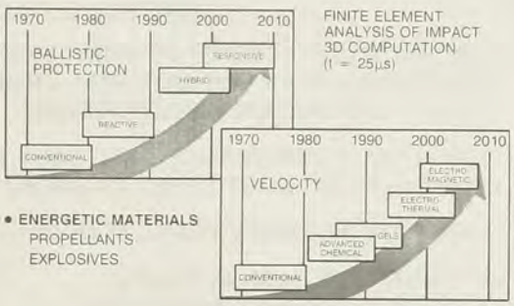
PROJECTED BLOCK III IMPROVEMENTS vs M1A1 ABRAMS TECHNOLOGY

- INCREASE IN THREAT ARMOR PENETRATION
- GREATER RATE OF FIRE
- IMPROVED, MODULAR ARMOR
- CREW SIZE REDUCED FROM 4 TO 3
- LESS PROPULSION SYSTEM VOLUME
- MORE SPROCKET HORSE POWER
- LESS BATTLEFIELD DAY FUEL REQUIRED
- REDUCTION IN TRACK & SUSPENSION WEIGHT
- LONGER TRACK LIFE

PROTECTION
LETHALITY

- **HIT AVOIDANCE**
  - SIGNATURE REDUCTION
  - COUNTER ENEMY TARGET ACQUISITION
- **HIGH PERFORMANCE ARMOR**
  - LIGHTWEIGHT/HI-STRENGTH MATERIALS
  - UNCONVENTIONAL ARMOR
- **DAMAGE TOLERANCE**
  - MULTI-HIT CAPABILITY
  - FAIL-SOFT DESIGN
- **KILL MECHANISMS**
  - BRILLIANT MUNITIONS
  - SMART MINES
  - LOITER WEAPONS
- **ADVANCED PROPULSION**
  - ELECTROTHERMAL
  - ELECTROMAGNETIC
- **HIGHLY MOBILE PLATFORMS**
  - ROBOTICS





FINITE ELEMENT ANALYSIS OF IMPACT 3D COMPUTATION ($t = 25\mu s$)

- **ENERGETIC MATERIALS**
  - PROPELLANTS
  - EXPLOSIVES

ARMOR/ANTI-ARMOR

Past technology base investments in the Armor/Anti-Armor (A3) area have led to proof-of-principal demonstration of the Advanced Tank Cannon (ATAC) which will permit our Block III tank to overmatch the threat. With the support of Congress, the Army has initiated an aggressive electrothermal/electromagnetic launch tank gun technology base program. While electrothermal tank gun propulsion offers projectile velocities beyond 2 kms per second, electromagnetic launch tank gun propulsion technology with the potential for projectile velocities as high as 4 kms per second is also being pursued. We are developing the supporting technologies which must be brought to fruition to make this a practical weapon system candidate; for example, power conditioning, projectile and terminal ballistics. In keeping with the Army's intent to pursue appropriate joint and cooperative programs with other military Services and agencies, the electric gun system program is being performed in cooperation wiht the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA), the Balanced Technology Initiative Office and the U.S. Navy. Electric gun technology offers not only leap-ahead lethality but also significant improvements in logistics and survivability. Technologies critical to ensuring our lethality and survivability superiority over threat armor systems are being pursued. To this end the Army/DARPA/USMC armor/anti-armor program has been successful in leveraging the creativity of American industry in addressing this vital area of our national defense.

AVIATION

Consistent with the Army Aviation Modernization Plan, our aviation technology base focuses on three areas vital to the United States' maintaining its world-wide pre-eminence in rotorcraft. In cooperation with NASA and DARPA the Rotorcraft Pilot's Associate (RPA) ATTD will yield the integrated, automated cockpit of the future by means of capitalizing on this nation's strength in microelectronics, artificial intelligence, computers, software, display technology and advanced sensors. This ATTD integrates and demonstrates advanced technologies for adverse weather pilotage, integrated weapons, aided target recognition, integrated/automated avionics, advanced sensors, and integrated aircraft survivability equipment. Major advancements in future warfighting capability, lethality, survivability, versatility and safety will result. The Army's small turbine engine portion of the tri-Service Integrated High Performance Turbine Engine Technology (IHPTET) Program will maintain our pre-eminence in this class of engine. Similar past investments in the Army Demonstrator Engine program have yielded the highy successful T-800 engine now in development for the LHX. Working with NASA and the USMC, we are pursuing critical technologies for Army air vehicles of the future with the objective of increased speed, agility, safety, survivability, deployability and versatility. The Army/NASA Crew Station Research and Development Facility at the NASA Ames Research Center, which has played such a beneficial role in developing the integrated cockpit for the LHX program, will be networked with SIMNET for the purpose of demonstrating how we can reduce the time from concept to development of future aviation systems by designing the Rotorcraft Pilot's Associate cockpit in the simulator and comparing competing technologies in simulated combat scenarios. This not only will assist in man-machine interface improvements, technology trade-offs and timely technology down-selects, it will also result in a more informed, concept based requirement for the integrated, automated cockpit of the future.

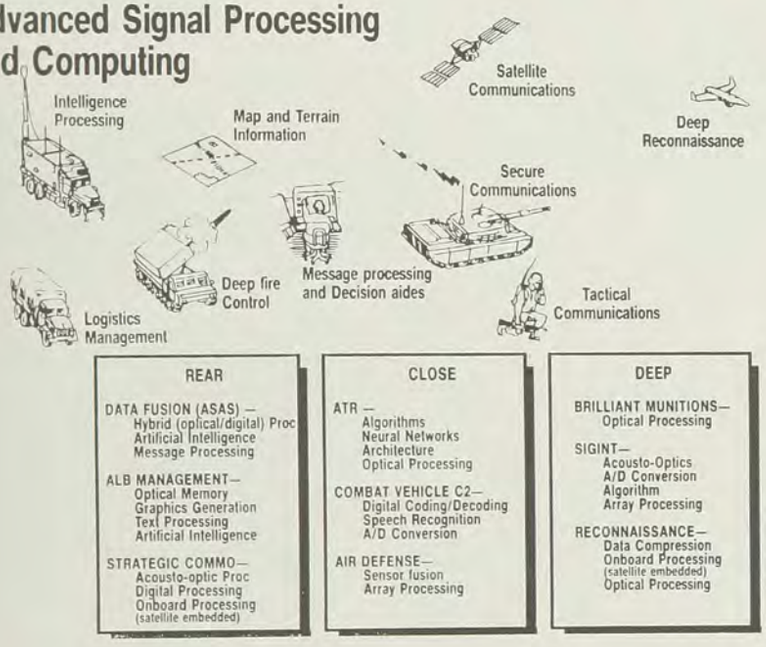
LIGHT FORCES

Our technology base supports technologies critical to the modernization of our light forces. Significant programs in this area include the Joint Service Small Arms Program, our revitalized Soldier R& D program, continuing biotechnology progress and the Soldier Integrated Protective Ensemble ATTD which is a major effort in the area of individual soldier integrated protection. The Soldier Integrated Protective Ensemble (SIPE) is designed to balance the full range of protection against multiple battlefield threats and hazards in a modular, head-to-toe, individual fighting system. SIPE concentrates on the soldier as a system; therefore, it addresses all items carried by the individual soldier including communications, weapon systems and target acquisition equipment. SIPE is estimated to show 30% savings in weight, exclusive of the microclimate cooling system, when compared to the total weight of the conventional clothing components. Airdrop equipment is being developed to deliver soldiers and supplies safely and efficiently into combat areas. Work on low altitude, fast delivery personnel and cargo parachutes will decrease the vulnerability of aircraft and paratroops, diminish landing zone dispersion, and increase resupply capability, particularly in scenarios such as the recent Operation Just Cause.

ADVANCED TECHNOLOGY FOR THE SOLDIER

- LIGHT-WEIGHT MATERIALS
- HIGH-STRENGTH POLYMERS
- FLASH PROTECTION
- LOW OBSERVABLES
- ADVANCED COMBAT RIFLE
- PORTABLE ANTITANK WEAPONS
- ELECTRO-OPTICS
- ENERGY DENSE BATTERIES
- MICROELECTRONIC COMMUNICATIONS
- GLOBAL POSITIONING SYSTEMS
- NEW RATIONS, e.g., MRE
- SURVIVABLE NBC CLOTHING
- IMPROVED FABRICS
- MICROCLIMATE COOLING
- AIR PURIFICATION
- MICROSENSOR DETECTION KIT
- MULTIPURPOSE CB DECON

Advanced Signal Processing and Computing

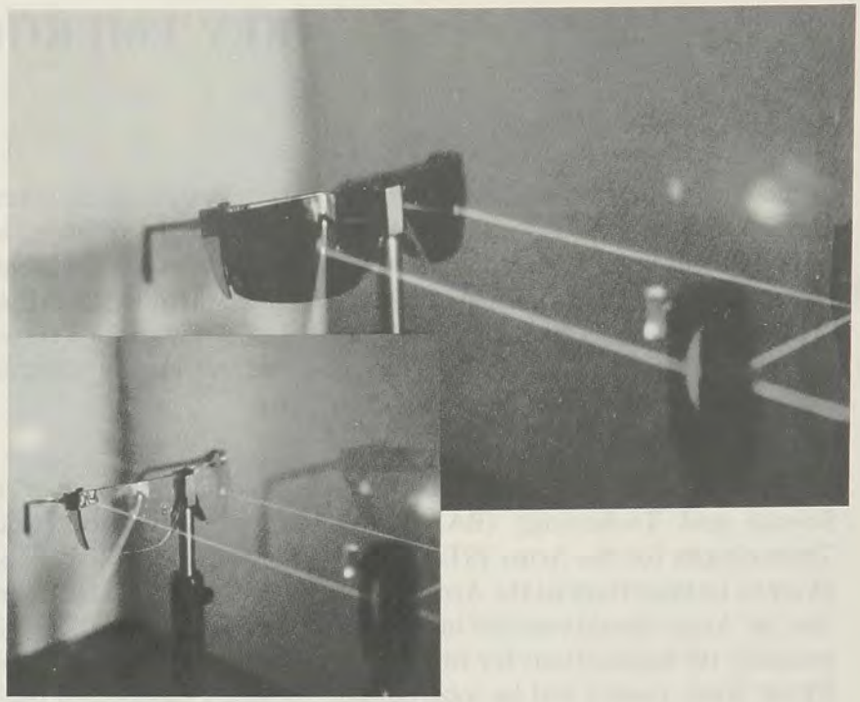


RSTA/C³I

Future reconnaissance, surveillance, target acquistion, command, control, communications & intelligence (RSTA/C³I) will benefit from advancements in advanced signal processing, sensors & computing technologies. Advanced sensors and seeker technologies are critical to future combat vehicles and smart weapons. With advanced signal and data processing, such technologies can automatically, or with minimal human assistance, identify targets of interest and, if necessary, guide appropriate countermeasures. This capability will allow soldiers to fight more efficiently, more effectively and at less personal risk on the quick tempo and lethal future battlefield. Technologies required to provide this capability include: radar and acoustic sensors; compact, high throughput signal and data processors; advanced software; and targeting algorithms. Specific programs include second generation focal plane arrays and advanced radars. Advanced signal processing involves the technologies for manipulating electronic signals to extract items of interest which would otherwise normally be lost in noise, interference, and jamming. The Army requires receivers that can intercept, identify, and locate future energy communication and radar transmitters in the presence of many other friendly and threat emitters.

DIRECTED ENERGY

With development of the laser and the ability to transmit intense microwave signals, electronic warfare has assumed a new dimension on the battlefield. Both lasers and microwave systems can be used as active sensors. At higher intensities they also can serve as anti-sensor or anti-electronic circuit countermeasures. The Army not only is improving its existing sensor systems concepts, but is developing the basic components for a new generation of laser and microwave sensor countermeasures. Concurrently, work is underway to reduce system and soldier vulnerabilities to such attack. The Army supports and is a major player in the National Directed Energy Program. This is an inter-service, inter-agency program. Research includes susceptibility and effects, hardening, microwave sources, components and systems concepts.



ROBOTICS

Robotics is the technology of autonomously functioning systems, which sense the outside world, respond through a set of rules or artificial intelligence, and control an actuator to achieve a desired purpose. Robots can replace humans in many applications, providing a combat multiplier or reducing the risk of casualties. Some examples include robotic material handlers for logistics and advanced autoloaders for tanks or artillery. Robotic weapon systems will permit one soldier to do the job of many, and in some instances may eliminate the need for personnel. Robotic manufacturing will reduce the procurement cost of Army systems.

KEY EMERGING TECHNOLOGIES

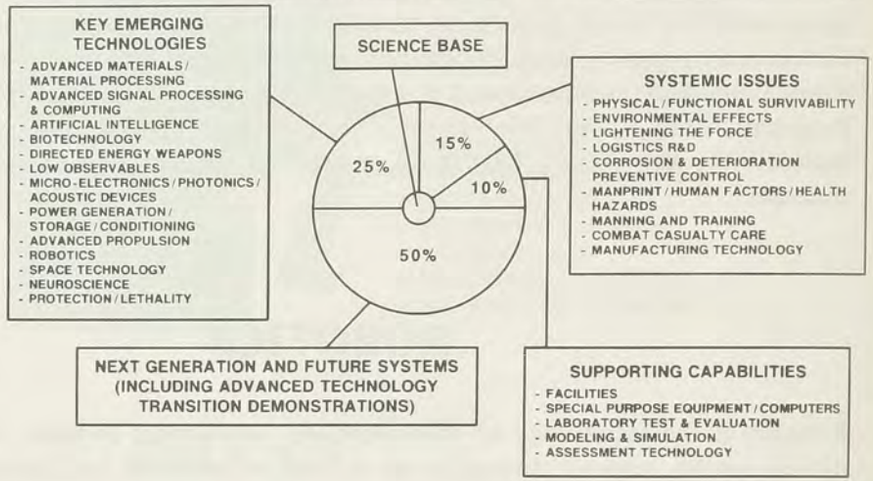
The Army Technology Base Investment Strategy devotes 25 percent of the Army technology base funding to 13 key emerging technologies offering the highest return on investment in terms of major improvements in the Army's warfighting capability. These are technologies considered most essential to provide Leap Ahead Technologies to ensure the long-term qualitative superiority of Army weapon systems. The Army's Key Emerging Technologies support the Congressionally directed DoD Critical Technologies Plan.

At the request of the Army, the National Academy of Sciences' Board on Army Science and Technology (BAST) has initiated a two-year study of Strategic Technologies for the Army (STAR) to: (1) identify the advanced technologies most likely to be important to the Army in the 21st century; (2) offer technology strategies that the Army should consider in developing their full potential; and (3) project, where possible, the implications for force structure modernization and strategy. The BAST STAR study results will be incorporated in future editions of the ATBMP.

The Army is committed to a strong and focused technology base to provide the bridge to our trained and ready Army of the future. Our technology base investment strategy is aimed at achieving critical warfighting capabilities and avoiding technological surprise.

Recent rapidly changing world events, increased third world military capability, and our national strategy require a modern, ready land force for deterrence and defense. The resultant increased uncertainty and risk associated with this and other global events, such as expanding foreign economic and technological changes, demand more than ever a strong technology base.

TECHNOLOGY BASE RESOURCE DISTRIBUTION

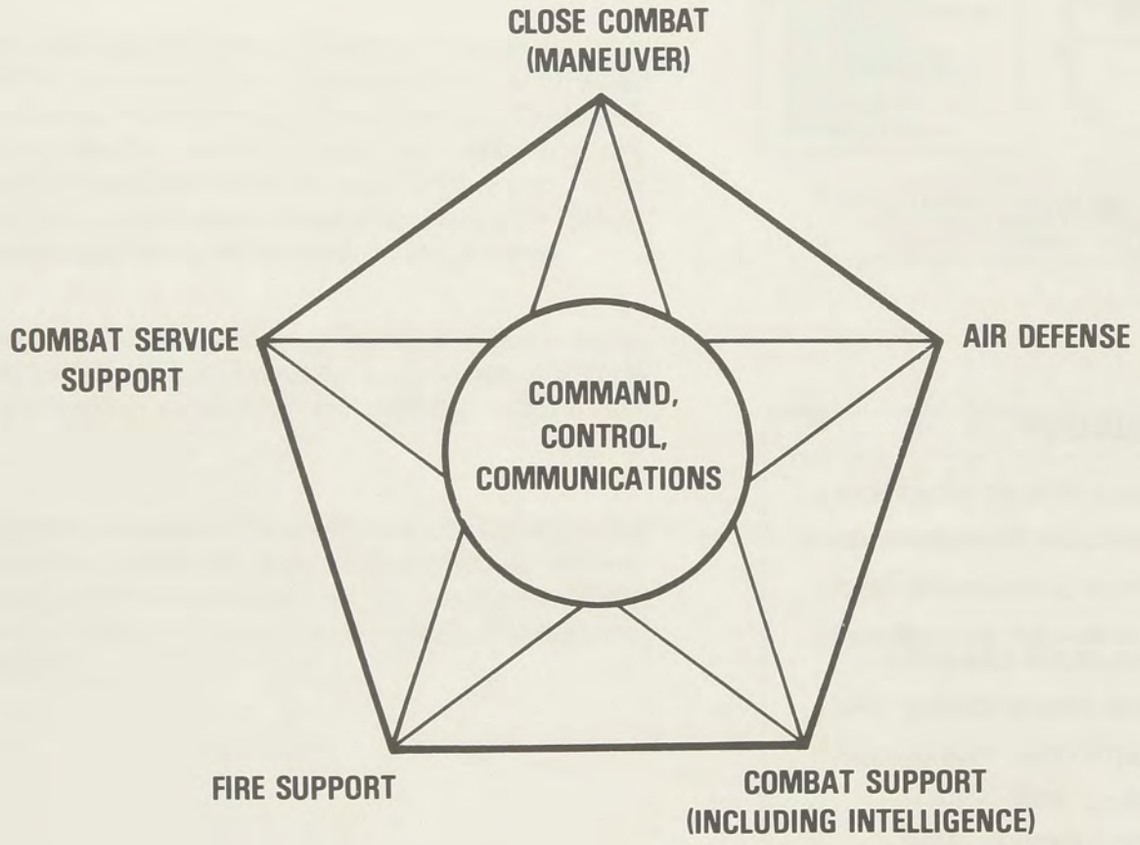


TECHNOLOGY BASE

- TECHNOLOGY TO DETER & DEFEAT
- KEY EMERGING TECHNOLOGIES FOR TECHNOLOGY SUPERIORITY
- AVOID TECHNOLOGICAL SURPRISE
- MODERNIZATION FOR A MORE LETHAL, DEPLOYABLE, VERSATILE & SUSTAINABLE FUTURE ARMY
- ARMY TECHNOLOGY BASE MASTER PLAN IS OUR ROADMAP
- REVOLUTIONARY WARFIGHTING CAPABILITIES:
  - ELECTRIC GUNS
  - AUTOMATIC TARGET RECOGNITION
  - SMART WEAPONS
  - SIGNATURE CONTROL
  - DEEP ATTACK
  - AIRLAND BATTLE MANAGEMENT

OUR BRIDGE TO THE FUTURE ARMY

The weapon systems described on the following pages are categorized by mission areas beginning with close combat. A brief explanation of the vital contribution of each mission area begins each section. It must be emphasized that these mission areas—the weapon systems and soldiers who operate them—work inextricably together on the battlefield. That is the essence of the combined arms concept and the belief that a small quality Army, working in a fully synchronized manner, will be able to hold its own against one with superior numbers. For this reason, our Research, Development and Acquisition planning is linked early and continuously with doctrine, training and force structure requirements to permit a coordinated advance across all these mission areas. In short, we strive for a balanced Army. There must be no weak links in the equipment we provide our soldiers. The logo below indicates how mission area teamwork and a balanced equipment posture is crucial to victory on the battlefield.



CLOSE COMBAT

The Close Combat mission area relates to the application of direct combat power. As the term indicates, close combat involves two adversaries standing eyeball to eyeball, with man pitted against man, weapon against weapon. This mission area includes such items as tanks, fighting vehicle systems, direct line-of-sight weapons, and short-range mortars that are used by the infantryman.

Abrams Tank

MISSION:

The Abrams tank is the Army's primary ground combat weapon system for closing with and destroying enemy forces using mobility, firepower, and shock action. Its special armor, compartmentalization of fuel and ammunition stowage, automatic fire detection and suppression system, and high agility and mobility provide the crew with the greatest possible levels of protection on the modern battlefield—protection levels which exceed those of any other tank. The M1A1 Abrams added a 120mm smoothbore cannon and a Nuclear, Biological, Chemical (NBC) microclimatic cooling system to the already proven combination of thermal sight, laser rangefinder, and full stabilization to provide a combat vehicle capable of operating under all climate and light conditions, as well as in an active chemical environment. The 1500-horsepower turbine engine and improved suspension provide the consistently superior handling and maneuverability that allow the tank to traverse the battlefield quickly, thus decreasing its exposure to threat direct and indirect fire weapons. Crew survivability, enhanced lethality, and superior mobility combine to produce the most combat effective tank the Army has ever fielded. The Abrams Block II is in Full Scale Development today and will provide enhanced survivability, improved target acquisition and fire control equipment, and improved reliability to the Abrams tank fleet when it enters production in 1992 as the M1A2.

CHARACTERISTICS:

Length:	387 inches	Secondary Armament:	One .50 cal machinegun
Width:	144 inches		Two 7.62mm machineguns
Height:	96 inches	Power Train:	1500 hp gas turbine
Weight:	67 tons (Combat loaded)		engine w/4 speed
Top Speed:	41.5 mph		automatic transmission
Crew:	4	Fire Control:	Thermal Imaging Sight;
Main Gun:	120 mm		Laser Rangefinder

SOVIET COUNTERPART:

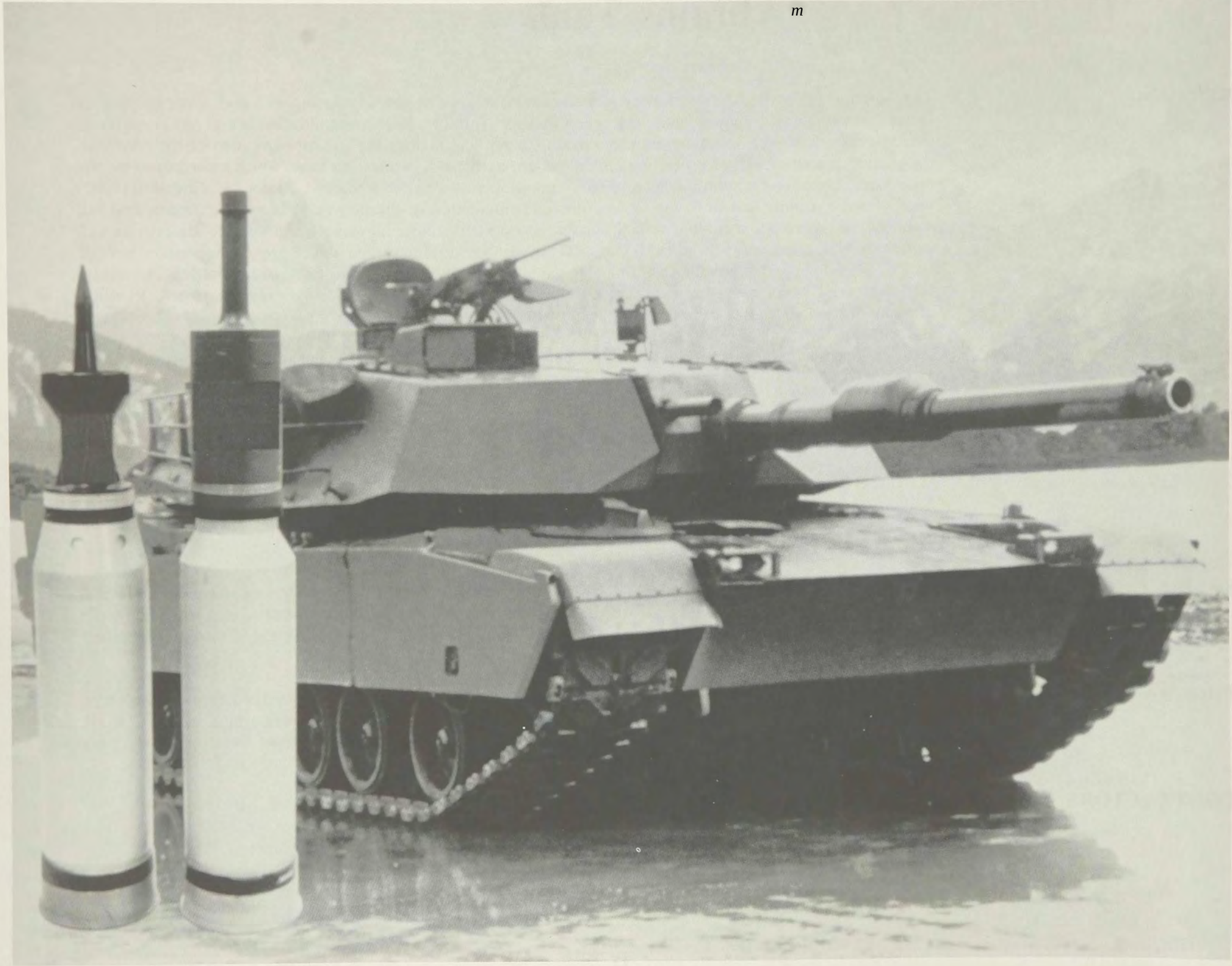
Over the past decade the Soviets have conducted an intensive armor modernization effort and have fielded several thousand T-64's and T-72's with enhanced armor protection and firepower. In addition, they are fielding the T64B, T-80, and FST I tanks which are capable of launching Anti-Tank Guided Missiles (ATGM) through their main gun tubes.

PROGRAM STATUS:

The Abrams tank is presently in its tenth year of production. Over 6000 tanks are in the field as of the beginning of 1990. By the end of FY91 all U.S. armor units in Europe, Korea and active component armor units in CONUS will be equipped with the M1A1 or M1. Reserve Component Roundout and non-Roundout units are also receiving the Abrams tank. Abrams Block II (M1A2) will enter production in 1992.

CONTRACTORS:

General Dynamics, Land Systems Div. (Sterling Heights, MI)
GMC, Allison Transmission Div.(Indianapolis, IN)
Hughes Aircraft Corp. (Culver City, CA)
Textron Lycoming (Stratford, CT)
Garrett AiResearch (Torrance, CA)
Cadillac Gage (Detroit, MI)
Honeywell Inc. (Hopkins, MN)
Kollmorgen (Northhampton, MA)
Singer-Kearfott (Little Falls, NJ)
Computing Devices of Canada (Nepean, Ontario)



120mm Tank Main Gun Ammunition

MISSION:

The 120mm family of tank ammunition supports the main gun on the M1A1 tank and is fired from the smoothbore M256 cannon. The 120mm munitions are comprised of four cartridges - a kinetic energy Armor Piercing Fin Stabilized Discarding Sabot-Tracer (APFSDS-T) round, a chemical energy High Explosive Anti-Tank (HEAT) round and training counterparts for each. This development program represents a successful effort to transfer the Leopard II cannon and munitions technology. The fielding of the 120mm tank weapons system complements the current fleet of 105mm tanks and provides a significant increase in the Army's armor combat capability.

CHARACTERISTICS:

M829/A1 - Armor Piercing Fin Stabilized Discarding Sabot with Tracer (APFSDS-T) - Combustible cartridge case; one piece depleted uranium penetrator; discarding aluminum sabot.

M830 - High Explosive Anti-Tank Multi-Purpose with Tracer (HEAT-MP-T) - Combustible cartridge case; multi-action fuzing; shaped charge warhead.

M865 - Target Practice Cone Stabilized Discarding Sabot with Tracer (TPCSDS-T) - Combustible cartridge case; limited range; training counterpart for APFSDS-T.

M831 - Target Practice with Tracer (TP-T) - Combustible cartridge case; inert warhead; training counterpart for HEAT-MP-T.

SOVIET COUNTERPART:

The Soviet armor forces have available armor piercing fin stabilized, high explosive antitank, and high explosive fragmentation munitions.

PROGRAM STATUS:

Production has been scheduled to meet fielding requirements and support various testing programs. The two service rounds are being shipped in metal cans. Honeywell Inc. (Minneapolis, MN) was the sole source systems contractor for the first three years (FY 84-FY 86) production. General Defense Corporation (Red Lion, PA) was the winner of a second source competition with General Electric (Burlington, VT). For FY87, General Defense had approximately 20% of the production quantity; Honeywell had the balance. Since FY88, Honeywell and General Defense have competed head-to-head. During FY89, Olin Ordnance (St. Petersburg, FL) bought General Defense Corporation and assumed all GDC 120mm tank ammunition contracts.

CONTRACTORS:

Honeywell, Inc. (Minnetonka, MN)
Olin Ordnance (St. Petersburg, FL)
Aerojet Ordnance (Jonesboro, TN)
Mason and Hanger (Middletown, IA)
NI Industries, Inc. (Concord, MA)
Valentec Int'l. (Costa Mesa, CA)
ARMTEC Defense Products (Coachella, CA)
Bulova Systems (Valley Stream, NY)
Hercules Inc. (Radford, VA)
Nuclear Metals, Inc. (Concord, MA)
Chamberlain Mfg. Corp. (Waterloo, IA)
Hamilton Technology, Inc. (Lancaster, PA)

Bradley Fighting Vehicle Systems (BFVS)

MISSION:

The Bradley Fighting Vehicles provide the mechanized infantry with a full-tracked, lightly armored fighting vehicle, and scout and armored cavalry units a vehicle for their screening, reconnaissance, and security missions. Both the M2 Infantry Fighting Vehicle (IFV) and M3 Cavalry Fighting Vehicle (CFV) have a two-man turret which mounts the 25mm automatic stabilized cannon, its primary armament, supported by the TOW antitank guided missile system, and the 7.62mm coaxial machinegun. The M2 and M2A1 IFVs have, in addition, six 5.56mm firing port weapons positioned along the side and rear of the vehicle. The M2A2 IFV has only two firing port weapons positioned at the rear. The overall mobility of the vehicle is comparable to that of the M1 tank. The IFV carries a three-man crew (commander, gunner, and driver) and six infantrymen. The CFV carries a three-man crew (commander, gunner, and driver) and two scouts.

CHARACTERISTICS:

Weight:	60,000 lbs (M2/M3A2 w/o Reactive Armor)	Crew:	3
		Power Train:	600 hp Diesel
Length:	21.5 ft	Cruising Range:	300 miles
Height:	9.75 ft	Road Speed:	38 mph
Width:	10.5 ft	Swim Speed:	4.4 mph
Main Armament:	25mm Cannon		
Secondary Armament:	TOW, 7.62mm Coaxial MG, Firing port weapons (IFV only)		

SOVIET COUNTERPART:

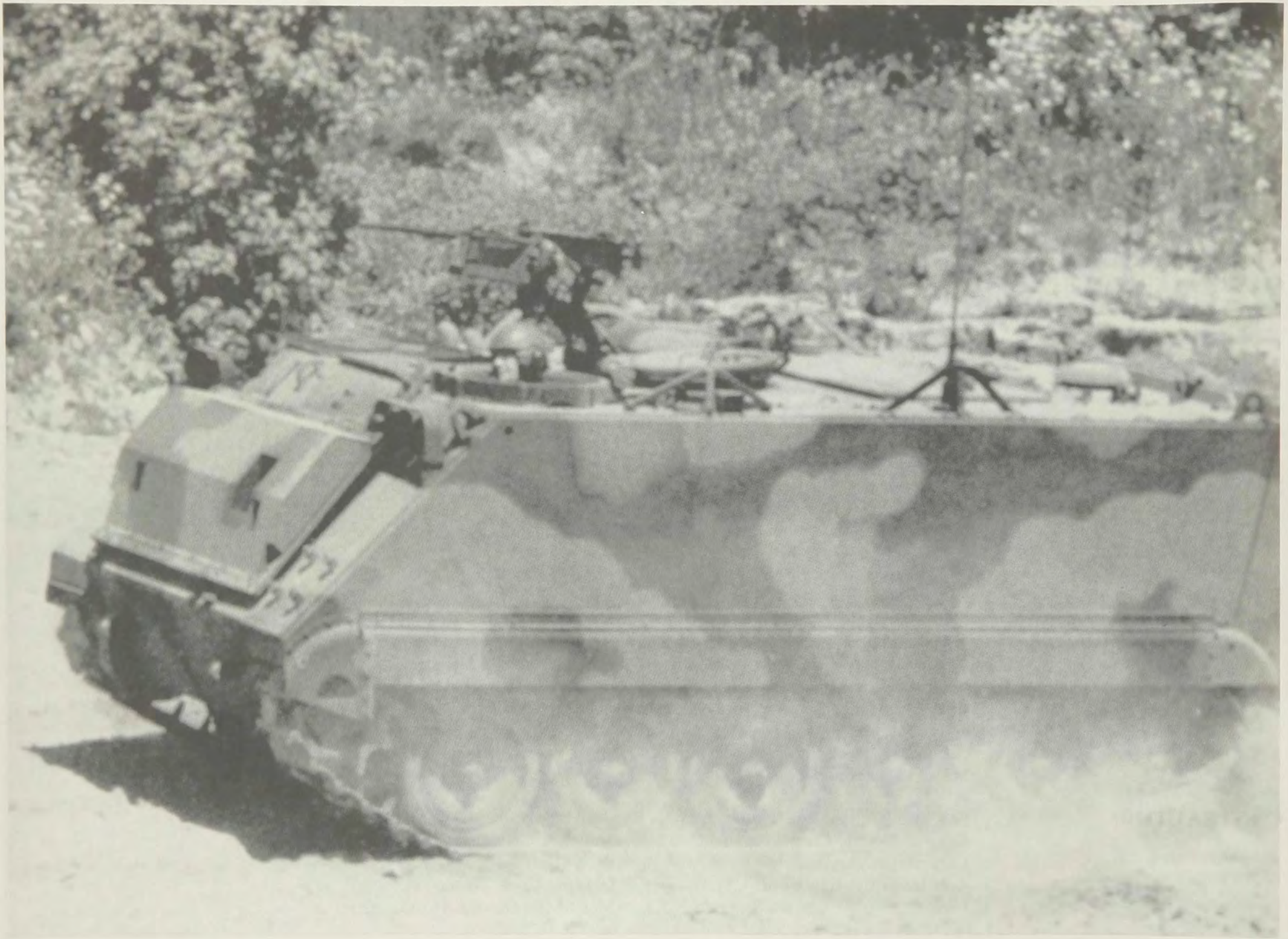
The Soviet BMP has been in the field in quantity for well over a decade and was considered the world's best fielded infantry fighting vehicle. It mounts a 73mm smoothbore cannon, an AT3, AT5, or AT6 antitank guided missile, and permits the infantry squad to fire from the inside. A variant with a 30mm gun, the BMP-2, which fires the AT4 or AT5, is also being widely fielded.

PROGRAM STATUS:

Bradley production has built up to a rate in excess of 50 vehicles per month and vehicle fielding is proceeding smoothly. To date 44 battalion sized units, including five ARNG battalions, have fielded the Bradley. A major modification, which incorporates the more lethal TOW 2 missile system into the vehicles, is in production and began fielding in 1987. These modified vehicles have been designated M2A1 and M3A1 Bradleys. A decision that incorporates increased survivability enhancements was approved during 1987. These enhancements include: spall liners in the troop compartments, enhanced applique armor, revised internal restowage of fuel and ammunition and provisions for reactive armor. These modifications are being retrofitted into the M2A1 and M3A1 Bradleys currently fielded. Bradleys with the increased survivability enhancements have been designated as M2A2 and M3A2 vehicles and began production in May 1988.

CONTRACTOR:

FMC Corp. (San Jose, CA)	Ford Aerospace (Newport Beach, CA)
General Electric Corp. (Pittsfield, MA)	Honeywell(Minneapolis, MN)
Cummins (Columbus, IN)	RCA (Burlington, MA)
Colt Industries (Hartford, CT)	Chrysler Corp. (Huntsville, AL)
Hughes Aircraft Co. (El Segundo, CA)	McDonnell Douglas (Mesa, AZ)



M113A3 Armored Personnel Carrier

MISSION:

The M113A3 is a product improved, aluminum armored, full-tracked personnel carrier designed to transport troops, equipment, and cargo during combat operations. The A3 configuration adds spall suppression liners, armored external fuel tanks, an upgraded engine and transmission to accommodate the added weight, and fixing points for bolt-on armor. It operates in numerous roles including: Infantry and Engineer Squad Carrier, MED-EVAC Carrier, Maintenance Support Vehicle, and other roles. Because of its mobility, firepower, and armor protection limitations, it cannot fulfill the role of a fighting vehicle and is being replaced in squad carrier and scout vehicle roles of high priority mechanized infantry and cavalry units by the Bradley Fighting Vehicles.

CHARACTERISTICS:

Weight:	27,200 lbs
Armament:	50 Cal. Machinegun
Armor:	Aluminum
Horsepower:	275
Road Speed:	42 mph
Troop Capacity:	13
Cross-Country:	20 mph

SOVIET COUNTERPART:

The Soviet wheeled BTR-60, BTR-70, and new BTR-80 series amphibious armored personnel carriers are roughly equivalent in function to the M113. The MTLB amphibious, multipurpose, tracked carrier is used to carry infantry and as a prime mover for towed artillery and antitank guns.

PROGRAM STATUS:

Deliveries of the new M113A3 production began 4th quarter FY86. A modification program is ongoing to implement the Congressionally directed survivability improvement upgrades to the existing M113A2s. These vehicles will be redesignated the M113A3.

CONTRACTORS:

FMC Corp. (San Jose, CA)
GMC, Detroit Diesel Allison (Detroit, MI)
GMC, Detroit Diesel Allison (Indianapolis, IN)

AH-64A Apache

MISSION:

The Apache is a quick-reacting, airborne antitank weapon. Terrain limitations and the unfavorable balance in NATO/Warsaw Pact armor dictate the need for a system that can deploy quickly to the heaviest enemy penetration and destroy, disrupt, or delay the attack long enough for friendly ground maneuver units to reach the scene. The Apache is designed to fight worldwide and survive. It is equipped with a Target Acquisition Designation Sight and Pilot Night Vision Sensor (TADS/PNVS) which permit its two-man crew to navigate and attack in darkness and in adverse weather conditions. Although the principal mission of the Apache is the destruction of enemy armor with the Hellfire missile, it is also capable of employing a 30mm chain gun and Hydra 70 rockets that are lethal against a wide variety of targets. The Apache has a full range of aircraft survivability equipment and the ability to withstand hits from rounds up to 23mm caliber in critical areas. The Apache is the Army's primary attack helicopter.

CHARACTERISTICS:

Mission Gross Weight:	14, 445 lbs
Cruise Speed:	145 knots
Crew:	2
Armament:	Hellfire Missiles, Hydra 70 rockets and 30mm chain gun

SOVIET COUNTERPART:

The Soviets have deployed significant numbers of HIND attack helicopters. This helicopter is capable of delivering antitank guided missiles, anti-aircraft missiles, unguided rockets, Gatling gun fire, (cannon fire on some) and bombs. While the HIND is faster than the Apache, it is considered less maneuverable, probably more vulnerable, and less capable of accurate antiarmor fire in darkness and adverse weather. The Soviets are also well on the way in the development of their own version of the Apache, the MI-28 Havoc. There are three known protypes. This helicopter looks very much like the Apache and is expected to operate in similar fashion. It is expected to be armored; armed with a cannon and to be able to carry various bombs, rockets, and some version of an air-to-air missile. Its primary role will be ground attack with a secondary role of air-to-air. It is expected to reach Initial Operational Capability (IOC) in the near future. The Soviets are also developing the HOKUM attack helicopter which is assessed to be highly maneuverable with a primary role of air-to-air against other helicopters and slow moving fixed-wing aircraft. The West has no counterpart to this helicopter. Its IOC is also expected in the near future.

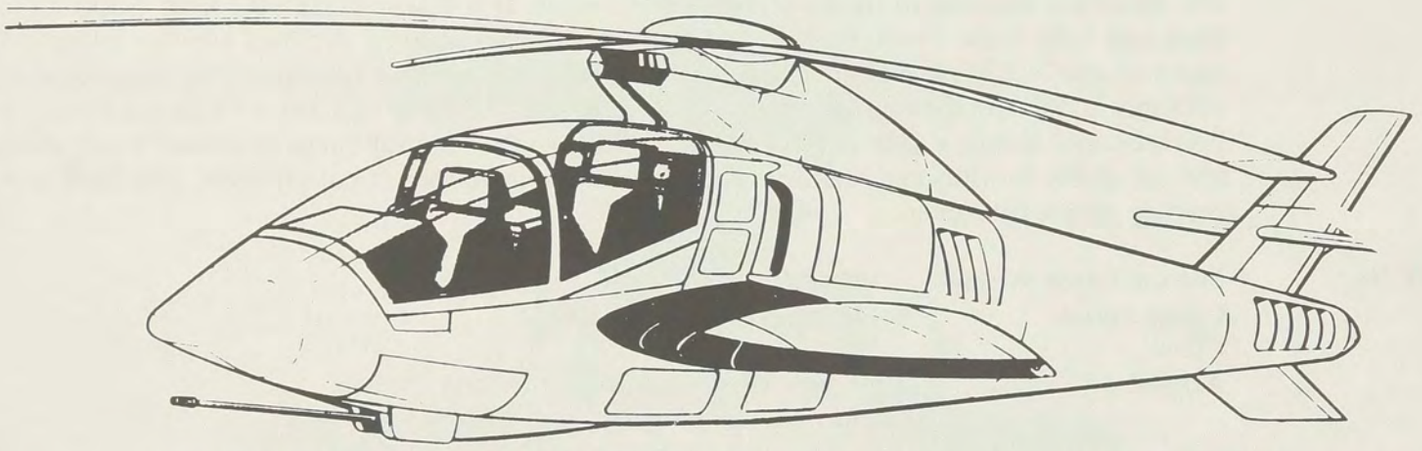
PROGRAM STATUS:

There have been 534 Apaches delivered to the Army as of Dec 89. The current total program procures 807 Apaches. The Apache began deployment in FY86. There are 18 Attack Battalions deployed and ready for combat.

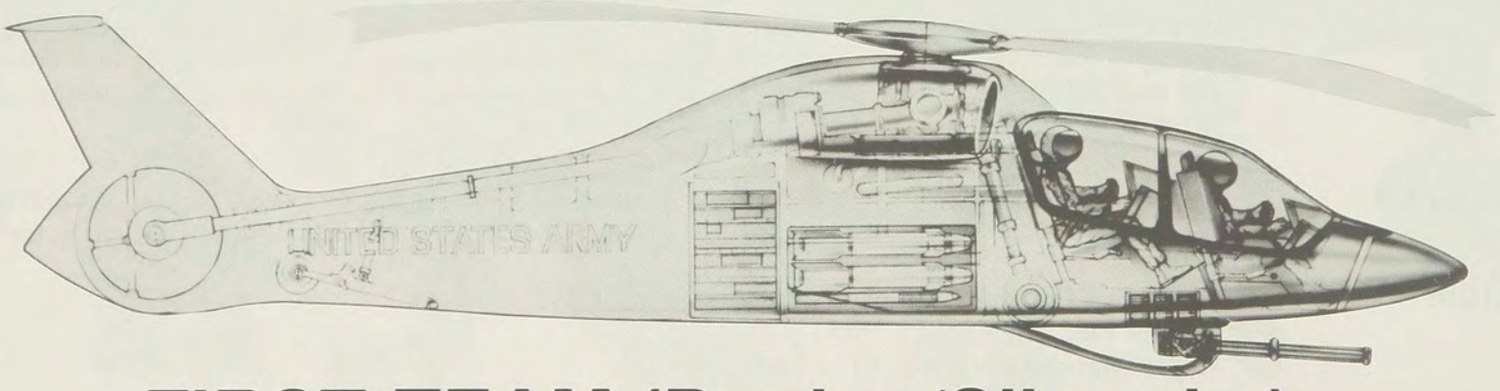
CONTRACTORS:

McDonnell Douglas Helicopters (Mesa, AZ)
General Electric (W. Lynn, MA)
Martin Marietta (Orlando, FL)

L H X



SUPERTEAM (McDonnell/Bell)



FIRST TEAM (Boeing/Sikorsky)

LHX (Light Helicopter)

MISSION:

The Light Helicopter (LHX) is the Army's next generation rotorcraft which will replace the aging unarmed scouts and AH-1 attack helicopters. This aircraft in the Army's air cavalry and attack organizations will significantly expand the Army's capability to conduct tactical operations in all types of terrain, adverse weather and battlefield environments, during day/night operations with increased survivability. The LHX with its increased speed, survivability, air-to-air capability and mission equipment will enhance the combat operations of supported forces. The LHX supports forward deployed and contingency forces by conducting both close and deep operations with improved lethality and survivability. The force agility will be significantly improved with LHX. Its 1260 NM self-deployment range and smaller size, compared to the AH-64, will improve Army aviation's rapid strategic deployment. One helicopter, the LHX, will be able to perform the missions currently being performed by three types of helicopters (AH-1, OH-58 and OH-6) better with greater operational and support efficiency.

CHARACTERISTICS:

Weight:	7,500 lbs (combat empty weight)
Speed:	170 knots (cruise)
Endurance:	2.5 hours (+.5 hour reserve)
Crew:	Two pilots (single pilot operable)
Mission Equipment Package:	Air-to-ground and air to air missiles, provisions for additional stores and a turret mounted cannon, night vision pilotage system, helmet mounted display, electro-optical target acquisition and designation system, aided target recognition, and integrated displays

SOVIET COUNTERPART:

Current Soviet HIND series helicopters and developmental HOKUM and HAVOC series helicopters present the air-to-air threat.

PROGRAM STATUS:

LHX was approved in June 1988 for entry into its Demonstration/Validation phase of development. The LHX Full Scale Development Milestone II decision is scheduled for December 1990. LHX will be fielded in December 1996. The T800 engine, currently in Full Scale Development, completed Preliminary Flight Rating Testing in 1989, with engine qualification testing currently underway.

CONTRACTORS:

LHX Demonstration/Validation competitive contractor teams are Boeing/Sikorsky and McDonnell Douglas/Bell. T800 contractor team for Full Scale Development continuation is Garrett/Allison (LHTEC).

OH-58 - KIOWA WARRIOR

MISSION:

OH-58D KIOWA WARRIOR is the Army's first true scout helicopter. It provides a solution to the need for the combined arms team to fight and defeat the threat during day or night operations, in adverse weather and in high temperature/high altitude conditions. The aircraft system incorporates a new drive train consisting of a four-bladed rotor, 650 HP engine and compatible transmission and tail rotor systems. The Mission Equipment Package incorporated in the OH-58D consists of a Mast Mounted Sight which provides day and night target acquisition sensors and laser rangefinder designator located above the rotor to maximize aircraft survivability. A highly accurate navigation system permits precise target location information which can be handed off to other aircraft or artillery elements via the airborne target handover system. The laser designator enables OH-58D to provide designation for laser guided weapons to include Hellfire and other precision munitions. The OH-58D will operate in air cavalry units. Beginning with production deliveries in FY91, aircraft will be equipped with Air-to-Air Stinger (ATAS). Using ATAS, the OH-58D can provide security against threat aircraft. An armed retrofit program begins in FY91 which will retrofit the remaining aircraft with ATAS, arm all 243 OH-58Ds with Air-to-Air Ground weapons and incorporate other improvements.

CHARACTERISTICS:

Max Gross Weight:	4,500 lbs
Speed:	118 KTAS
Crew:	2

SOVIET COUNTERPART:

None specifically, but the Soviets have various helicopters used in an artillery spotting and reconnaissance role, such as HINDs, HIPs, and Hoplites.

PROGRAM STATUS:

Kiowa Warrior is in the sixth year of production. There have been 144 aircraft fielded through December 1989. Aircraft are currently deployed to the training base at Ft Rucker and Ft Eustis and to operational units in CONUS, USAREUR, and Korea. Production is currently capped at 243. Deliveries will end in June 1992.

CONTRACTORS:

Bell Helicopter Textron, Inc. (Ft. Worth, TX)
McDonnell Douglas Electronics Systems Co (Monrovia, CA)
Northrop Corp. (Anaheim, CA)
Honeywell Inc. (Defense Avionic System Division) (Albuquerque, NM)
Litton Laser Systems (Orlando, FL)
Allison Gas Turbine Division (General Motors Co) (Indianapolis, IN)

U.S. ARMY
U.S. ARMY

Hellfire Modular Missile System

MISSION:

Hellfire is a third-generation airborne antiarmor weapon. It is presently employed for use as the main armament of the Apache helicopter. Hellfire homes on a laser spot that can be projected from ground observers, other aircraft and the launching aircraft itself. This enables the Apache-64 to launch its missiles indirectly, in some situations, without seeing its target. The Apache AH-64 can carry up to 16 Hellfire missiles.

CHARACTERISTICS:

Diameter	7
Weight:	99.8 lbs
Guidance	Laser semi-active

SOVIET COUNTERPART

The Soviets have a wide variety of wire, radio, and laser homing antiarmor missiles of varying accuracy and lethality. No accurate comparision is yet possible between Hellfire and Soviet laser homing antitank weapons.

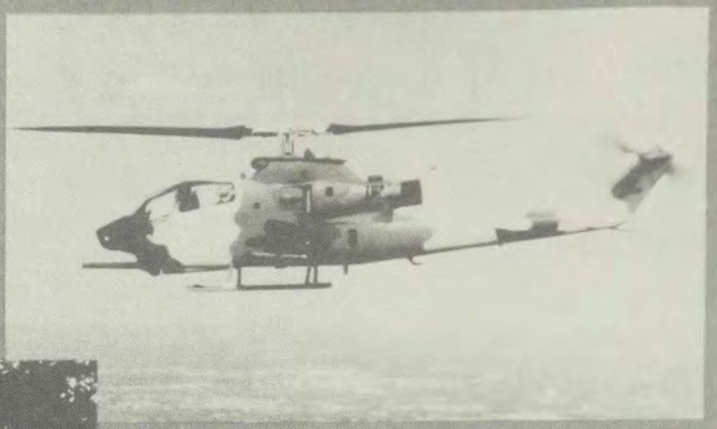
PROGRAM STATUS:

Hellfire is in full production and was fielded with Apache in 1986. There is an aggressive product improvement program ongoing to enhance the missiles lethality against applique (Reactive) armor. A program to harden the seeker against countermeasures will begin in FY90. These missile improvements will ensure the Hellfire system's effectiveness into the 2000's.

CONTRACTORS:

Rockwell International Corporation (Duluth, GA)
Martin Marietta (Orlando, FL)

BRADLEY



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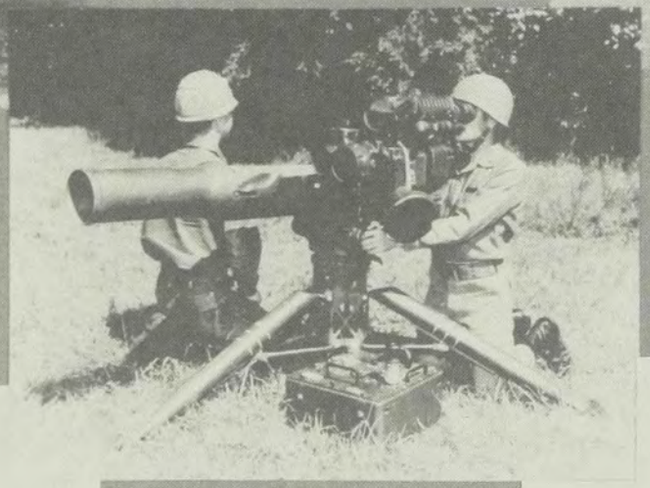
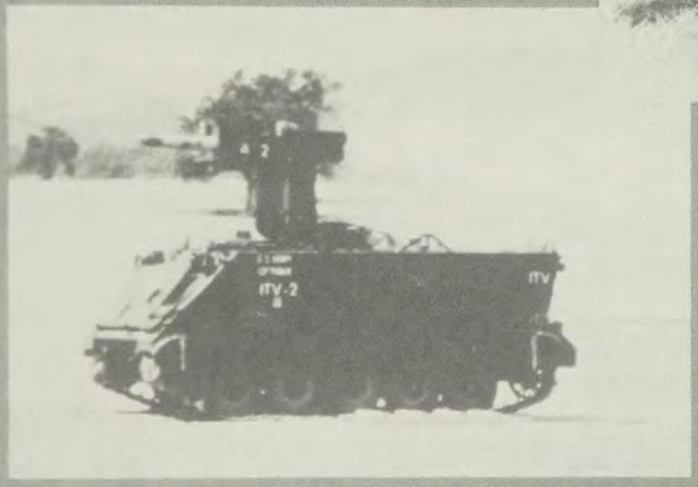


GROUND TOW



IMPROVED TOW VEHICLE

HMMWV

TOW Missile System

MISSION:

The TOW (Tube-Launched, Optically Tracked, Wire Command-Link Guided) missile is the most powerful antitank weapon used by the infantry. It is found at battalion level in ground units and is also mounted on the Bradley Fighting Vehicle, Improved TOW Vehicle, the High Mobility Multipurpose Wheeled Vehicle (HMMWV) and on the AH-1S Cobra Helicopter. When the missile is fired, a sensor in the launcher tracks a beacon in the tail of the missile. The gunner need only keep his crosshairs on the target. A computer in the launcher corrects any deviation of the missile from the crosshair aim point and sends corrections to the missile via two extremely thin wires that deploy in flight.

CHARACTERISTICS:

Weight (Ground Launcher):	246 lbs
Weight (Missile-cased):	62.4 lbs
Range:	3750 meters
Crew:	3

SOVIET COUNTERPART:

The Soviets have fielded a family of semiautomatic, command to line of sight, anti-tank guided missiles similar to the TOW. The AT-4/SPIGOT is a crew served system with a maximum range of 2000 meters. AT-5/SPANDREL is the vehicular mounted version with a larger missile and a maximum range of 4000 meters. AT6/SPIRAL is the heliborne ATGM mounted on the HIND-E and has a range of 5000 meters.

PROGRAM STATUS:

Basic TOW has been in the inventory since 1970. A TOW Thermal Night Sight, an improved warhead-ITOW, and the TOW 2 missiles and modification kits to convert Basic launchers to the TOW 2 configuration have been fielded in USAREUR, EUSA, WESTCOM, FORSCOM, and SOUTHCOM. Fielding to National Guard and Army Reserve Units continues. TOW 2 Initial Operational Capability was met in October 1983 in Europe. The TOW 2A missile, developed to counter Soviet reactive armor, began fielding in Europe in September 1987. There is an aggressive product improvement program, including the TOW 2B and alternate TOW 2B warhead development efforts and the TOW Sight Improvement Program (TSIP) that will significantly enhance the current systems capabilities and ensure the TOW weapon system effectiveness into the 1990's.

CONTRACTOR:

Hughes Aircraft Company, Tucson, Arizona is currently the prime contractor for the TOW missile.

Advanced Antitank Weapon System—Medium (AAWS-M)

MISSION:

The Advanced Antitank Weapon System-Medium (AAWS-M) is a one-man portable fire and forget weapon employed at the infantry platoon level to defeat the current and projected Soviet armor threat. The AAWS-M was developed to replace the Dragon while addressing its deficiencies. These deficiencies include lethality, range, gunner vulnerability, launch signature and time of flight. The systems long wave imaging infrared acquisition and guidance technology will be capable of operating in day, night, smoke and other battlefield obscurants, as well as in a countermeasures environment.

CHARACTERISTICS:

Weight:	less than 45 lbs
Range:	greater than 1500 meters
Crew:	1
Lethality:	Capable of defeating advanced Soviet armor.

SOVIET COUNTERPART:

The Soviets have fielded a shoulder fired antitank guided missile, AT-7, which is comparable to the Dragon and is their current medium, one-man portable antitank system.

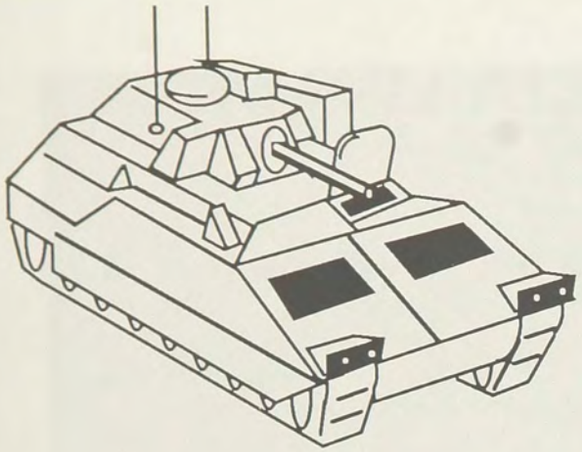
PROGRAM STATUS:

Firm Fixed Price (FFP) contracts for the Proof of Principle (POP) phase awarded in August 1986. The POP phase flight test program was completed 30 November 1988. An RFP for Full Scale Development FSD and Low Rate Initial Production was released to industry in September 1988. The three year cost plus incentive fee contract with firm price incentive options for the first two years of low rate initial production was awarded on 21 June 89.

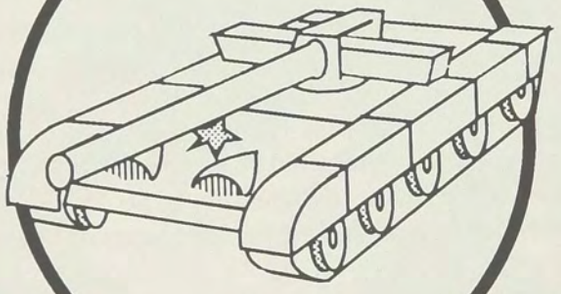
CONTRACTORS:

Joint Venture FSD Contractors

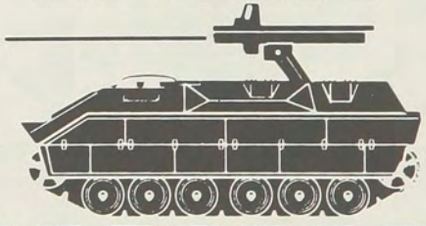
Texas Instruments, Dallas, TX and Martin Marietta, Orlando FL.



AMS-H



LOSAT



ADVANCED ANTITANK WEAPON SYSTEMS - HEAVY (AAWS-H)

Advanced Antitank Weapon System-Heavy (AAWS-H) (LOSAT)

MISSION:

The Advanced Antitank Weapon System - Heavy (AAWS-H) will be a crew served TOW replacement weapon employed by both heavy and light forces to provide stand-off and overmatch to defeat the current and projected Soviet Armor threat. AAWS-H is a family of weapons consisting of an Advanced Missile System — Heavy (AMS-H), and a Line of Sight Antitank Weapon (LOSAT) System using a Kinetic Energy Missile (KEM). The LOSAT weapons system, will replace the M901 ITV vehicle (dedicated heavy antitank system); the AMS-H will be deployed in the light, airborne and air assault forces and mechanized rifle companies by maintaining war fighting capabilities of the Bradley Fighting Vehicle, High Mobility Multipurpose Wheeled Vehicle (HMMWV), and potentially the Cobra attack helicopter. (There are multiple candidate technologies under consideration for the AMS-H mission). The systems will be capable of operating in day, night, through battlefield obscurants, as well as in a countermeasure environment.

CHARACTERISTICS:

	AMS-H	KEM
Weight:	TBD	170 lbs
Length:	TBD	110 lbs
Diameter:	TBD	6.4 in
Range:	Greater than TOW	Greater than TOW
Crew:	4 or less	3

PROGRAM STATUS:

The LOSAT Program is in the Advanced Technical Transition Demonstration (ATTD) phase and is building upon the earlier Joint Service HVM Demo (approved in August 1988).

Advanced Missile System — Heavy (AMS-H): A technical demonstration began in March 1989 for an Imaging Infrared (IIR) Seeker that can double the range on current seekers, KEM, and AMS-H: A Milestone II Decision Review for entering FSED is planned for 1st Qtr. FY91 and a modularity analysis for upgrade of the KEM Fire Control technology will be infused into a Tow/ANS-H SIGHT improvement start in FY91.

CONTRACTORS:

IIR ATTD - LTV, Dallas, TX
IRR Tech Demo - TI, Dallas, TX
- HAC, Canoga Rark, CA
Fire Control Modularity - LTV (Prime),
TI (Subcontractor) Dallas, TX

Lightweight Multipurpose Weapon (AT4)

MISSION:

The AT4 is the Army's new Lightweight Multipurpose Weapon and supplements the M72 LAW. The AT4 is a shoulder fired recoilless weapon used against light armor and materiel targets. The system incorporates a disposable launcher and a cartridge case containing a fin stabilized high explosive shaped charge projectile. The AT4's accuracy, lethality and range (over 300 meters) are considerably greater than the M72 LAW's.

CHARACTERISTICS:

Weight:	14.6 lbs
Length:	39.7 inches
Range:	300 + meters
Caliber:	84mm
Sights:	Front post/rear peep similar to M16
Storage Life:	20 years

SOVIET COUNTERPART:

The RPG 22 probably has performance characteristics similar to the AT4 and is probably the latest fielded RPG series of weapons.

PROGRAM STATUS:

Fielding of the system is underway. Initial purchases were procured from Sweden. The Army has signed a contract with Honeywell, Inc. to produce AT4's on shore in FY88. First delivery from onshore production was in July 1989. The Marine Corps and the Navy are also buying this weapon.

CONTRACTORS:

FFV of Sweden is the current producer with Honeywell (Minnetonka, MN) as their US licensed representative. Honeywell will use Joliet Army Ammunition Plant (Joliet, IL) for domestic production.

120mm Mortar

MISSION:

The 120mm Mortar is a nondevelopmental system from Israel. The weapon is a conventional, smoothbore, muzzle-loaded mortar and will be employed in both towed and carrier-mounted versions. The 120mm Mortar will replace the current 4.2-inch mortar in heavy divisions and will fire a new family of enhanced ammunition currently in development. The 120mm Mortar will provide increased range and improved transportability, effectiveness, and standardization.

CHARACTERISTICS:

Range:	7,240 meters
Weight:	317 lbs (ground-mounted)
Rate of Fire:	4 rounds per minute, sustained
Crew:	4
Ammunition:	HE, Smoke, Illumination

SOVIET COUNTERPART:

The nearest Soviet counterpart is the M43 120mm Mortar. Its range is 5,700 meters, it weighs 602 pounds, and has a 6-man crew. It is fielded in the Soviet, Warsaw Pact, and other armies.

PROGRAM STATUS:

The weapon and a family of nondevelopmental ammunition is currently undergoing Operational Testing for type classification during 1990. Initial fielding occurs during 1990. A family of enhanced ammunition, including HE, Smoke, and Illumination cartridges, is currently under development. All production will be in the U.S. except for initial fielding quantities. FY 91 procurement will purchase 196 carrier variants, all of which will be produced at Watervliet Arsenal, NY.

CONTRACTORS:

Martin Marietta Ordnance Systems, MD
Watervliet Arsenal, NY

Squad Automatic Weapon (M249)

MISSION:

The Squad Automatic Weapon provides a lightweight, one-man-portable machine gun capable of delivering a large volume of effective fire for infantry squads. This role was filled during World War II and Korea by the Browning Automatic Rifle, during the 1960's by the M14A1 Rifle, and during the 1970's by the M16A1 Rifle. For this role, the M16A1 was equipped with a bipod and fired in the automatic mode. There are two and three M249's in Army and Marine Corps Infantry squads, respectively. Acquisition is also programed by the Air Force and expected of the Navy. Modifications are being made to the weapon to enhance soldier-weapon interface.

CHARACTERISTICS:

Caliber:	5.56mm
Weight:	16.3 lbs
Rate of Fire:	750 rds/min
Range:	800 meters
Magazine Capacity:	200 rds

SOVIET COUNTERPART:

The closest Soviet equivalent systems are the 7.62mm PKM and the 5.45mm RPK 74 which are fielded with Soviet and Warsaw Pact nations.

	PKM	RPK74
Caliber:	7.62mm	5.45mm
Weight:	18.5 lbs	11 lbs
Rate of Fire:	650 rds/min	600 rds/min
Range:	1000 meters	800 meters
Magazine Capacity:	100 rds	75 rds

PROGRAM STATUS:

Fielding of the M249 started in FY84. Improvements recommended by users have been successfully tested and approved. These changes have been incorporated into the current 5-year, multiyear, competitively selected, firm fixed price contract awarded in September 1988.

CONTRACTOR:

CONUS procurement began with a contract awarded to FN Manufacturing Inc. (Columbia, S.C.) in September 1988.

M16 A2 RIFLE

M16A2 Rifle

MISSION:

The M16A2 is an improved version of the M16A1 and is being issued to front line combat soldiers as the Army's primary combat rifle. The M16A2 is a lightweight, air-cooled, gas operated, low impulse rifle. It incorporates improvements in sight, pistol grip, stock and overall combat effectiveness. Accuracy is improved by incorporating an improved muzzle compensator, three round burst control, a heavier barrel and by using the heavier NATO standard ammunition which is also fired by the Squad Automatic Weapon.

CHARACTERISTICS:

Caliber:	5.56mm
Weight:	8.9 lbs
Range:	550 meters
Type of fire:	Semi-automatic, three round burst
Magazine capacity:	30 rounds

SOVIET COUNTERPART:

The 5.45mm AK-74 Assault Rifle is currently in service in Soviet and some Warsaw Pact forces.

Caliber:	5.45mm
Weight:	7.9 lbs
Range:	400 meters
Type of fire:	Semi-automatic, automatic
Magazine capacity:	30 rounds

PROGRAM STATUS:

The Army First Unit Equipped (FUE) occurred in January 1987 and to date, approximately 262,000 weapons have been fielded. Some M16A1 rifles will be converted to M16A2 rifles during depot overhaul using modification kits. A 5-multiyear, competitively selected, firm fixed price contract was awarded in September 1988.

CONTRACTOR:

Colt Industries (Hartford, CT) began original production in June 1983. Current contractor is FN Manufacturing Incorporated (Columbia, S.C.)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M9 9mm Personal Defense Weapon

MISSION:

The 9mm pistol is the standard replacement weapon for the caliber M1911A1 .45 caliber pistol and four-inch barrel caliber .38 revolvers currently used by the Department of Defense. The 9mm is a semiautomatic double-action pistol that is more lethal, lighter, and safer than the .45 caliber pistol. It can be used effectively by either right or left handed shooters. The weapon will be issued to individuals who are not riflemen, or who are not issued rifles for personal defense, for law enforcement personnel, close quarter requirements, and aviators. The 9mm pistol is a Joint Service Program/which provides a weapon capable of firing NATO standard 9mm ammunition.

CHARACTERISTICS:

Caliber:	9mm
Weight (Loaded):	2.6 lbs (fully loaded)
Range:	50-100 meters
Trigger action:	Double
Magazine capacity:	15 rounds

SOVIET COUNTERPART:

The 9mm Makarov is the standard pistol for the Soviet forces and for most of the countries in the Warsaw Pact. It is a copy of the Walther PP in general size, shape and handling.

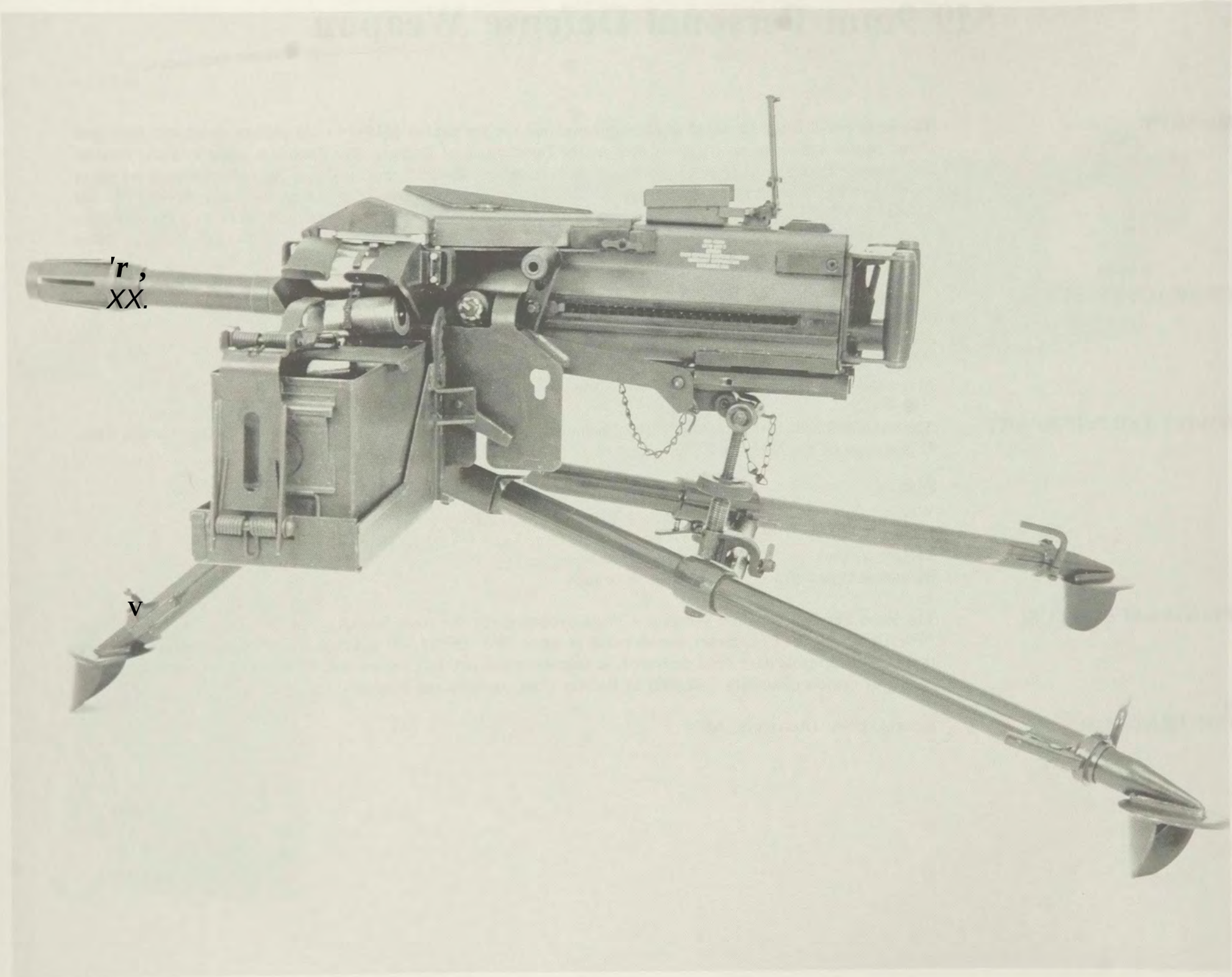
Caliber:	9mm
Weight:	1.8 lbs
Range:	50 meters
Trigger action:	Double
Magazine capacity:	8 rounds

PROGRAM STATUS:

The 9mm Personal Defense Weapon is being produced for the Joint Services. An initial five year, multiyear firm fixed price (FFP) contract was awarded in April 1985 for 315,930 weapons. As of September 1989, more than 140,000 pistols have been delivered. A follow-on competition was conducted in FY88/89 resulting in the award of option quantities (142,292) to Beretta USA commencing May 89.

CONTRACTOR:

Beretta, USA. (Accokeek, MD)



MK19-3 40mm Automatic Grenade Launcher

MISSION:

The MK19-3 will be used in offensive and defensive operations against personnel and light-armored vehicles. It will be used in the main battle area by all types of combat infantry units and by combat support and combat service support units to conduct rear area security missions. The MK19-3 will be mounted on M113 Armored Personnel Carriers, High Mobility Multi-Purpose Wheeled Vehicles (HMMWV), selected cargo trucks, and the M88A1 Medium Recovery Vehicle.

CHARACTERISTICS:

Caliber:	40mm
Weight:	72.5 lbs
Rate of fire:	325-375 rds/min
Max effective range:	1500 meters (point targets); 2200 meters (area targets)
Lethality:	Anti-personnel—5 meters (Expected Casualty Radius) Anti-armor—2.0 inches penetration to maximum range of 2200M

SOVIET COUNTERPART:

The Soviet 30-mm AGS-17 automatic grenade launcher was developed as a result of the fielding of the US 40mm MK19 Mod O machine gun, which saw extensive service in Vietnam.

Caliber:	30mm
Weight:	37 lbs
Rate of fire:	100-400 rds/min
Max effective range:	1200 meters; max range is 1700 meters

PROGRAM STATUS:

The MK19-3 was developed and approved for Service use by the Navy in 1981. The Army type classified the MK19-3 as standard "A" January 1986. Initial procurement of MK19-3 for the 9th Infantry Division was contracted for by the Navy in October 1983. The Army assumed program management responsibilities from the Navy in FY88. A new competitive multiyear contract was awarded in December 1988. First Unit Equipped (FUE) occurred in November 1989.

CONTRACTOR:

SACO Defense Inc. (Saco, Maine).

M24 Sniper Weapon System (SWS)

MISSION:

The SWS is a 7.62mm weapon system which is capable of being modified to fire .300 Winchester magnum ammunition. It provides precision fire on selected high value targets beyond the effective range of all standard issue rifles. The SWS consists of the M24 rifle, carrying case, and a telescopic sight unit. It replaces the M21 sniper rifle on a selected basis in Special Forces, Ranger, and Infantry battalions.

CHARACTERISTICS:

Caliber:	7.62mm
Weight:	16 lbs
Efective range:	800 meters
Type of fire:	Single
Magazine capacity:	5 rds

SOVIET COUNTERPART: The SVD is the standard Soviet sniper rifle.

Caliber:	7.62mm
Weight:	9.5 lbs
Effective range:	800 meters
Type of fire:	Single/semi
Magazine capacity:	10 rods

PROGRAM STATUS:

The SWS was type classified in Sep 86 and is being procured under a contract awarded in FY87 with three option years. As of 30 Sep 89, 600 M24s had been delivered to the Army. FY90 represents the last procurement planned for this system.

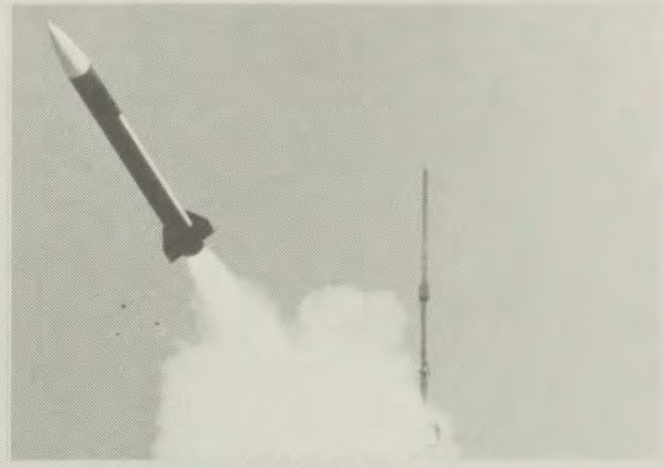
CONTRACTOR: Remington Arms.

The Air Defense mission area relates to the detection and engagement of the air threat with ground fire systems. Air defense systems must protect all ground forces elements including troop formations, depots, lines of communication, air bases, key command and control facilities, and other vital assets.

AIR DEFENSE

PATRIOT

RADAR



MISSILE

LAUNCHER

PATRIOT

MISSION:

The PATRIOT air defense system is the centerpiece of theater air defense. The system's fast reaction capability, high firepower, and ability to operate in a severe electronic countermeasure environment are features not previously available in the systems PATRIOT will replace. The PATRIOT design eases the field logistic burden since its overall performance is achieved with less equipment, less operational manpower and fewer repair parts than previous systems. The combat element of the system is the fire unit which consists of a radar set, an engagement control station, a power plant, antenna mast group and eight remotely located launchers. The system is highly automated combining high-speed digital processing with various software routines to effectively control the battlespace. The single radar, using phased array technology, provides for all tactical functions of airspace surveillance, target detection and track, and support of missile guidance. The only manned element of the fire unit during air battle, the engagement control station, provides the human interface for control of automated operations. Each launcher contains four ready-to-fire missiles, sealed in canisters, which serve a dual purpose as shipping containers and launch tubes.

CHARACTERISTICS:

Guidance:	Command/Track-Via-Missile
Engagement:	Multiple Targets Simultaneously

SOVIET COUNTERPART:

The Soviets have several missile systems, including the SA-1, SA-2, SA-4, SA-5, SA-10, and SA-12, that are used to attack aircraft in the regime for which PATRIOT was designed. Only the SA-10 and SA-12 are considered as advanced or effective as PATRIOT.

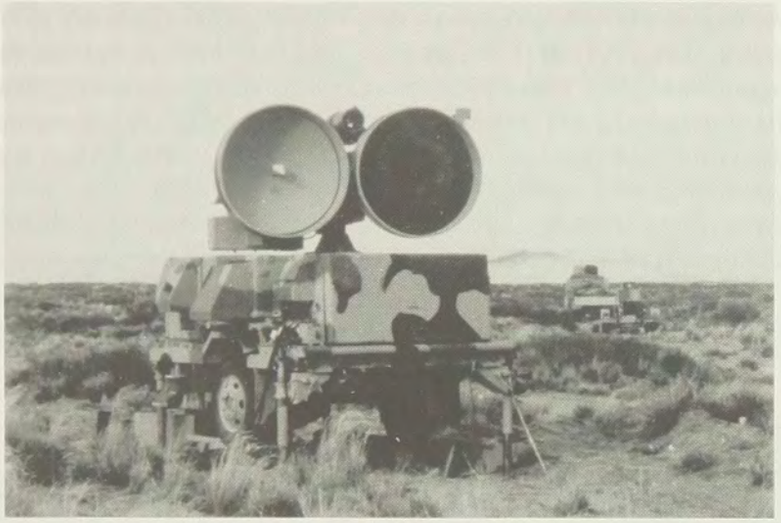
PROGRAM STATUS:

PATRIOT is in its eleventh year of production and was initially deployed to Europe in 1985. Ten half- battalions are currently operational with backfill to full strength underway. US missile production deliveries include Patriot ATM capability-Level 2 (PAC-2) modifications. PAC-2 missiles and Post Deployment Build-2 (software) provide Patriot a limited asset defense against the TBM threat. Germany, Holland and Italy are currently participating in PATRIOT acquisition programs to provide for cooperative air defense improvements. The first NATO unit was delivered in 1986 and discussions continue with other interested NATO allies. Additionally, Japan has been licensed for the production of 23 fire units.

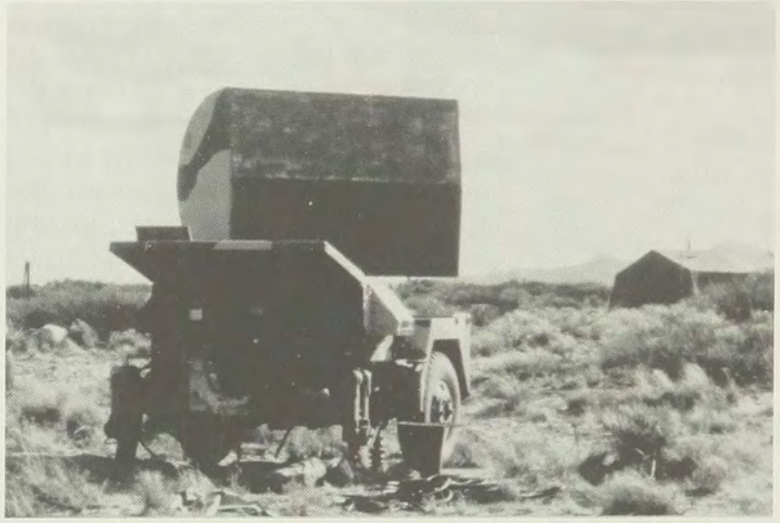
CONTRACTORS:

Raytheon Company (Bedford, MA)
Martin Marietta Corporation (Orlando, FL)

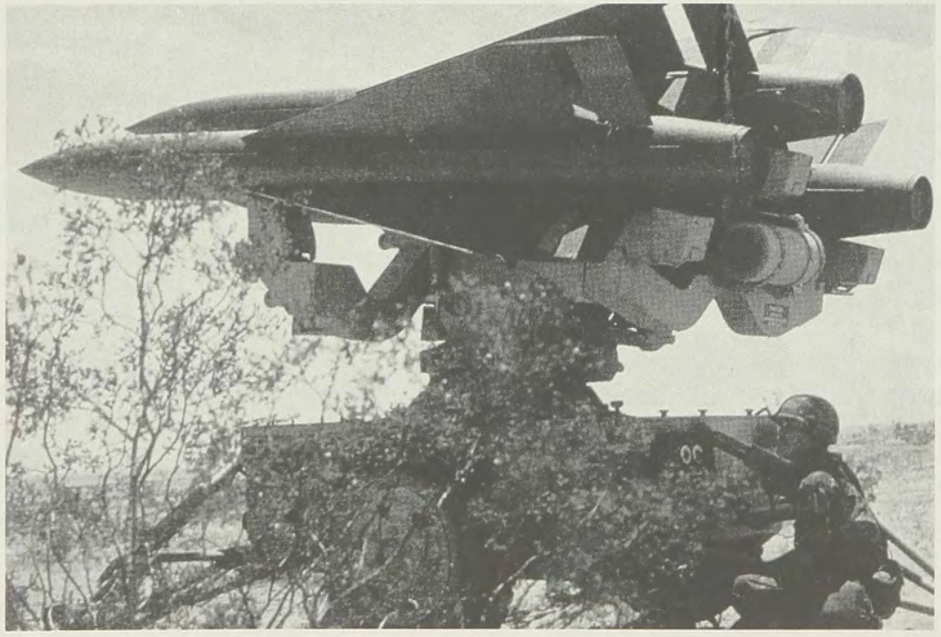
HAWK



High Power Illuminator



Continuous Wave Acquisition Radar



Launcher

HAWK

MISSION:

HAWK is a medium-range air defense guided missile system designed to provide air defense protection against low to medium altitude air attack. First fielded in 1960, it is a mobile, all weather, missile system providing vital air defense for critical installations and maneuver forces. HAWK is highly lethal, reliable and effective in the electronic countermeasures environment of the modern battlefield. HAWK units are being reorganized into a more streamlined and efficient fighting organization. Each firing platoon is comprised of a platoon command post, an acquisition radar, a tracking radar, an optical tracking system, an Identification, Friend or Foe (IFF) system, and three or four launchers each with three missiles. The Hawk missile is guided by reflected radar energy and uses a proximity fuze to detonate its highly lethal warhead. Hawk's latest product improvement (PIP III) will provide a low-altitude, simultaneous engagement capability and enhanced electronic counter-countermeasures.

SOVIET COUNTERPART:

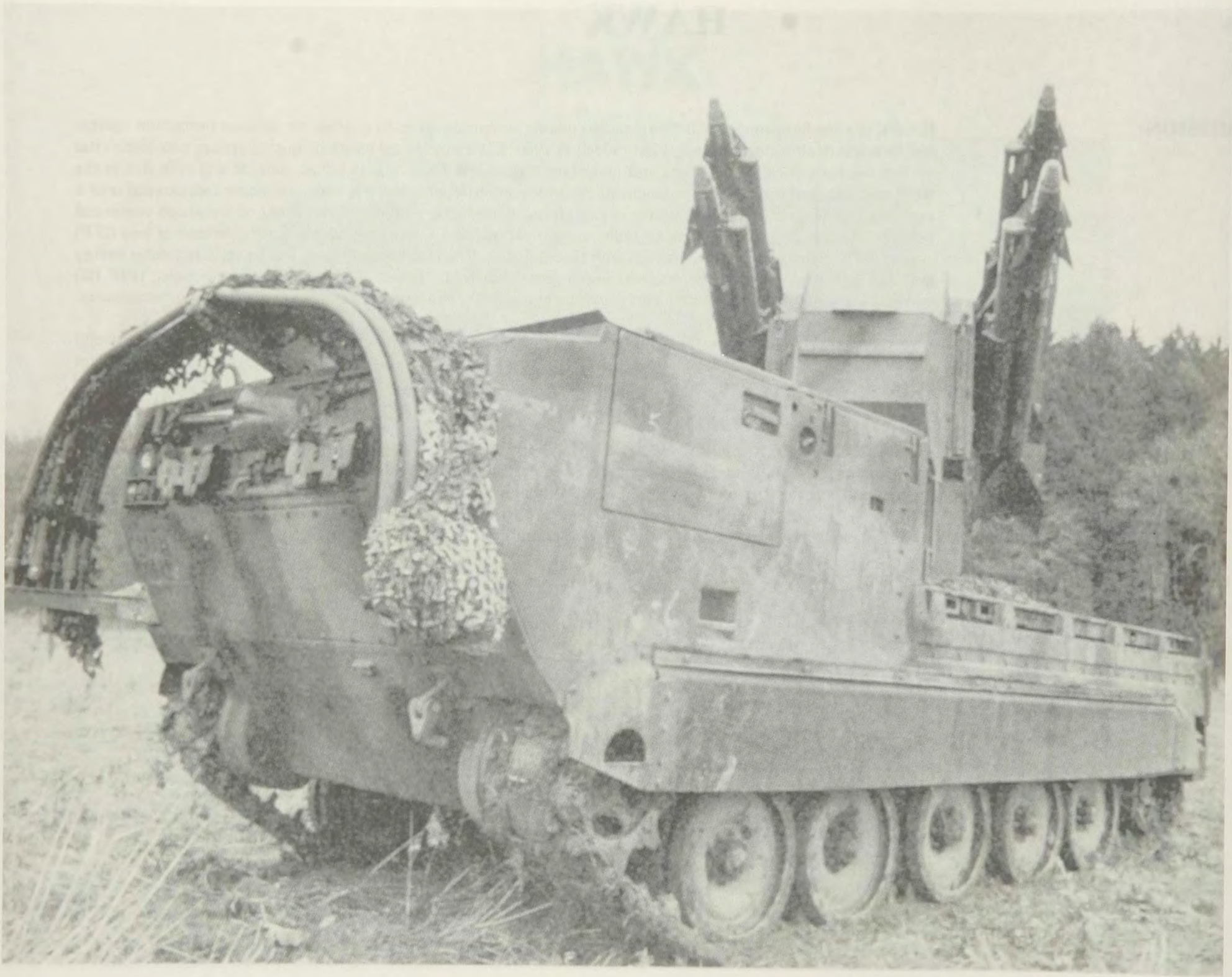
The Soviet SA-6 is somewhat similar to Hawk. Its range and altitude capabilities (30 km and 10 km, respectively) are less than that of the HAWK, but the SA-6 is more mobile. The basic SA-6 unit is a regiment which includes five missile batteries. Each missile battery contains a target acquisition and fire control radar called "STRAIGHT FLUSH" and 4 Transporter Erector Launchers (TEL). Each TEL carries 3 ready-to-fire missiles.

PROGRAM STATUS:

HAWK is deployed worldwide with the Army, Marines, NATO, and numerous other nations. HAWK modernization is continuing with the procurement of the third in a series of product improvements that will further enhance the firepower, reliability, and combat effectiveness of the system. The Army began fielding of PIP III systems in FY89. A program to enhance the system's mobility has been initiated as a cooperative development between the U.S. Army, the Netherlands, and the U.S. Marine Corps.

CONTRACTORS:

Raytheon Company (West Andover, MA)
Aerojet (Sacramento, CA)
Westinghouse Electric Corp (Baltimore, MD)
Northrop Corp (Anaheim, CA)
ICSD (Hauppauge, NY)
DBA (Kissimme, FL)
General Electric (Huntsville, AL)



Chaparral

MISSION:

CHAPARRAL is the Army's short-range air defense (SHORAD) surface-to-air missile system. It is effective against all types of aircraft at low altitudes and provides protection for corps, theater rear areas and, currently, division areas. CHAPARRAL is a self-propelled system. Its tracked carrier provides excellent cross-country mobility. The launch station can be removed from the carrier and operated from a ground emplacement. It is equipped with a Forward Looking Infrared Subsystem that provides day/night and adverse weather capability and extends system acquisition range. The missile is lightweight, supersonic, fire-and-forget, with an all aspect passive infrared homing guidance system capable of engaging both approaching and receding targets. To enhance missile acquisition range and infrared countermeasure rejection capability the Rosette Scan Seeker (RSS) guidance section has been developed. To reduce rocket motor smoke, a smokeless motor has been developed and is being retrofitted to inventory missiles upon shelf-life expiration of the current "smoky" motors. To assist the gunner in identifying targets as friendly, CHAPARRAL has an Identification Friend-or-Foe (IFF) subsystem. CHAPARRAL carries four ready missiles on launch rails and eight additional missiles in storage compartments. CHAPARRAL, which was initially fielded in 1969, is continually being improved and will remain in the inventory into the 21st century.

CHARACTERISTICS:

Crew:	Four
Guidance:	Infrared Homing, Fire and Forget
Warhead:	Blast-fragmentation
Fuze:	RF directional doppler

SOVIET COUNTERPART:

The SA-9 and SA-13, introduced in late 1960's and 1970's respectively, are the counterparts to CHAPARRAL. They have approximately the same range and also use an infrared homing guidance system. The SA-9 is mounted on a two-axle amphibious vehicle; the SA-13 is on an MTLB tracked vehicle.

PROGRAM STATUS:

The initial contract for production of the improved Rosette Scan Guidance Section was awarded competitively to Hughes Aircraft Company in September 1988. The FY89 RSS production contract was awarded to the prime developer, Ford Aerospace Corporation. The FY90 RSS procurement contract was awarded to Hughes Aircraft Company.

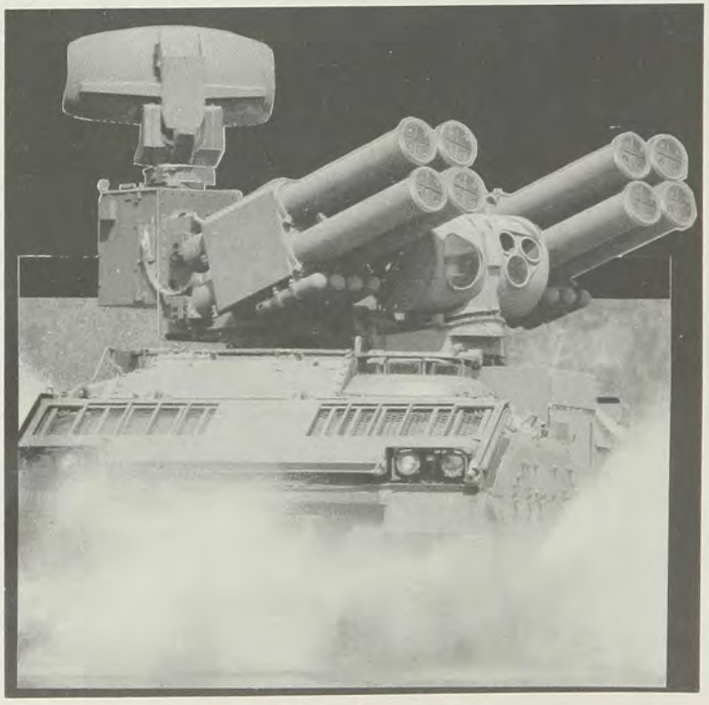
CONTRACTOR:

Ford Aerospace Corp. (Newport Beach, CA) - System Development and RSS Production
Hughes Aircraft Co. (Tucson, AZ) - RSS Production

FAADS

NLOS

LOS-R



LOS-F-H

Forward Area Air Defense System (FAADS)

MISSION:

The cancellation of the DIVAD program resulted in major reassessment of air defense requirements in the Forward Area. The lessons learned from the DIVAD experience proved that one weapon alone, or even multiple weapons acting independently, cannot defeat the air threat. FAADS is an integrated program of complementary systems which will provide Army Divisions with dedicated Air Defense Artillery (ADA) and integrate Joint and Combined Arms contributing to the counter air fight. Ongoing Army programs are being combined with new technology to integrate weapons, sensors, and a command, control and intelligence architecture into a system of systems optimized to counter the entire spectrum of the air threat to the forward area through the 1990's and beyond. The FAADS concept is designed to provide total coverage in the division area and permits the enemy no preferred attack option. The strategy relies heavily on nondevelopmental items (NDI) and preplanned product improvements (P^3I) to rapidly overcome our current air defense deficiencies and keep pace with the advancing threat.

CHARACTERISTICS/ PROGRAM STATUS:

FAADS consists of five components: Line of Sight-Forward (the ADATS); Line of Sight-Rear (Avenger); Non-Line of Sight (the Fiber Optic Guided-Missile); FAAD Command, Control and Intelligence, and Combined Arms Initiatives. Line of Sight-Forward-Heavy (LOS-F-H) mission is to counter the fixed wing air threat and provide long range anti-helicopter fires as it maneuvers with heavy division's Combined Arms Team in the close combat fight. After extensive testing in an intense countermeasures environment, Martin Marietta's ADATS was selected for the LOS-F-H role. The Army plans to buy a total of 562 systems with the First Unit Equipped (FUE) in FY93. Line of Sight-Rear (LOS-R) is a missile/gun system mounted on the HMMWV. LOS-R provides a weighted, area defense against the air threat to the brigade and division rear areas. Also known as Pedestal Mounted Stinger (PMS), this system uses the proven Stinger missile and a .50-caliber machine gun. Boeing's AVENGER, selected to perform this role, provides a shoot-on-the-move, soldier friendly solution to the LOS-R requirements. The First Unit Equipped (FUE) for AVENGER was FY89 in the 3 ACR. A procurement of 1,207 fire units is planned. Non-Line of Sight (NLOS) is the Fiber Optic Guided-Missile (FOG-M). This system provides a long range anti-helicopter, anti-tank system that can defeat targets beyond the range of line of sight systems and targets masked by terrain. A Full Scale Development contract with the Boeing/Hughes team was awarded December 1988. FAAD Command, Control, and Intelligence (FAAD C2I) integrates FAADS components into a synergistic system of systems by providing rapid and reliable (1) targeting; (2) air situation; and (3) air battle management information. FAAD C2I will assist in planning, directing, coordinating, and controlling the FAAD fight. FAAD C2I consists of four separate but interrelated efforts: Command & Control (C2) Hardware and Software, Ground Based Sensor, Masked Target Sensor, and Positive Hostile Identification equipment. FAAD C2I's Command and Control, Ground Based Sensor and one of the passive identification components are scheduled for initial fielding in FY94. Combined Arms Initiative (CAI) provide ground and aerial combat elements an enhanced capability for self defense against enemy helicopters. Air-to-Air Stinger is in production for the OH-58C/D. The Bradley Fighting Vehicle sight reticle enhancement was cut into the BFV production line in May 1987. Engineering development continues on providing 120mm tank ammunition an anti-helicopter capability.

SOVIET COUNTERPART:

The Soviets have continued to deploy numerous Air Defense Systems in the Forward Area of the battlefield including the ZS6, ZSU-23/4, SA-8, SA-9, and continue to deploy and improve a robust integrated Air Defense Command, Control and Intelligence System.

CONTRACTORS:

LOS-F-H (ADATS)—Martin Marietta (Orlando, FL)
NLOS (FOG-M)—Boeing Aerospace (Huntsville) and Hughes Aircraft Co (Canoga Park, CA)
FAAD C2 SOFTWARE—TRW (Redondo Beach, CA)
LOS-R (PMS)—Boeing Aerospace (Huntsville, AL)
FAAD GROUND BASED SENSOR—TBD

Stinger

MISSION:

Stinger is a shoulder-fired, infrared homing missile system whose mission is to provide air defense coverage to combat units. The missile homes on the heat emitted by either jet or propeller-driven fixed-wing aircraft or helicopters, and employs a proportional navigation system that allows it to fly an intercept course to the target. A Stinger crew visually acquires its target and electronically interrogates it to help determine if it is a friend. The missile notifies the gunner when it has a "lock" on the target. After trigger pull the Stinger is then ejected from the tube by a small launch motor. Once the missle has traveled a safe distance from the gunner, its main engine ignities and propels it to the target. Stinger is stored in a sealed tube, requires no maintenance in the field, and is designed to withstand the rigors of the battlefield. It is replacing the Redeye system. It can attack much faster targets than Redeye, and most importantly, can destroy aircraft from any aspect. A follow-on seeker (Stinger-POST) improves the capability of the system in certain infrared countermeasures environments. Stinger-Reprogramable Microprocessor (RMP) further enhances the performance in infrared countermeasures environments and provides the capability to make future changes to the missile as the threat envolves through a replaceable software module.

SOVIET COUNTERPART:

Soviet Manportable Air Defense Systems are the SA-7, comparable to the U.S. Redeye, and The SA-14. The SA-7 has a range and altitude capability of approximately 3 km and only a tail chase capability. The SA-7 was used extensively in Vietnam and the Middle East and is deployed with maneuver units throughout the Warsaw Pact. The SA-14, fielded in the late 1970's, has similar performance characteristics to the Stinger. The SA-14 is replacing the SA-7. The SA-16 fielded in the 1980's, is replacing the SA-14.

PROGRAM STATUS:

Basic Stinger was operationally deployed to Germany in 1981 and to the 82nd Airborne Division in 1982. Basic Stinger production has been completed. Stinger-POST entered production in FY83, first deliveries were made in September 1986, and production was completed in August 1987. Stinger-POST missiles were deployed in FY87. Stinger-RMP entered development in September 1984, transition to production began in November 1985, and initial deliveries began in FY89; fielding began in FY90. The FY90 and FY91 RMP buys consist of head-to-head competitive split procurement between prime and second source contractors.

CONTRACTORS:

General Dynamics Valley Systems Division (Rancho Cucamonga, CA) (Prime)
Raytheon (Lowell, MA)(Second Source).

The Fire Support mission area includes those systems directly related to the generation of indirect firepower. This mission area includes not only conventional, nuclear, and chemical fire support provided by cannons, rockets, and missile systems, but also the target acquisition and communication systems integral to field artillery operations.

FIRE SUPPORT

Multiple Launch Rocket System (MLRS)

MISSION:

The MLRS is a free-flight, area fire, artillery rocket system being fielded to fill an existing void in conventional fire support. The primary missions of MLRS are counterfire and suppression of enemy air defenses. MLRS supplements cannon artillery fires by delivering large volumes of firepower in a short time against critical, time-sensitive targets. The basic warhead carries improved conventional submunitions. Germany, one of five partners in an international development program, is developing a scatterable mine warhead. Growth potential exists to add a Terminal Guidance Warhead (TGW) to defeat armor, a Sense and Destroy Armor (SADARM) warhead to improve counter battery fires, and a binary chemical warhead. Codevelopment of TGW by the United States, United Kingdom, Germany, and France will continue in FY90. The MLRS M270 Launcher is being updated to accommodate launching the family of new munitions, including the ATACMS.

CHARACTERISTICS:

Warhead: Improved Conventional Munitions (ICM)
Propulsion: Solid

SOVIET COUNTERPART:

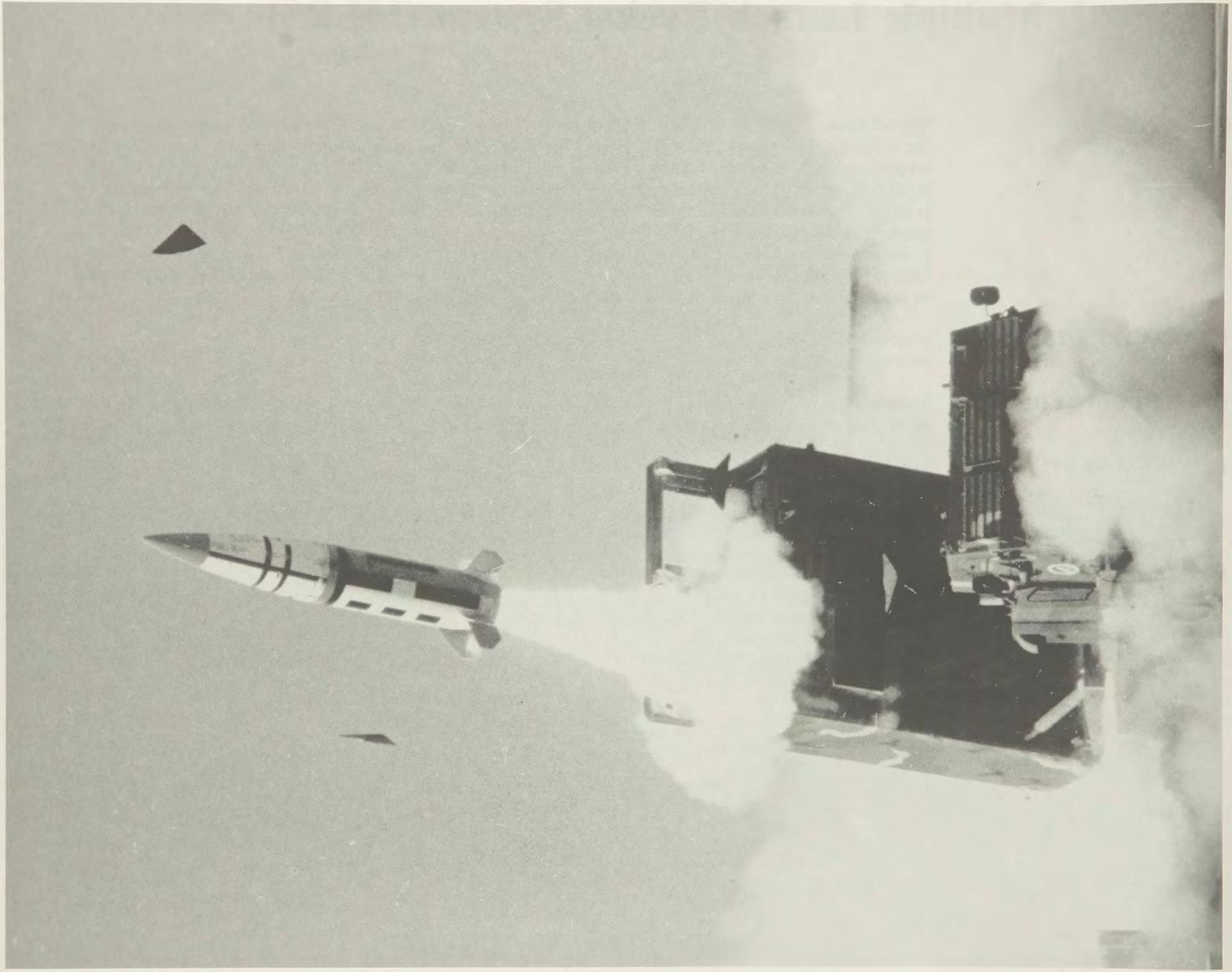
The Soviets have a very effective multiple rocket capability with several sizes of rockets. A new system, believed to be similar in employment concept and size, but larger than MLRS, is in late stage development.

PROGRAM STATUS:

The US Initial Operational Capability for MLRS was achieved in 1983. Starting in FY89, MLRS is being coproduced by the United States, United Kingdom, Germany, France and Italy. Second multiyear procurement contract for FY89-93 was awarded in July 1989. The FY90 TGW program continues its System Demonstration Substage.

CONTRACTORS:

LTV Aerospace and Defense (Dallas, TX)
Norden Systems (Norwalk, CT)
Atlantic Research (Camden, AR)
Brunswick Corp (Camden, AR)
Norris Industries (Los Angeles, CA)
Bendix Corp (Redbank, NJ)



Army Tactical Missile System (Army TACMS)

MISSION:

The Army has an urgent need for a long-range weapon that operates in near all weather, day or night, is air transportable and capable of effectively engaging high priority land targets at ranges beyond the capability of cannons, rockets, and the Lance Missile System. The system will be used to attack tactical surface-to-surface missile sites, air defense systems, logistic elements, command/control/communication complexes, and second echelon maneuver units arrayed in depth throughout the corps area of influence.

CHARACTERISTICS:

The system will be a ground-launched conventional missile system consisting of a surface-to-surface semi-guided ballistic missile with an Anti-Personnel/Anti-Materiel (APAM) warhead. Army TACMS will be fired from the modified M270 MLRS launcher. The system will utilize targeting systems, engagement systems, and command control systems that are the same as MLRS.

PROGRAM STATUS:

Missile test flights began in 1988. Low Rate Initial Production (LRIP) began in FY89. The FY90 program will be a second year of LRIP with Full Rate Production beginning in FY91.

CONTRACTOR:

LTV (Prime) (Dallas, TX)

M109A2/A3 Self-Propelled Howitzer/ Howitzer Improvement Program (HIP)

MISSION:

The M109A2 is an improved version of the M109 self-propelled howitzer that was fielded in the early 1960's. The M109A3 is a depot modified M109A1 with the same performance capabilities as the production M109A2. The M109 is designed to provide the primary indirect fire support to the maneuver brigades of the armored and mechanized infantry divisions. The M109A2/A3 is air transportable in a C5 and is capable of firing both conventional and nuclear munitions. The Army, in October 1985, initiated the development of a major system modification of this fielded system. The HIP modification includes: A new cannon and mount, automotive improvements, crew Nuclear/Biological/Chemical (NBC) protection, driver's night vision, secure communications, ballistic computer and navigation system and built in test equipment. HIP will provide significant improvements in system survivability, responsiveness, lethality, and reliability.

CHARACTERISTICS:

	M109A2/ A3	**Howitzer Improvement Program**
Range:	23.5 km w/Rocket Assisted Projectile (RAP) 18.1 km unassisted	30 km with RAP 22 km unassisted
Weight:	56,000 lbs	Max 62,000 lbs (Combat Loaded)
Length:	29.9 ft	30.5 ft
Height:	10.8 ft	11.5 ft
Width:	10.3 ft	Same
Main Armament:	155 mm cannon (M185)	Improved 155 mm cannon (M284)
Secondary Armament:	Machine Gun Cal. .50 and M16A1 rifles	Same
Crew:	6 (+ Accompanying Vehicle M548/3)	Same
Cruising Range:	220 miles (345 km)	Same
Ammunition:	All ammunition except the M203 charge	All ammunitions

SOVIET COUNTERPART:

The Soviets have a modern 152mm self-propelled howitzer designated 2S3. It is considered comparable to the M109A2 in most performance characteristics.

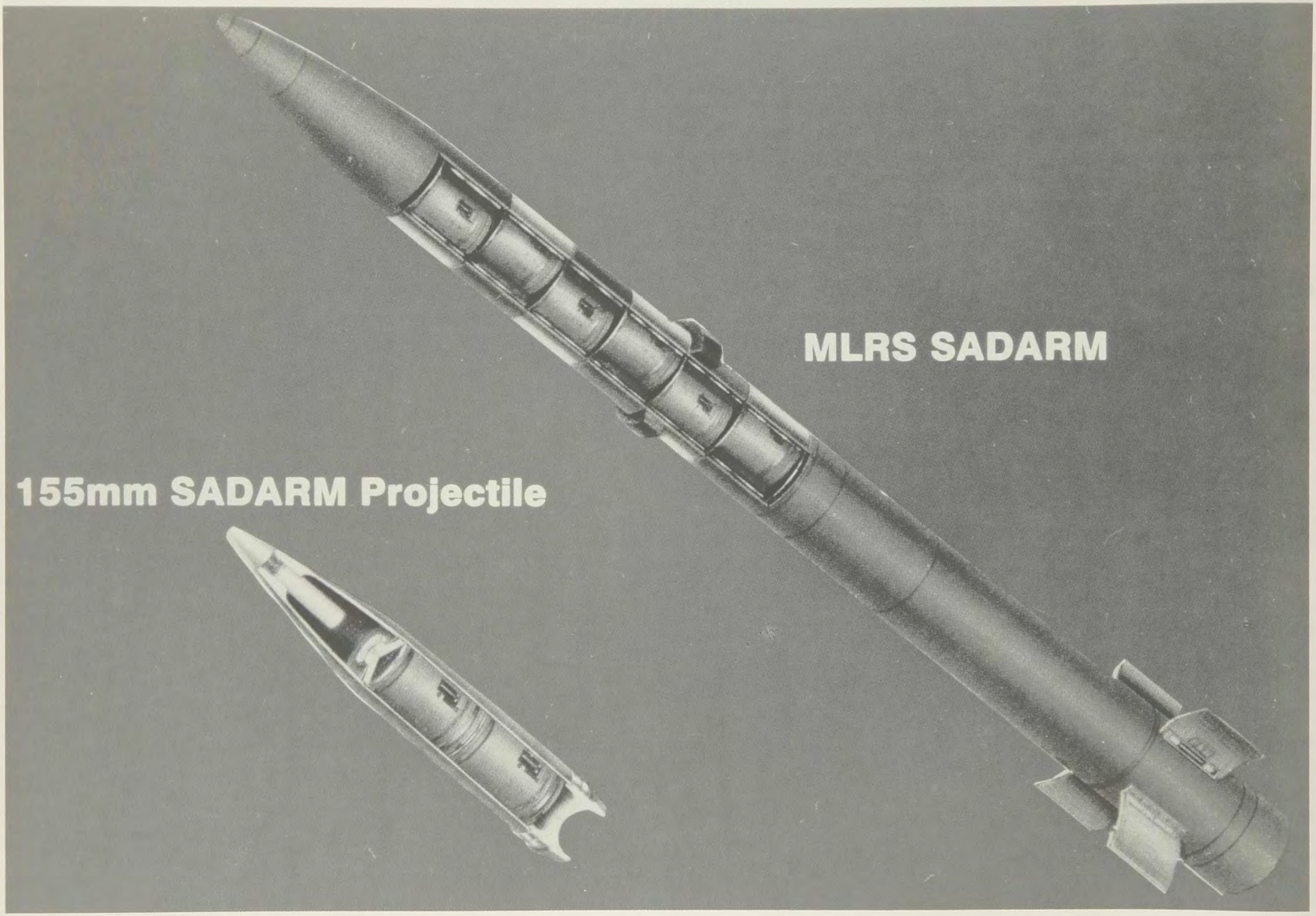
PROGRAM STATUS:

Six HIP prototypes were built in FY88. Low Rate production begins in FY90 to achieve a First Unit Equipped date in FY91.

CONTRACTOR:

BMY, a Division of Harsco Corporation (York, PA)

The SADARM System



Sense and Destroy Armor (SADARM)

MISSION:

SADARM is a comparatively low cost, sensing submunition designed to detect and destroy lightly armored vehicles, primarily self-propelled artillery. SADARM is the first of the Army's new family of fire and forget "SMART" munitions. The submunition is launched from 155 howitzers or via the Multiple Launch Rocket System (MLRS). After launch, the submunition is dispensed from its carrier over the target area and detects appropriate targets using a dual mode (combination millimeter wave and infrared) sensing mechanism. Once a target is detected, SADARM fires an explosively formed penetrator, which travels at an extremely high velocity to penetrate the top of target vehicles.

CHARACTERISTICS:

	155mm	MLRS
Caliber:	5.8 In	5.8 In
Weight:	27 lbs	30 lbs
Range:	18 km*	32 km*
Number Submunitions:	2	6

*Range of delivery system; other characteristics apply to submunition.

SOVIET COUNTERPART:

There is no known Soviet Counterpart.

PROGRAM STATUS:

SADARM was approved in March 1988 to enter Full Scale Development (FSD). Production is projected for early 1992. Development effort during FY90 will consist of 155mm projectile Technical Test (TT), 155 mm Force Development Test and Evaluation (FDTE), and MLRS dispenser development and testing. SADARM is scheduled to be fielded in FY93.

CONTRACTORS:

Honeywell (Minneapolis, MN)
Aerojet (Aczusa, CA)

M119 105mm Howitzer

MISSION:

The M119 is a non-developmental 105mm light howitzer from the United Kingdom. It will replace all M102's in the Army inventory. The M102's will then be used to replace all remaining M101A1 howitzers. The M119 will provide fire support for the six light infantry divisions and other Rapid Deployment Forces. This weapon affords the commander the improved range and performance needed to maintain his maneuverability and quick strike capability. It will fire all conventional 105mm ammunition in the inventory plus two enhanced capability rounds now under development. It is airmobile with the UH-60 helicopter and its prime mover will be the High Mobility Multipurpose Wheel Vehicle (HMMWV).

CHARACTERISTICS:

Range (kilometers):	14.0 DPICM, 14.3 HE, 19.5 Rocket Assisted Projectile (RAP)
Weight:	4,000 pounds
Width:	5 feet, 10 inches
Length:	20 feet, 1 1/2 inches
Height:	4 feet, 6 inches (Traveling Configuration)
Crew:	7
Ammunition:	HE, Smoke, Illumination, HE-RAP.

SOVIET COUNTERPART:

The nearest Soviet counterpart is the D-30 122mm howitzer. It is fielded in Soviet, Warsaw Pact, and other armies. Its range is 15.4 km, it weighs 7,000 pounds, and requires a crew of 7 personnel. The 122mm projectile is significantly more lethal more than the 105 mm.

PROGRAM STATUS:

The M119 was type-classified standard in December 1985. The weapon began production in the United Kingdom during 1987, and initial production in the U.S. arsenal system begins in 1990. In FY90 total production shifted from the U.K. to the U.S. arsenal system. Fielding of the first unit was conducted during 1989.

CONTRACTORS:

Royal Ordnance, United Kingdom
US: Watervliet Arsenal, N.Y.
Rock Island Arsenal, IL

FIREFINDER Radars
Artillery Locating Radar(AN/TPQ-37) and Mortar Locating Radar (AN/TPQ-36)

MISSION: FIREFINDER radars enable friendly forces to locate and bring immediate fire upon enemy mortar, artillery, and rocket-launching positions, silencing them before they can adjust their fires on friendly units and positions. The world's first automatic hostile-weapon-locating systems, FIREFINDER radars use advanced phased array antenna techniques with computer-controlled signal processing. They function by spotting enemy projectiles in flight and mathematically backplotting their trajectory. The position of the weapon is reported in grid coordinates that can be fed automatically into artillery fire centers, enabling them to target the enemy weapons with guns, rockets, or other ordnance. Upon fielding of the Army Data Distribution System (ADDS), the link from the radars to fire direction centers will communicate this position data on a near real-time basis. In tests, both radars, in combination with fire control devices, enabled an artillery unit to have accurate counterfire on the way before the first enemy projectile struck the ground. In actual combat action in Lebanon (1984), the AN/TPQ-36 performed equal to or better than the test results. Each Army division is being equipped with two artillery locating radars and three mortar locating radars.

SOVIET COUNTERPART: The closest Soviet counterpart to FIREFINDER radars is the ARK-1, a system with significantly less capability.

PROGRAM STATUS: Fieldings of the AN/TPQ-36 and AN/TPQ-37 to the Active Army are nearing completion. Current Active Army fielding requirements will be completed in October 1990. Fieldings to the Reserve Components are scheduled for completion in Mar 1991. FIREFINDER II, which will upgrade the current systems to a more capable radar on a single vehicle, is scheduled to enter Full Scale Engineering Development in FY92.

CONTRACTOR: Hughes Aircraft (Fullerton, CA)

Combat Support is an aggregation of the following mission areas dedicated to providing operational assistance to combat arms.

(1) Engineer Support relates to combat engineer efforts and mine/countermine warfare.

(2) NBC relates to supporting combat operations in a nuclear, biological, chemical environment

(3) Theater Tactical Intelligence relates to providing theater/tactical commanders with intelligence and information to support planning, the conduct of combat operations, and the readiness of forces combat operations.

COMBAT SUPPORT

High Mobility Multipurpose Wheeled Vehicle (HMMWV)

MISSION:

The HMMWV is a light, highly mobile, diesel powered, 4-wheel drive tactical vehicle that uses a common 1 1/4 ton payload chassis. The HMMWV can be configured through the use of common components and kits to become a cargo/troop carrier, armament carrier, S250 shelter carrier, two or four litter ambulance, or TOW missile carrier. The HMMWV provides a successor to the 1/4 ton Jeep, M718A1 Ambulance, 1/2 ton M274 Mule, 1 1/4 ton Gamma Goat, and M792 Ambulance. The HMMWV is a Tri-Service program that also provides vehicles to satisfy Marine Corps and Air Force requirements. The HMMWV program is complementary to the 1 1/4 Ton Commercial Utility and Cargo Vehicle (CUCV) Non-development Item (NDI) program. Other developmental models include prime mover for the light howitzer, towed VULCAN systems, and heavy variant shelter carriers.

CHARACTERISTICS:

	Cargo/Troop Carrier	Armament Carrier	TOW Carrier	Ambulance Carrier	S250 Carrier
Curb Weight	5200	5960	6051	7180	5483
Payload, lbs	2500	2240	2149	1920	3177
GVW, lbs	7700	8200	8200	9100	8660
Crew/Cab	2/4	4	4	2/4(litters)	2
Length, inches	180	180	180	203	188
Height, inches	72	74	72w/o Launcher	105	104
Width, Inches	85	85	85	85	85

Trailer Towing Capacity: 3400 lbs
Range: 300 miles

SOVIET COUNTERPART: No known Soviet counterpart.

PROGRAM STATUS: A new 5-year multiyear letter contract was awarded in August 89. The total multiyear quantity is approximately 33,000 vehicles.

CONTRACTOR: LTV Missile and Electronics Group, AM General Division, (South Bend, IN)

M9 Armored Combat Earthmover (ACE)

MISSION:

The M9 ACE is a highly mobile (tracked), amphibious armored earthmoving vehicle that can move, survive, and work with the flow of battle, responding immediately to the maneuver commander's need for elimination of enemy obstacles, creation of obstacles to enemy maneuver, preparation of fighting positions for the fighting forces, expedient antitank ditching and maintenance of roads and supply routes. The ability to perform these tasks in the highly lethal and mobile AirLand battlefield assures that friendly force momentum is maintained in the offense, that enemy forces are slowed, channelized and made more susceptible to friendly fire in the defense while providing protected positioning from which our weapon systems can fight. Digging, dozing, hauling, scraping, and grading earthmoving tasks can be accomplished further forward on the battlefield than ever before. Its highly mobile (tracked), amphibious, light armored capabilities make this earthmover tough enough to live and fight with the infantry and fast enough to move with tanks. The M9 ACE is an essential force multiplier and a key member of the combined arms team on the Airland Battlefield.

CHARACTERISTICS:

Weight (Empty):	36,000 lbs
Loaded:	54,000 lbs
Speed:	30 mph
Air Transportable:	C-130, C-141B, C-5B aircraft
Amphibious:	3 mph
Survivable:	Small arms, artillery fragmentation, and operator NBC protection.

SOVIET COUNTERPART:

Although the Soviets have no direct counterpart to the M9 ACE, they do employ several pieces of equipment, each fielded in large quantities, which presently give Soviet combat units at least twice the engineer support of comparable US units. Examples are their MDK series of ditching machines, the BAT/M heavy, tracked dozer and the IMR Armored Engineer Tractor. The latter consists of a T-55A tank chassis with hydraulically controlled hinged blade, crane with telescoping boom, armored cupola and internal overpressure system. The Soviets are in their third or fourth generation fielding of these items.

PROGRAM STATUS:

The 7th Infantry Division (light) was the first unit equipped with seven of the low rate initial production (LRIP) vehicles. The training base (TRADOC) received three LRIP vehicles in November 1986. Initial production testing was completed during the June-August 1988 time frame. Deliveries of the full production vehicles to the field began in the June-October 1989 time frame. The FY90 contract option for 132 vehicles was awarded in January 1990.

CONTRACTORS:

BMY, a Division of Harsco Corporation (York, PA)

M88A1 Medium Recovery Vehicle

MISSION:

The M88A1 is a full-tracked, armored vehicle designed for hoisting, winching and towing operations to effect battlefield recovery and evacuation of tanks and other tracked combat vehicles. The M88A1 is the primary recovery vehicle in the Army inventory for M1 Abrams tank, M2/M3 Bradley Fighting Vehicles, M60 series tanks, and heavy self-propelled artillery.

CHARACTERISTICS:

Length:	325 inches	Power Train:	12-cyl, 750 hp air-cooled diesel engine with 3 speed automatic transmission
Width:	135 inches		
Height:	123 inches		
Weight:	56.0 tons	Cruising Range:	30 miles
Top Speed:	27 mph; 18 mph with towed load	Draw Bar Pull:	90,000 lbs
		Boom Capacity:	25 tons
Armament:	One .50 cal machinegun		

SOVIET COUNTERPART:

The Soviets have historically based recovery vehicles on existing chassis design. The most current is a vehicle based on a T-72 chassis. T-62, T-54, T-55-T, and JSU-T recovery vehicles are still in the Soviet inventory.

PROGRAM STATUS:

Conversion of all M88's in the US Army to M88A1's was completed in February 1982. Deliveries of the M88A1 were completed in 1989. No further procurement is programmed. There are approximately 2500 M88A1's in the Army inventory.

CONTRACTORS:

BMY Company (York, PA)
GMC, Detroit Diesel Allison Div. (Indianapolis, IN)
Teledyne Continental Motors (Muskegon, MI)
Firestone Tire (Moblesville, IN)
Goodyear Tire (St. Marys, OK)
Standard Products (Port Clinton, OH)
Bata Engineering (Batawa, Ontario, Canada)
Adviondack (Watervliet, NY)
Rogers Olympic Corp. (Seattle, WA)
Buckeye Steel Casting (Columbus, OH)
Ferguson Gear (Gastonia, NC)
Berwick Forge (Berwick, PA)

Mine Clearing Line Charge (MICLIC)

MISSION:

Army ground combat forces require a system which can be rapidly deployed by engineer units to clear lanes in minefields. Operations must be capable of being conducted under enemy fire and in daylight or darkness. The Army is acquiring the US Marine Corps Trailer-Mounted M58 Line Charge System, which consists of the M58 high explosive (HE) linear demolition charge, the Mark 22 rocket (5 inch) for projecting the explosive charge across the minefield, a rocket launcher with firing kit, and the standard Army M353 trailer or M200A1 trailer. The M68 inert linear charge is used for training. The charge is contained in a box which is cradled on the rocket launcher. The launcher, in turn, mounts on the trailer. The assembled system is towed by a light forces engineer vehicle to about 50 meters from the edge of a minefield and the rocket is fired pulling the line charge across the minefield with it. In heavy forces, the MICLIC is towed by a tank or engineer M113 Armored Personnel Carrier. After the line charge is resting across the minefield, the operator detonates it, thus neutralizing mines along the 110 meter length of the line charge and 4 meters on both sides. Three MICLIC systems will be issued to each engineer company in Divisional and Corps Combat Engineer Battalions.

CHARACTERISTICS:

System Weight:	2.5 tons
Explosive Line Charge:	Length-110 meters; weight - 1850 lbs
Dimensions of Minefield Breach:	8 meters x 100 meters

SOVIET COUNTERPART:

The Soviets have fielded the M1979, second generation tracked explosive mine breaching system. The M1979, assigned to Soviet Divisional Engineer Battalions, performs similarly to the US MICLIC, clearing a lane approximately 8 meters by 75 meters with a demolition charge.

PROGRAM STATUS:

The USMC MICLIC began production in FY83. The Army procurement began in FY86. Fielding is complete in US Army Europe (USAREUR) and 8th Army (Republic of Korea), and ongoing in Forces Command (FORSCOM).

CONTRACTOR:

Thiokol, Inc. (Shreveport, LA)
Martin Marietta Ordnance System, Inc. (Milan, TN)

Multiple Delivery Mine System (VOLCANO)

MISSION:

VOLCANO is a rapid mine dispensing system. It incorporates the GATOR antitank and antipersonnel mines. These mines are pre-loaded into canisters which can be placed in standard dispenser racks for Army helicopter or ground vehicle use. VOLCANO is composed of mounted launcher racks with mounting hardware, an electrical dispenser control unit and the mine canisters. VOLCANO provides a rapid and flexible means of placing tactical minefields to delay, canalize, and interdict attacking enemy forces. The helicopter system, which will replace the M56 helicopter delivered mine, will permit low altitude, reduced vulnerability and delivery of 960 mines by a single Black Hawk (UH-60A). Five-ton cargo and dump trucks and Tracked Cargo Carrier, M548 mounting similar dispensing systems will also deliver 960 mines to create tactical minefields. Air systems will be issued to combat aviation companies and ground systems to divisional and corps combat engineer companies. Mine canisters will be supplied within the Class V supply system.

CHARACTERISTICS:

VEHICLES	NUMBER OF SYSTEMS	NUMBER OF CANISTERS	NUMBER OF MINES
UH-60A Black Hawk	One-4 Racks	160	960
M817 5-Ton Dump Trk	One-4 Racks	160	960
M814 5-Ton Cargo Trk	One-4 Racks	160	960
M548 TRK Cargo Carrier	One-4 Racks	160	960

SOVIET COUNTERPART:

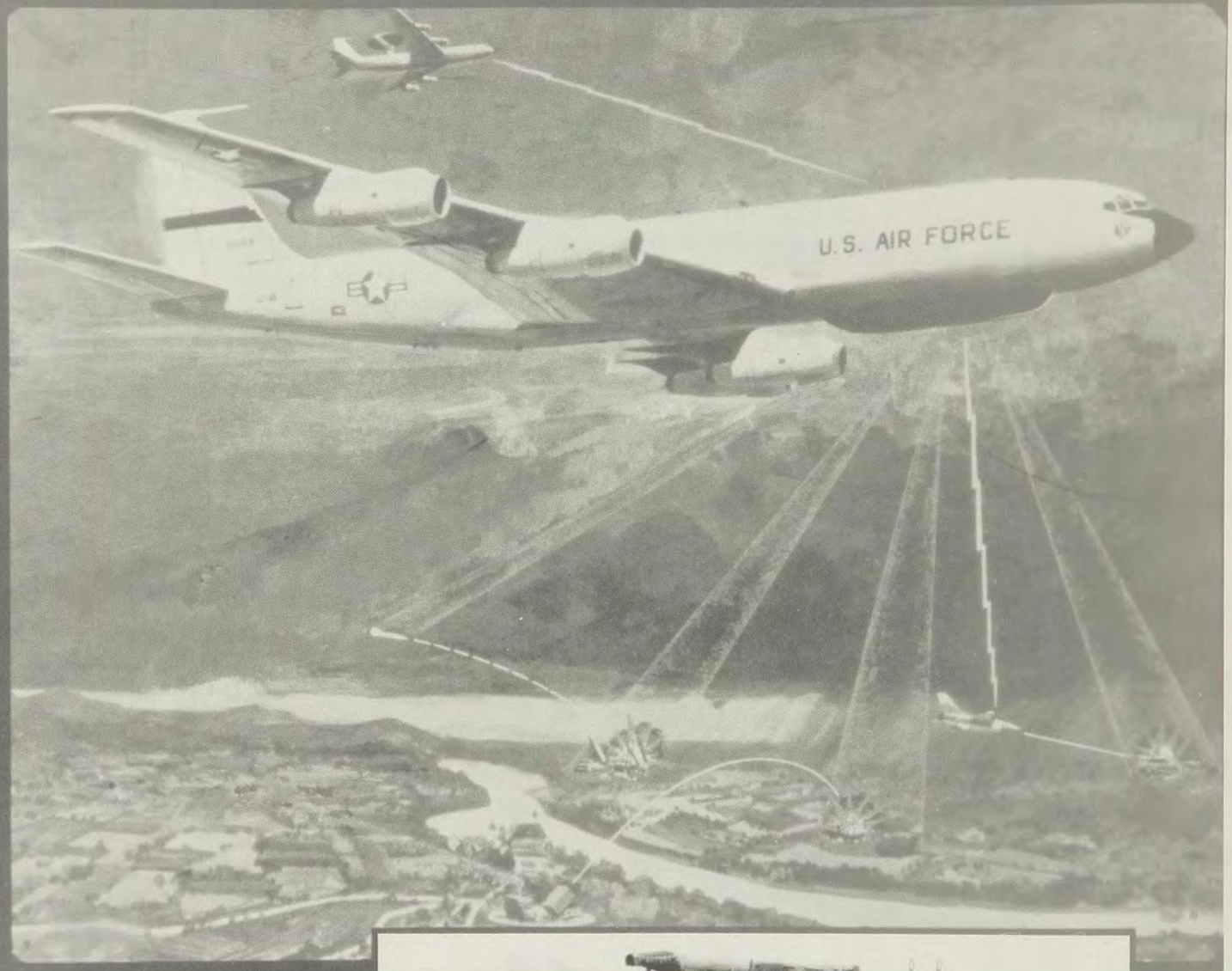
The Soviets can deliver mines from helicopters and ground vehicles, but their systems are not directly comparable to the VOLCANO.

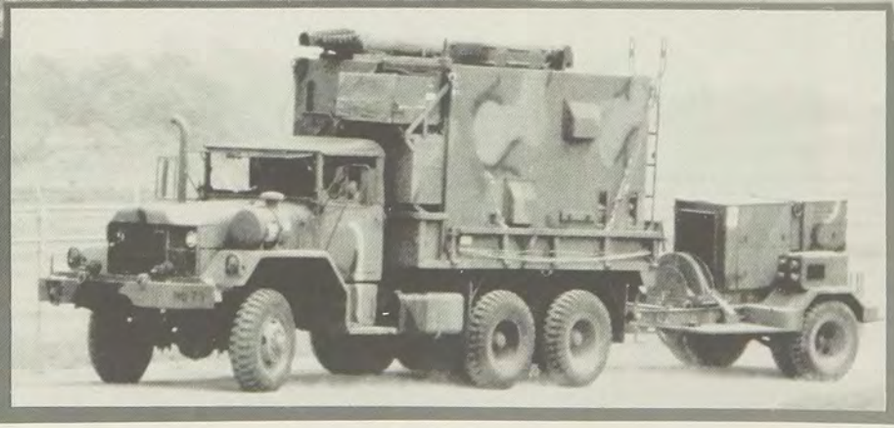
PROGRAM STATUS:

The VOLCANO has been in procurement since FY87 to meet the urgent requirement for Scattermine Systems in the motorized and light infantry divisions.

CONTRACTORS:

Honeywell (Hopkins, MN)
Day & Zimmerman, Inc. (Texarkana


U.S. AIR FORCE



Joint Surveillance and Target Attack Radar System (Joint STARS)

MISSION:

Joint STARS is a battle management and targeting system which detects, locates, tracks, classifies and assists in attacking both moving and stationary targets beyond the Forward Line of Troops (FLOT). This allows the commander to DECIDE (situation intelligence), DETECT (targeting intelligence), and DELIVER (trigger delivery of ordnance, direct attack aircraft or counter enemy movements by maneuver of friendly forces). The Air Force is responsible for the Prime Mission Equipment (PME): platform, radar, data link. The Army is responsible for the Ground Station Modules (GSM)—tactical data processing and evaluation distribution centers that link the Joint STARS radar (through the data link) to Army C3 nodes at corps and division levels. The GSM will process Joint STARS and OV-1D Mohawk radar data. Plans are underway to enhance the GSM to process imaging data from unmanned aerial vehicles and NATO airborne radars. Situation development information is transmitted through the All Source Analysis System—(ASAS) and targeting information is transmitted through the TACFIRE/AFATDS system to their respective users. The GSM program will develop and incorporate nuclear/blast hardening and NBC filtering into a Block II GSM configuration.

CHARACTERISTICS:

Detection range:	In excess of 100 km into hostile territory
Aircraft:	E-8 (militarized Boeing 707)
Target:	Moving, fixed, tank-sized targets

SOVIET COUNTERPART:

The Soviets have a variety of airborne radar systems; however, there is no known Soviet system comparable to Joint STARS.

PROGRAM STATUS:

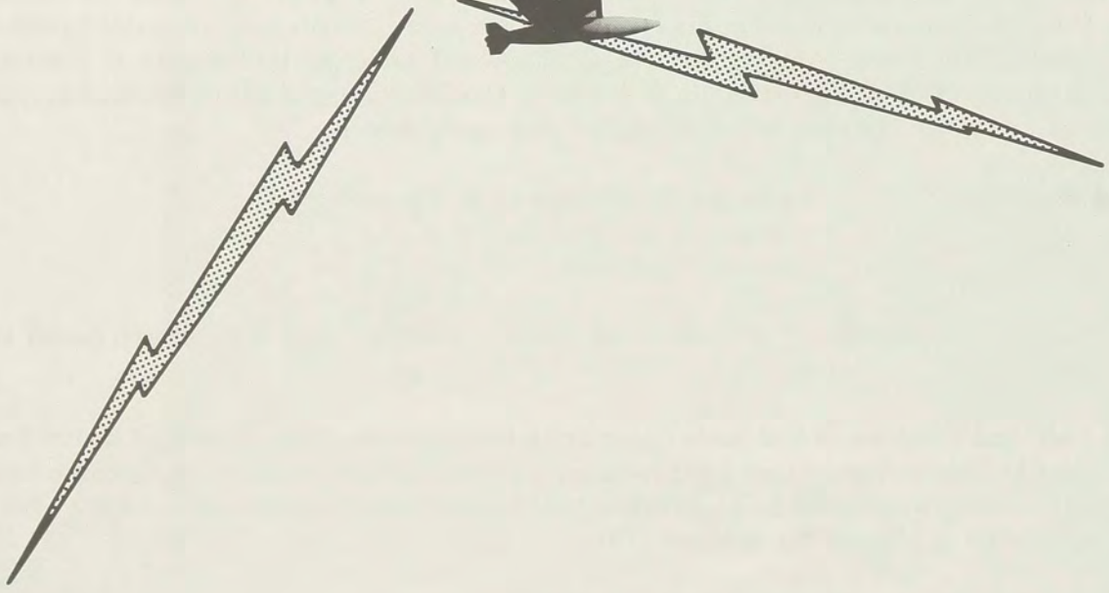
The PME and GSM are in Full Scale Engineering Development. There is also a Limited Procurement Urgent (LPU) of 11 GSM's. Two of these LPU systems are for a NATO effort called the Airborne Radar Demonstration System. A limited operational field test demonstration with the fully operational GSM and a full scale development platform radar is planned for summer 1990.

CONTRACTOR:

Motorola Corporation (Tempe, AZ) (Ground Station)
Honeywell, Incorporated (Minneapolis, MN) (Simulator/Trainer)
Gruman Aerospace (NY/Melbourne, FL) (PME)
Norden Systems Division of United Technologies (Norwalk, CT) (PME)

AN/UPD-7 RADAR SURVEILLANCE SYSTEM

OV-1D MOHAWK AIRCRAFT
W/ AN/APS-94F SIDE LOOKING RADAR (SLAR)
AN/AKT-18B( ) AIRBORNE DATALINK (ADL)



AN/TKQ-2B( )
GROUND STATION TERMINAL (GST)

AN/TSQ-132( )
GROUND STATION MODULE (GSM)

OV-1D (Mohawk) Surveillance System

MISSION:

The OV-1D, MOHAWK, is a two place, twin turboprop, combat aircraft equipped with side-looking, airborne radar (AN/APS—94F) and photographic (KA-60/76) camera capable of monitoring enemy movement in daylight, darkness, and inclement weather. The primary sensor is the AN/UPD-7 airborne radar surveillance system. When used in conjunction with a data link, the radar information is transmitted to a ground based receiving system which has the capability to convert the received signals back to film for near real time viewing analysis. The AN/UPD-7 system is capable of interfacing with the Ground Station Module (GSM) of JSTARS. The radar surveillance system will be modified to improve reliability, availability, and maintainability by replacing obsolete components.

CHARACTERISTICS:

	Side looking Airborne
Mission Weight:	18,587 lbs.
Cruise Speed:	210 knots
Endurance:	4.0 hours
Maximum Range:	820 nautical miles
Crew:	2
Armament:	Not Applicable
Payload (mission equipment)	2,129 lbs.

PROGRAM STATUS:

The OV-1D is currently deployed in Military Intelligence Battalions (Aerial Exploitation): three Outside Continental United States (OCONUS), two in Forces Command (FORSCOM), and two in the National Guard.

CONTRACTORS:

Grumman Aerospace (Stuart, FL)
Motorola Inc. (Tempe, AZ)
Lycoming (Stratford, CT)


UNITED STATES ARMY

Quick Fix

MISSION:

Quick Fix is a tactical, electronic warfare, heliborne jamming system configured in the EH-1H, EH-1X, and EH-60A (Black Hawk airframe) helicopters. Each aircraft has the capability to intercept and jam radio communications, and the EH-1X and EH-60 (Quick Fix II) versions can also locate communication transmitters. The Army plans to buy 66 Quick Fix II aircraft. Quick Fix aircraft will be organic to division and armored cavalry regiment.

CHARACTERISTICS:

	EH-1H	EH-1X	EH-60A
Mission Gross Weight (lbs)	8,800	9,200	16,500
Cruise Speed:	100 knots	100 knots	137 knots
Endurance:	1.7 hours	1.5 hours	2.0 hours
Maximum Range:	250 nautical miles	250 nautical miles	266 nautical miles
Crew:	3	4	4
Armament:	Not Applicable	Not Applicable	Not Applicable
Payload (mission equipment):	1,050 lbs.	1,557 lbs.	2,130 lbs.

SOVIET COUNTERPART:

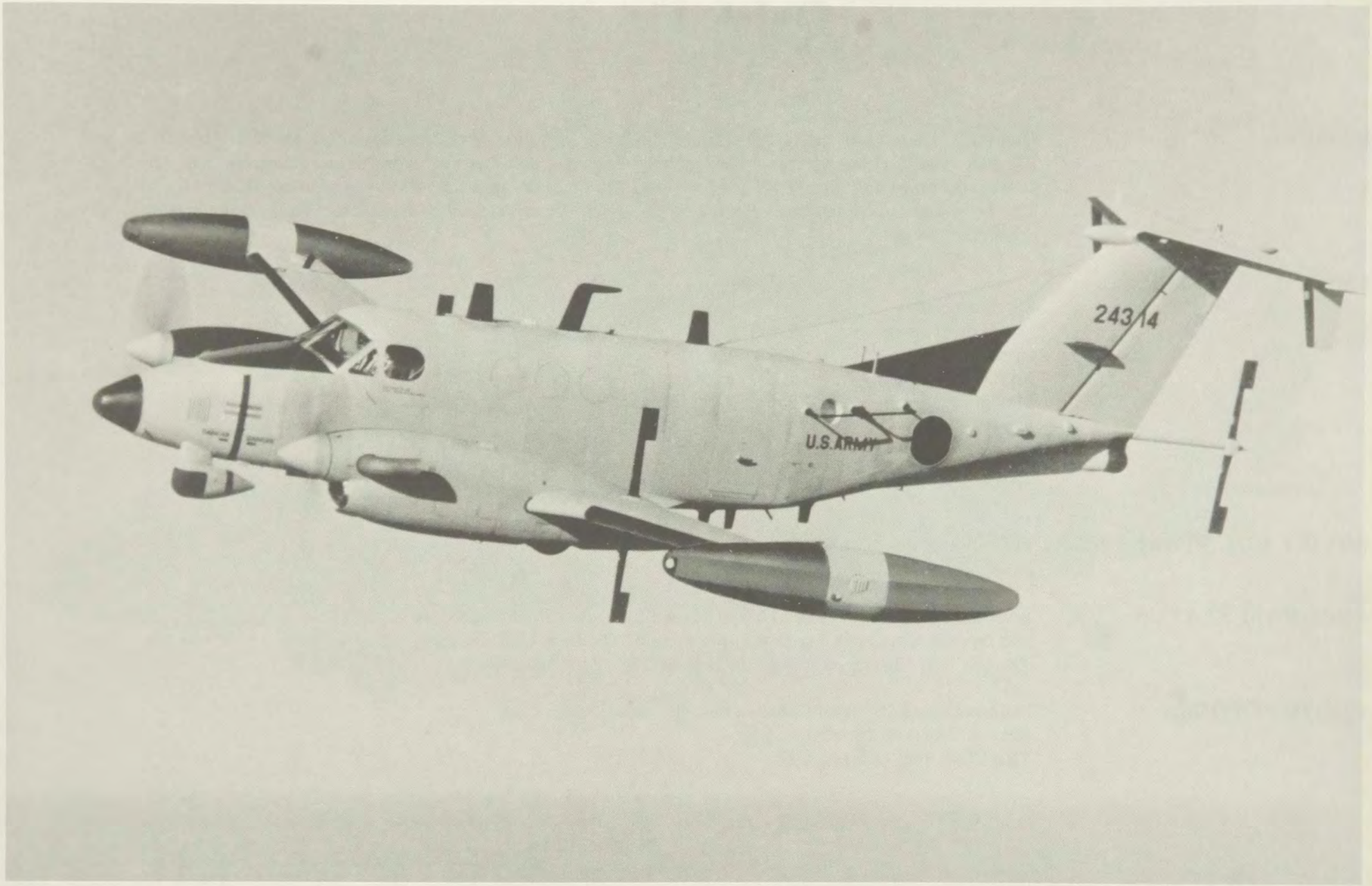
The Soviets have fielded a family of dedicated electronic warfare helicopters using at least two variants of the MI-8 and MI-17 helicopters.

PROGRAM STATUS:

Several interim EH-1H Quick Fix systems are currently fielded; the interim EH-1X system has ended production, and the EH-60A Quick Fix II is in production. The First Unit Equipped date for Quick Fix II was May 1988. The last unit fielding of Quick Fix II is scheduled for May 1990.

CONTRACTORS:

Electromagnetic Systems Laboratories, Inc. (Sunnyvale, CA)
Sikorsky Aircraft (Stratford, CN)
TRACOR, Inc. (Austin, TX)



GUARDRAIL/COMMON SENSOR

RC-12

Guardrail

MISSION:

Guardrail, a combined airborne and ground communications intelligence system, is designed to intercept and locate enemy communications emitters. The system provides timely and accurate data on enemy locations and plans, and will enable the commander to concentrate his combat resources at the critical time and place. The Guardrail V system uses the RU-21H aircraft; the Improved Guardrail V system uses the RC-12 aircraft; and, the future Guardrail Common Sensor system, which combines communications and electronic intelligence sensors, will use the RC-12K airframe. Guardrail Common Sensor will provide targeting accuracies for ATACMS to effectively employ its Block I Munition.

CHARACTERISTICS:

	RU—21H	RC—12D	RC—12K
Mission Weight:	10,200 lbs.	14,200 lbs.	16,000 lbs.
Cruise Speed:	176 knots	200 knots	250 knots
Endurance:	4.0 hours	5(+) hours	5(+) hours
Maximum Range:	1,000 nautical miles	1,200 nautical miles	1,200 nautical miles
Crew:	2	2	2
Armament:	Not Applicable	Not Applicable	Not Applicable
Payload (mission equipment)	1,126 lbs.	2,027 lbs.	1,413 lbs.

SOVIET COUNTERPART:

The Soviets have a wide variety of airborne and ground-mounted electronic warfare systems. There is no known Soviet system comparable to Guardrail, although the AN—12 CUB C performs similar missions.

PROGRAM STATUS:

Two Improved Guardrail V units were deployed in 1985. Contractor work for the Guardrail Common Sensor system mounted in the RC-12K started in 1984 and will enter the inventory in 1991.

CONTRACTORS:

Beech Aircraft Corporation (Wichita, KS)
Electromagnetic Systems Laboratories, Inc. (Sunnyvale, CA)
UTL Corporation (Dallas, TX)
IBM (Oswego, NY)

Black Hawk

MISSION:

The UH-60 Black Hawk is replacing the UH-1 "HUEY" in air assault, air cavalry, and aeromedical evacuation missions. The Black Hawk can carry more than twice the UH-1 payload and is capable of transporting an entire 11-man, fully equipped squad faster and in most weather conditions. The Black Hawk is the first utility/assault helicopter that adds to the Army's Division level mobility; for example, it can reposition a 105mm howitzer, its crew of 6, and up to 30 rounds of ammunition in a single lift. Its critical components and systems are armored or redundant to enable it to withstand multiple small arms hits, and its airframe is designed to progressively deform on impact to protect the crew and passengers in a crash. Advanced technology in the Black Hawk makes it easier to maintain in the field than any other helicopter in the world. Black Hawk's full squad carrying ability significantly improves the small-unit commander's ability to retain control of his forces under combat conditions, and permits more rapid replacement of ammunition and other combat consumables in a high intensity war.

CHARACTERISTICS:

Max Gross Weight:	20,250 lbs.
Cruise Speed:	145 knots
Maximum Range	330 nautical miles
Crew:	2 pilots, 1 crew chief
Armament:	Two 7.62mm machine guns
Payload:	2640 lbs. (or 11 combat equipped troops) at 4000 ft./95°F

NOTE: Performance characteristics at primary mission weight of 16,953 lbs.

SOVIET COUNTERPART:

The HIP series, much slower and used by the Soviets as a troop carrier and general cargo transport, can carry up to 24 troops.

PROGRAM STATUS:

Black Hawk is being procured under a four year, fixed-price multiyear contract covering FY88 to FY91. The Army has fielded the UH-60A Black Hawk to high-priority units in the continental United States (CONUS), Europe, Korea, Panama, and U.S. Army Western Command (WESTCOM). UH60L, now in production, is being used to identify production aircraft with the new T700-GE-701C engine. Deliveries will continued to U.S. Army Forces Command (FORSCOM), U.S. Army Training and Doctrine Command (TRADOC), U.S. Army Europe (USAREUR), and to Reserve and National Guard units.

CONTRACTORS:

Sikorsky (Stratford, CT)
General Electric (W. Lynn, MA)

CH-47 Modernization

MISSION:

The CH-47 Chinook, the Army's only medium-lift helicopter, is a twin-engine, tandem rotor, cargo helicopter. Designed in the 1950's and fielded in 1962, the CH-47's primary missions are movement of ammunition, repair parts, petroleum and tactical movement of artillery, troops, and special weapons on the battlefield. In 1975 a modernization program was approved to upgrade the CH-47A, B, and C models into a new "D" model configuration. These improvements extend the useful life of the fleet beyond the year 2000. The modernization includes new fiberglass rotor blades, transmission and drive systems, modularized hydraulics, electrical systems, advanced flight controls, triple hook cargo system, and an auxiliary power unit. These features greatly enhance reliability, maintainability, productivity, survivability, and safety of the medium-lift fleet.

CHARACTERISTICS:

Max Gross Weight:	50,000 lbs.
Cruise Speed:	162 knots
Endurance:	2.2 hours
Maximum Range:	300 nautical miles
Crew:	2 pilots, 1 crew chief
Armament:	Not Applicable
Payload:	15,873 lbs. (or 33 troops) @ 4000 ft., 95°F

SOVIET COUNTERPART:

The Soviets have one helicopter in the medium-lift category, the upgraded "HIP." It is not considered equal in performance or efficiency to the improved Chinook. They do, however, have the HOOK and HALO heavy lift helicopters.

PROGRAM STATUS:

Planned production has been raised from 328 to 472 which will complete the modernization of the fleet to the "D" model configuration. Aircraft deliveries are on schedule. The program has been on cost since its inception. The Initial Operational Capability (IOC) date was attained in February 1984.

CONTRACTORS:

Boeing Vertol (Philadelphia, PA)
AVCO-Lycoming (Stratford, CT)

SPECIAL OPERATIONS AVIATION (SOA)

MH-47E

MH-60K

Special Operations Aircraft (SOA)

MISSION:

The Special Operations Aircraft (SOA) are modified Black Hawk (UH-60L) and medium-lift Chinook (CH-47D) helicopters that will provide the Army with the capability for low level, night, adverse weather, extended range, precision navigation through unfamiliar mountainous terrain. Both the utility and medium-lift version (designated MH-60K and MH-47E, respectively) will be provisioned with extended range fuel systems including an aerial refueling capability, upgraded engines and worldwide communications equipment. Additional improvements include a totally integrated cockpit, which dramatically reduces pilot workload, as well as improved terrain following/terrain avoidance radar and forward looking infrared radar capability. Their missions cover rapid deployment, strategic intelligence strikes, and other operational missions supported by the Special Operations Forces.

CHARACTERISTICS:

	MH-47E	MH-60K
Mission Weight:	54,000 lbs.	24,500 lbs.
Cruise Speed:	138 knots	122 knots
Endurance*:	9.8 hours	7.6 hours
Maximum Self Deployment Range*:	1260 nautical miles	755 nautical miles
Crew:	4	4
Armament:	2 - 50 calibre machine guns	2 - 50 calibre machine guns
Payload:	42 troops	12 troops

*unrefueled w/30 min reserve: however, also has air-to-air refuel capability.

SOVIET COUNTERPART:

The Soviet MI-8 is a medium-lift helicopter and the MI-26 is a heavy lift helicopter. The HIP series and HALO performs troop carrier and general cargo transport.

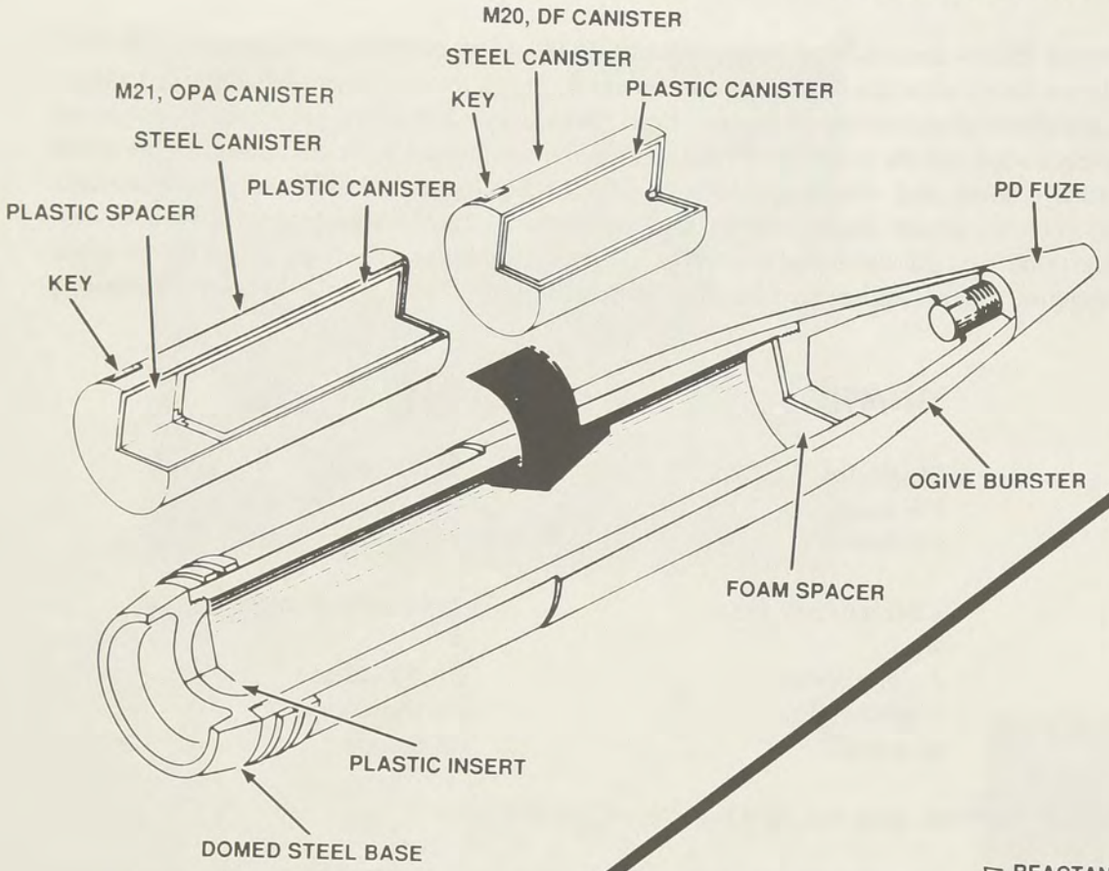
PROGRAM STATUS:

The MH-47E and MH-60K are currently under development. MH-47E production is anticipated to begin in FY91 with First Unit Equipped (FUE) date during the 4th Qtr, FY92; for MH-60K 4th Qtr, FY92. The SOA program will provide 23 MH-60K and 51 MH-47E aircraft.

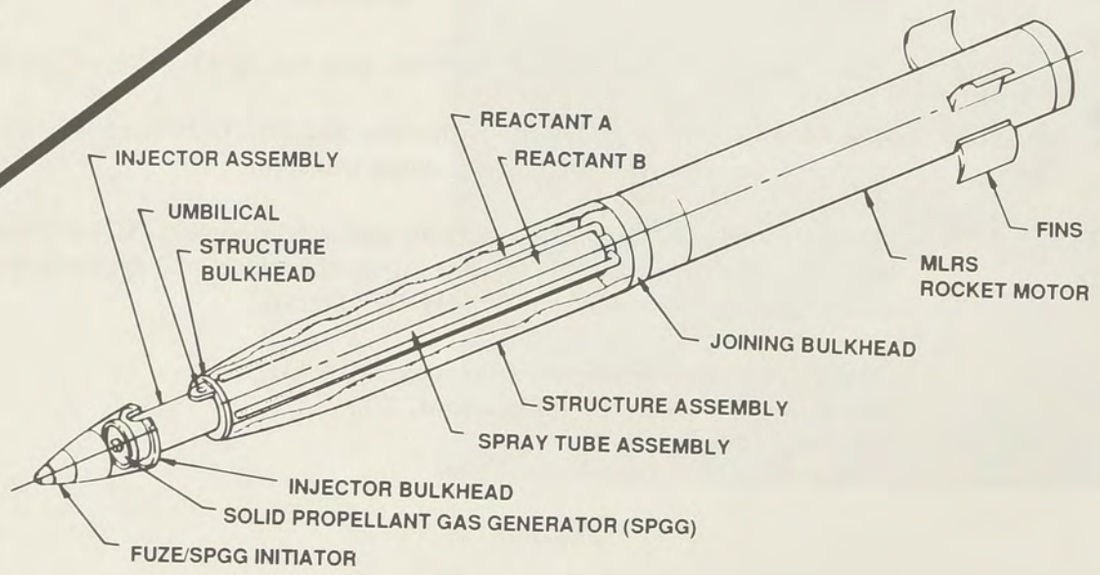
CONTRACTORS:

Boeing Helicopter Company (Philadelphia, PA)
Sikorsky Aircraft Division (Stratford, CT)
IBM FSD (Owego, NY)

155mm CHEMICAL PROJECTILE



MLRS BCW ROCKET



Binary Chemical Munitions

MISSION:

National defense policy dictates that the United States reestablish a credible retaliatory chemical warfare capability. This policy is based on the belief that such a capability is the most effective deterrent to the first use of chemical weapons by a potential enemy. The Army's Chemical munitions stockpile has an average age of 27 years and is becoming obsolete through deterioration. The binary chemical munition is a means of modernizing this stockpile in a manner which is both technologically feasible and environmentally acceptable. The binary concept is a process by which a lethal chemical agent is formed from nonlethal components by means of a chemical reaction during flight of the weapon to a target. Significant advantages over current conventional chemical munitions are achieved in safety, transportation, production, storage, handling and final disposal.

CHARACTERISTICS:

Type binary munitions: Binary Chemical Warhead for the Multiple Launch Rocket System
155mm Binary Chemical Projectile

SOVIET COUNTERPART:

Soviet forces are trained, equipped and structured to perform offensive and protective chemical warfare actions on the battlefield. They have produced, stockpiled and deployed large quantities of chemical agents and munitions. They have the tactical doctrine for the use of chemical weapons against targets for which they are best suited to gain tactical advantage. The circumstances under which the Soviets would initiate chemical warfare are not known. Their ability to do so, however, is undeniable, and they are likely to use chemical weapons against high priority, selected targets. Chemical weapons already have been produced by third world countries and were used in the Iran/Iraq war. The current inadequacy of the US retaliatory capability increases the probability of chemical weapons use by the Soviets and other nations.

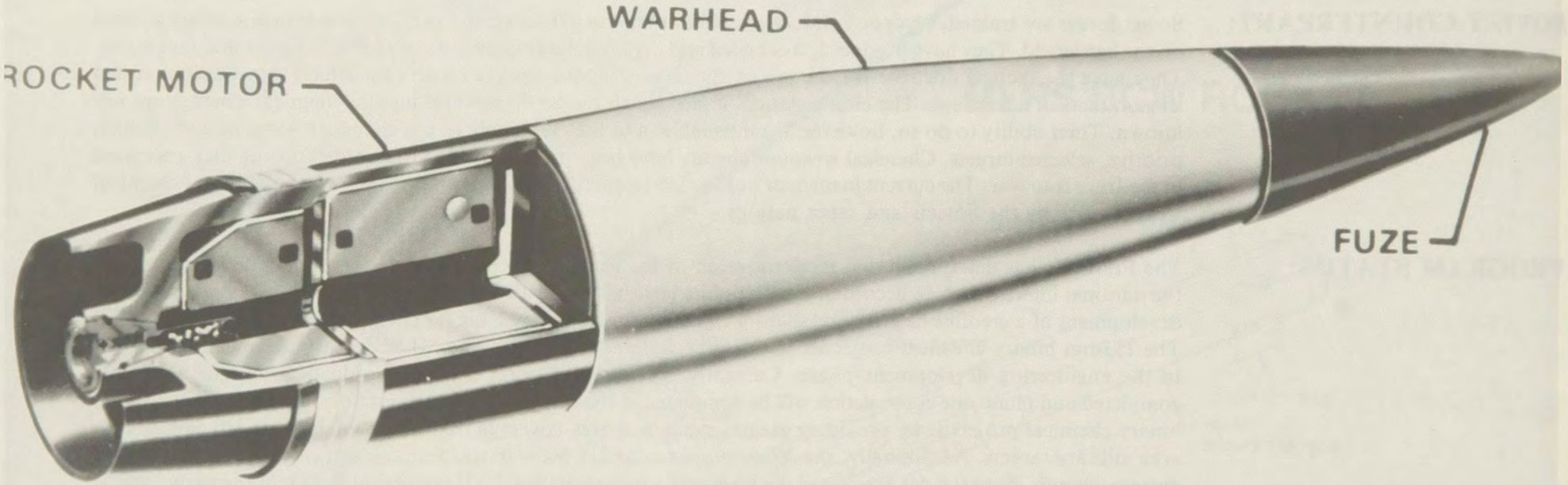
PROGRAM STATUS:

The President has determined that modernization of the chemical deterrent retaliatory stockpile is essential to the national interest and, in accordance with public law, has so certified to the Congress. The Army is pursuing development of a credible deterrent retaliatory capability by adding two binary chemical munitions to its arsenal. The 155mm binary chemical projectile has entered initial production. The MLRS binary chemical warhead is in the engineering development phase. Currently the pre-production and full-production designs are being completed and phase one construction will be completed in the early 1990's. This system complements the 155mm binary chemical projectile by providing greater range and area coverage than front line artillery to engage rear area military targets. Additionally, the Army supports the US Navy in the development of the BIGEYE binary chemical bomb. Both the Air Force and the Navy will procure the BIGEYE bomb and field it in the early 1990's.

CONTRACTORS:

Marquardt Company (Van Nuys, CA)
Morton Thiokol Corporation (Shreveport, LA)
Combustion Engineering Operations and Maintenance Corporation (Pine Bluff, AK)
LTV Corporation (Dallas, TX)
KDI Corporation (Cincinnati, OH)
Parsons Company (San Diego, CA)

PROJECTILE, 155MM; NUCLEAR, XM785



Improved Nuclear Projectiles

MISSION:

The mission of the Non-Strategic Nuclear Forces is to deter both nuclear and conventional attack by enemy forces, and, should deterrence fail, to support the defense of the theater. The improved 155mm nuclear projectile will replace the current 155mm Artillery Fired Atomic Projectile which was developed in the 1950's. It will be more effective than the current 155mm nuclear projectile because of its improved reliability, increased range, and greater yield. Additionally, it contains security devices and command-disable features that prevent unauthorized use. It is compatible with the FH 70 NATO Howitzer and will be ballistically similar to the M549, high-explosive, Rocket Assisted Projectile. Fielding of an improved 155mm nuclear projectile will improve the effectiveness and survivability of tactical nuclear forces by providing a modern nuclear capability to US and NATO 155 cannon artillery units.

SOVIET COUNTERPART:

The Soviets have a wide variety of tactical nuclear weapons. The number of nuclear capable and potentially nuclear-capable artillery cannons has increased by well over a factor of ten in the last decade.

PROGRAM STATUS:

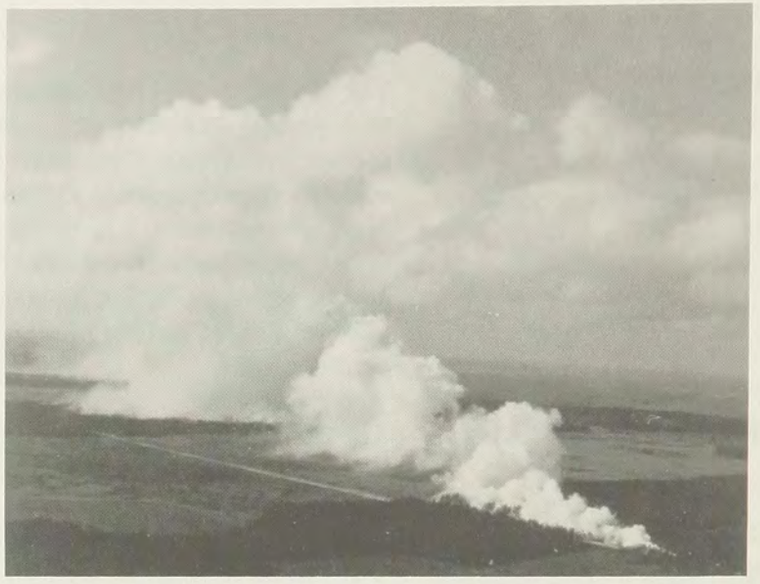
The improved 155mm nuclear projectile is in Full Scale Engineering Development. It is a joint development between the Army and the Department of Energy.

CONTRACTORS:

Motorola Corp. (Scottsdale, AZ)
Sandia National Laboratories (Livermore, CA)
Sandia National Laboratories (Albuquerque, NM)
Chamberlain Manufacturing Corp. (Waterloo, IA)
Lawrence Livermore National Laboratory (Livermore, CA)
Ferrulmatic, Inc. (Patterson, NJ)

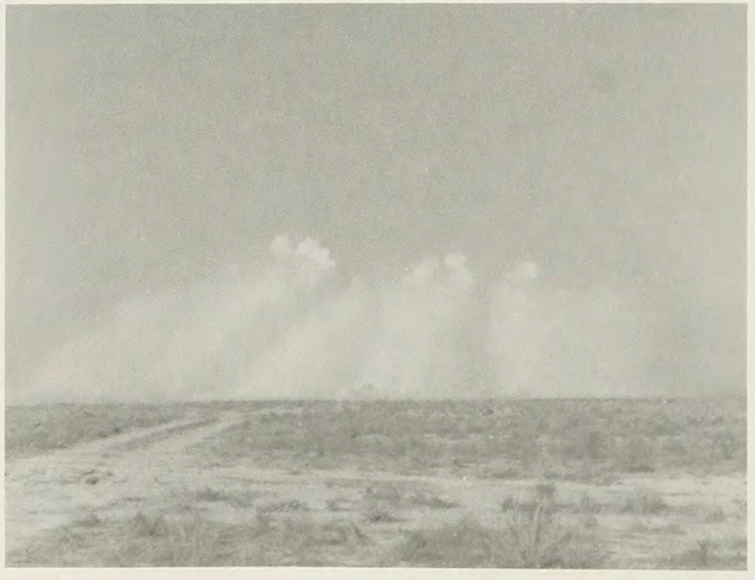
SMOKE AND OBSCURANTS

INITIAL BURST OF M76
IR GRENADES



SMOKE FORMED FROM LARGE
AREA SMOKE SCREENING

XM55 PRODUCING IR SMOKE
ON M998 HMMWV



M825 WHITE PHOSPHORUS
SMOKE PROJECTILE

Smoke and Obscurants

MISSION:

Smoke and obscurants greatly improve survivability on today's high intensity battlefield. Smoke grenades deployed from combat vehicles produce an instantaneous screen that defeats enemy electro-optic sensors and weapon guidance systems. Artillery, mortar and rocket delivered smoke rounds can be directed on enemy units or between friendly and enemy positions to degrade enemy vision or to screen the advance of friendly forces. Mounted on tactical and combat vehicles, large area screening-smoke systems help obscure high priority targets (airfields, bridges and ammunition depots) as well as convoys and troop movements.

SOVIET COUNTERPART:

Soviet doctrine emphasizes extensive use of smoke during tactical operations. They achieved remarkable success in reducing personnel and materiel losses with smoke tactics in World War II. The Soviet intention to employ smoke against NATO forces is clearly demonstrated by the level of smoke usage in Warsaw Pact exercises. They have extensive capability to produce visual smokes. Indications suggest that the Soviets are expanding their obscurant capability to other electromagnetic spectra.

PROGRAM STATUS:

Smoke and obscurants include a family of currently fielded smoke grenade launchers providing self-protection to armored vehicles. These systems degrade electro-optical devices such as day and night sights, anti-tank guided missiles, and laser range finders. Expanded capabilites are required to screen the infrared and millimeter regions of the electromagnetic spectrum in order to defeat advanced target and guidance systems. An infrared defeating smoke grenade (M76) is in production, and a millimeter screening grenade (XM81) is in development. In addition, the CVDOS program to enhance armored combat vehicle survivability includes a multi-salvo smoke grenade launcher (XM6) which is now in development. It will provide the capability to launch a variety of multispectral smoke grenades more than once without reloading. Projected smoke systems are being improved by changing from bulk-filled to submunition designs. The new design yields a several fold improvement in obscuration effectiveness for the same quantity of munitions. The M259 2.75 inch smoke rocket, M825 155mm smoke projectile and M819 81mm smoke mortar cartridge are examples of the submunition concept. Large area screening capability is being improved through recently fielded mobile smoke generators mounted on M113's and HMMWV's (M1059 and M157, respectively). Development is underway on Large Area Screening Systems (LASS) with visual, infrared and millimeter wave screening capabilities (XM55/56) mounted on HMMWVs. The XM56 Smoke (LASS)/DECON System will also be capable of decontaminating chemical warfare agents.

CONTRACTORS:

AAI Corp. (Combat Vehicle Defense Obscurants System development) - (Towson, MD)
MRC Division of Chamberlain Manufacturing Corp (XM55/56 Full Scale development) - (Hunt Park, MD)
Minowitz Manufacturing Corp. (M157 production) - (Detroit, MI)
Tierney (Turbines for XM55/56 development) - (Detroit, MI)
Engineered Air Systems Inc. (M157 production) - (St. Louis, MO)

The Combat Service Support mission area relates to providing tactica1 commanders with supply, maintenance, personnel and administration, civil affairs, medical, transportation, and other services. In terms of equipment modernization of the force, this handbook includes those major items that the Army is developing to improve its tactical transportation capability.

COMBAT SERVICE SUPPORT

Truck, 5 Ton, 6x6 (M939A2)

MISSION:

The 5 ton truck is a diesel-powered, 6-wheel drive tactical vehicle. The M939 series is improved over the old M809 series with new commercial components such as engine, transmission and brakes. It comes in six body styles: cargo, dump, tractor, wrecker, van and long wheelbase cargo. The FY85-90 multi-year procurement provides M939A2 series trucks which include a new lightweight, fuel efficient engine and central tire inflation system (CTIS) for improved mobility. The 5 ton trucks meet the requirement for general cargo transport, unit mobility and special purpose use. It supports fielding of many other systems such as Patriot, DEPMEDS, Apache, and MLRS.

CHARACTERISTICS:

Six body styles	
Payload:	5 ton
Speed (MPH highway):	52
Engine:	Diesel
Horesepower:	240
Drive	6X6

SOVIET COUNTERPART(S): **URAL 375**

Payload:	4.5 ton
Speed:	47
Engine:	Gasoline
Horespower:	175
Drive:	6X6

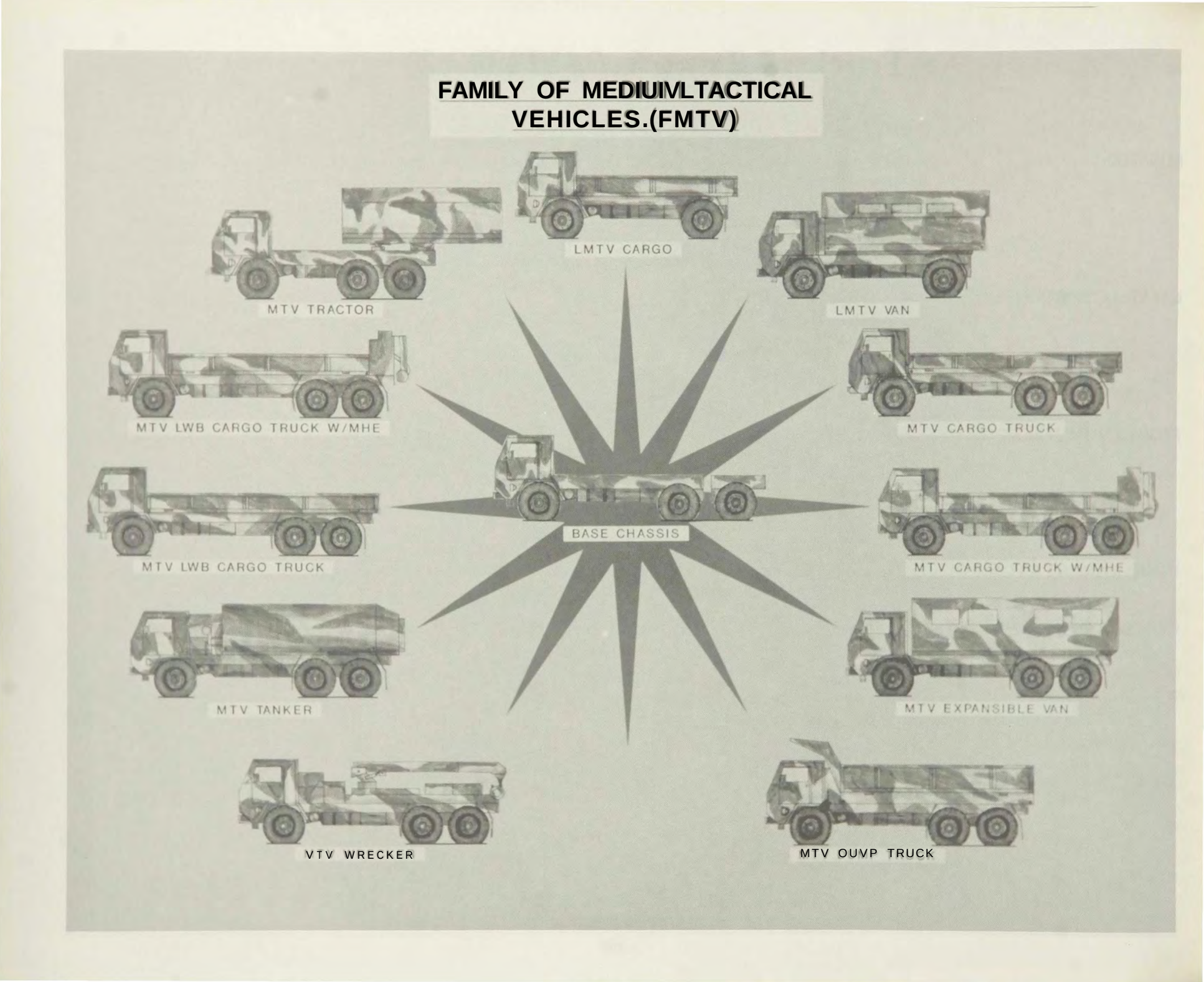
PROGRAM STATUS:

The first production contract was awarded in FY85. FY 89 was the fourth year of the multi-year contract, the fifth year of the MYP was cancelled.

CONTRACTOR:

BMY, York, PA. Production facilities located in Marysville, Ohio.

FAMILY OF MEDIUIVLTACTICAL VEHICLES.(FMTV)



Family of Medium Tactical Vehicles (FMTV)

MISSION:

The FMTV consists of a family of vehicles based on a common truck chassis defined by payload. The Light Medium Tactical Vehicle (LMTV) has a 2-1/2 ton payload capacity consisting of cargo and van body model variants, including a companion 2-1/2 ton full cargo trailer. The Medium Tactical Vehicle (MTV) has a 5 ton payload capacity consisting of the following models: cargo with and without material handling equipment (MHE), long wheel base cargo (with and without MHE), tractor, wrecker, dump, expansible van and tanker, including a companion 5 ton full cargo trailer. The FMTV will perform line haul, local haul, unit mobility, unit resupply and other missions in combat, combat support, and combat service support units. Vehicles will operate worldwide on primary and secondary roads and trails. The FMTV will supplement and replace existing and aging 2-1/2 ton trucks and 5 ton trucks.

CHARACTERISTICS:

	LMTV Cargo	**MTV** Cargo
Payload, lbs.	5000	10000
Towed load, lbs.	7500	21000
Cargo bed length, inches	147	168
Engine type	Diesel	Diesel
Transmission	Automatic	Automatic
Drive	4 x 4	6 x 6
Range, integral fuel at Gross Combined Weight	300 miles	300 miles

SOVIET COUNTERPART(S): LMTV Track - ZIL-131, GAZ-66, ZIL-157; MTV Truck - URAL 375

PROGRAM STATUS:

Three contracts to provide protoype vehicles for competitive evaluation and testing were awarded in 1988. The results of testing and evaluation will support the production source selection. Milestone III production decision and award are scheduled for 1991.

CONTRACTOR:

Contractors for the protoype phase are: Tactical Truck Corportation (Livonia, MI), Stewart/Stevenson Services (Houston, TX), and Teledyne-Continental Motors (Muskegon, MI). The production contractor will be selected from the three prototype contractors.

Heavy Expanded Mobility Tactical Truck (HEMTT)

MISSION:

HEMTT vehicles perform a variety of missions of varying duration. Current tactical doctrine states that support for combat elements should occur as far forward as possible. HEMTT vehicles are used for resupply, refueling, and recovery operation. MLRS units use the M985 HEMTT cargo for wheeled ammunition resupply between the Self-Propelled Launcher Loaders (SPLL) and Ammunition Supply Points (ASP). Self-Propelled artillery units use the M977 for resupply of ammunition between the Field Artillery Ammunition Support Vehicle (FAASV) and the ASP due to the requirement for FAASV to remain with the firing units. Armor and cavalry units use the M977 HEMTT cargo for continuous ammunition resupply to the Armored Forward Area Rearm Vehicle (AFARV). The AFARV will then move forward to rearm tanks and fighting vehicles. Vehicles refueling in the combat area must be accomplished as far forward as possible using the M978 HEMTT tanker to move POL forward from battalion trains to preselected areas close to the Forward Line of Troops (FLOT) where combat vehicles will withdraw to refuel. High mobility and high load capacity of the HEMTT are requirec to successfully perform this misssion. The M984E1 wreckers used in the recovery role for other HEMTTs or other tactical vehicles were mobility, load, capacity lift, and winch capability of HEMTT is required to recover vehicles in the forward battle areas. The M983 HEMTT tractor will function as a support vehicle for Patriot Missile System and Pershing. The HEMTT Family is assigned to Army Armor, Field Artillery, Engineer, Missile, Air Defense Artillery, Aviation and Cavalry units worldwide.

CHARACTERISTICS:

Five body styles with common chassis	Transport	C-130
Payload:	10 ton	445 BHP
Speed (MPH highway):	55	60% Grade at GVWR
Engine:	Diesel	30% Side slope
Horsepower:	445	Fully automatic transmission
Drive:	8x8	43 Approach/45 Depart engines
Width:	96 in	Cab/Forward
Ground clearance:	13 in	Super single radial tires
Fording depth:	48 in	Traction transfer differentials (both
Material Handling equipment		rear axles)

SOVIET COUNTERPART:

	KRAZ 255B	ZIL-135	MAZ-7310
Payload:	7½ ton	8-10 ton	16 ton
Speed (MPH highway):	70	40	40
Engine	Diesel	Gas	Diesel
Horsepower:	240	300	520
Drive:	6x6	8x8	8x8

PROGRAM STATUS:

The HEMTT is a Nondevelopmental item (NDI) program. The first contract was awarded in 1981 and the second in 1986. A total of 11,498 HEMTTs have been purchased with 10,108 delivered and 9,000 + fielded. The HEMTT is currently in production.

CONTRACTOR:

Oshkosh Truck Company, Oshkosh, Wisconsin


B32

Heavy Equipment Transporter System (HETS)

MISSION:

The HETS consists of the M1070 Truck Tractor and M1000 Semitrailer, 70 Ton. Each is being procured under separate acquisition programs. The HETS is required to transport, deploy and evacuate the M1 Series Main Battle Tank (MBT) and other tracked vehicles on highway, unimproved roads and cross-country. Current HETS (M746/M911 with M747) demonstrates very poor durability when overloaded beyond 60 tons. HETS will transport 70 ton payloads, primarily M1 series tanks. Operates on OCONUS highways; on CONUS highways with permits. Interoperable with current HETS and German HET system. Pass under 4 meter underpass when loaded with M1 series tank. Military load classification (MLC) of 95 or less. Negotiates 90 degree intersection of two 30 ft. highways.

CHARACTERISTICS:

Speed:	40-45 mph	With 70 ton payload:	25-30 MPH
Range:	300 mi		
Transport:	C-5 Aircraft		
Mobility:	95% on road	51% off—road	
RAM:	3,000 MMBHMF for both tractor and trailer.		

SOVIET COUNTERPART(S):

PROGRAM STATUS:

The HETS is a Nondevelopment Item (NDI) program. Two separate programs; one for trailer and one for tractor. Trailer procurement to lead tractor procurement by five to six months. Trailers will be fielded for use with current HET tractors (M746/M911), follow-up with new tractor 11-12 months later. Trailer and tractor to be fielded separately.

CONTRACTOR:

In-House: PEO, Combat Support TACOM, Warren, MI
Contractor: Oshkosh, Oshkosh, WI (tractor)
Southwest Mobile Systems, St. Louis, MO (trailer)

PLS

Paccar

Oshkosh

GM

Palletized Load System (PLS)

MISSION:

The Palletized Load System (PLS) is a 16.5 ton tactical vehicle composed of a prime mover with integral self-load/unload capability, a 16.5 ton trailer, and flatracks (demountable cargo beds). Vehicles can also be equipped with materiel handling equipment and/or winch. The PLS will perform line haul, local haul, unit resupply, and other missions in the support of modernized, highly mobile organizations. The PLS prime movers with associated trailers will selectively replace or augment the standard tactical vehicles currently authorized in units such as Field Artillery and Transportation. Interoperability of flatracks with the equipment of European forces is a requirement.

CHARACTERISTICS:

Truck payload, tons	16.5
Trailer payload, tons	16.5
Flatrack dimensions, feet	8 x 20
Engine Type	Diesel
Transmission	Automatic
Number of Driven Wheels	TBD
Range, integral fuel at Gross Combined Weight	225 miles

SOVIET COUNTERPART:

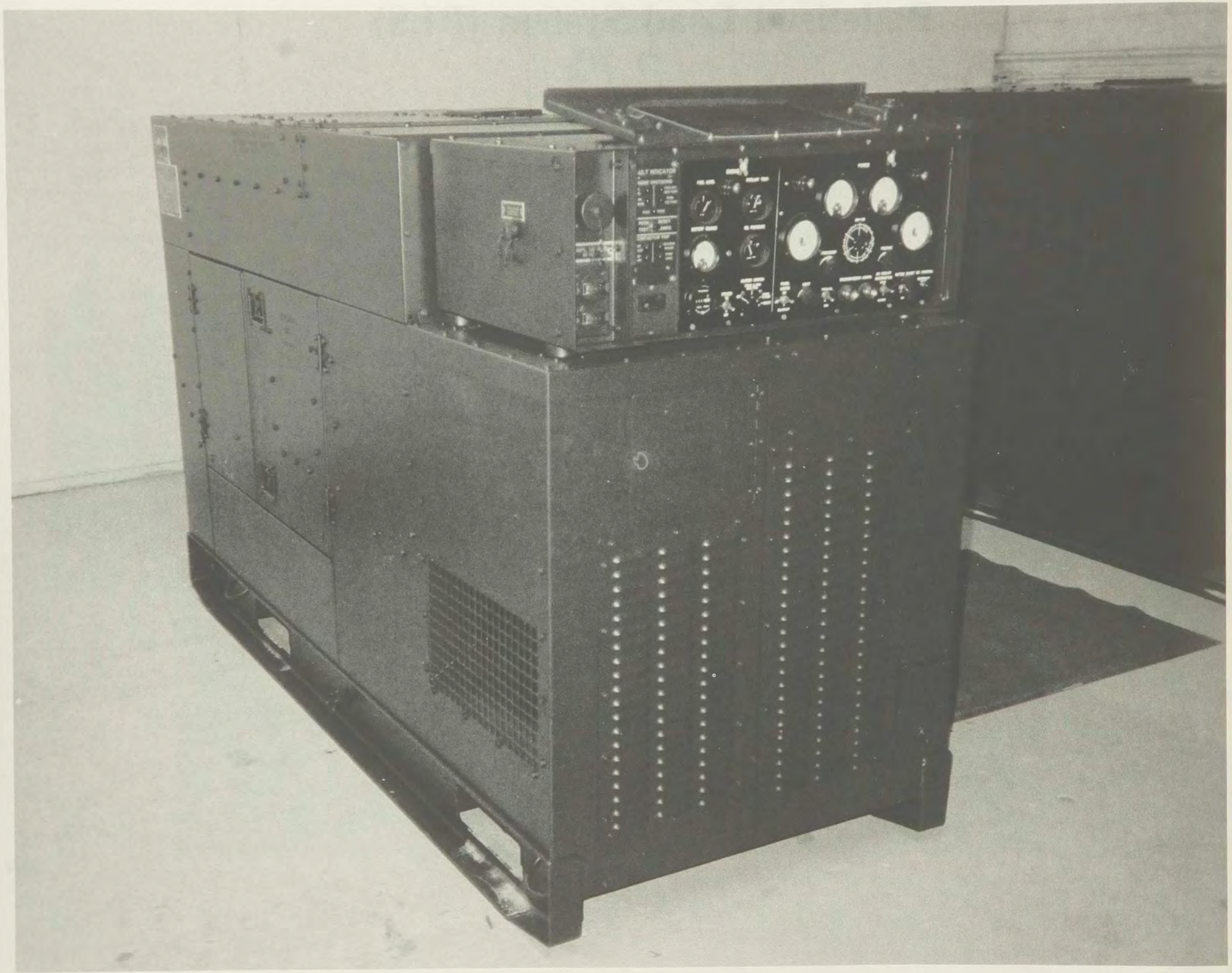
No Known Soviet counterpart.

PROGRAM STATUS:

Three contracts to provide prototype vehicles for competitive evaluation and testing were awarded in 1989. The results of testing and evaluation will support the production source selection. Milestone III production decision and award are scheduled for 1990.

CONTRACTORS:

Contractors for the protoype phase are: General Motors (Warren, MI), Oshkosh Truck Corporation (Oshkosh, WI), and PACCAR (Kirkland, WA). The production contractor will be selected from the three prototype contractors.



Tactical Quiet Generators (TQG)

MISSION:

The Tactical Quiet Generator (TQG) Set is the new DOD Standard family of power sources that meets the users current and future requirements. The new 3KW-200KW TQG provides DOD with more reliable, quieter, lighter weight, single fuel, and improved High-Altitude Electromagnetic Pulse (HAEMP) protected electrical power systems for command post, C3I systems, weapon systems, logistic and maintenance functions and other battlefield support equipment. The new power generators will counter threat forces which have the capability of locating critical targets by detecting the high aural and thermal signatures.

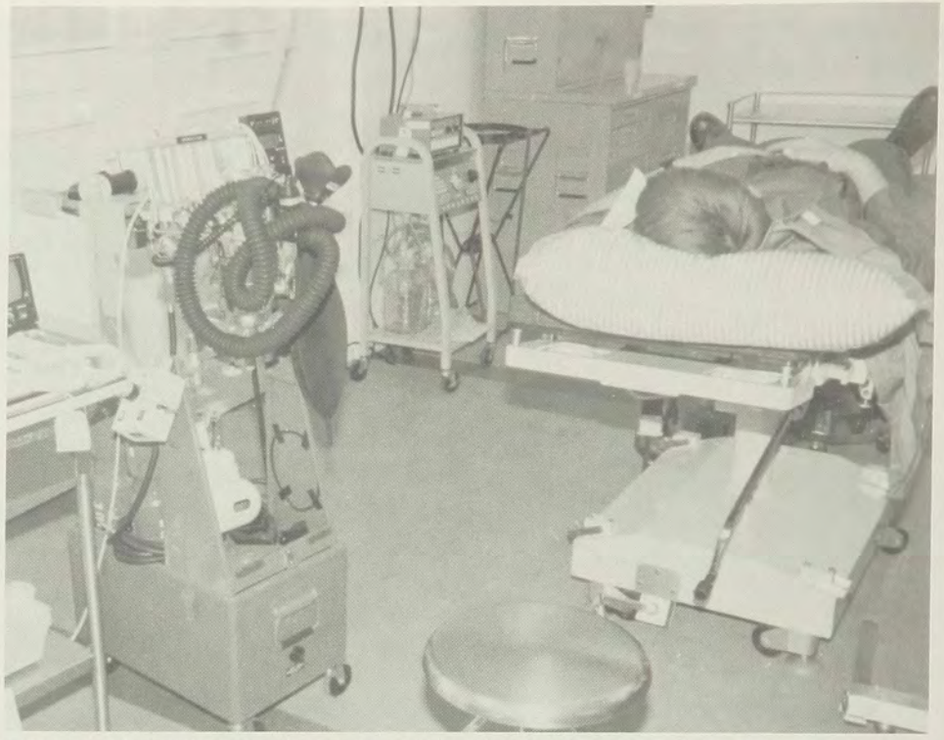
CHARACTERISTICS:

	Current Fleet Performance	**TQG Requirements**
Aural Signature	79-85 dBA @25Ft	70 dBA @7M
Fuel	GAS/DSL/JP4	JP8/DSL
Environment	All Climatic Conditions	3 of 4 Climatic Conditions
k w	1.5-200	3 - 100
Hertz	DC/50/60/400	60, 50/60, 400
HAEMP	No	Yes
IR Suppressed	W/Nets	W/Nets
Reliability (MTBOMF)	140-408 hrs.	500/600 hrs
Standard Voltage Connections	Yes	Yes
Slave Receptacle	Ordnance	NATO

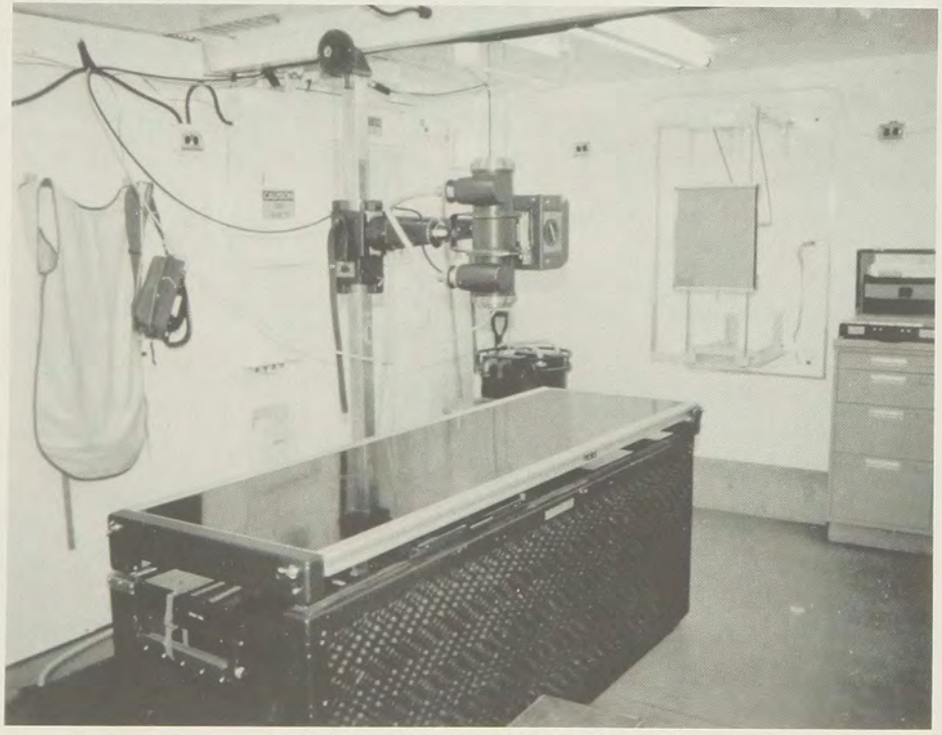
PROGRAM STATUS:

TQG contract award for 5kw-60w TQG sets was made in August 1988. During April 1989 a contract was awarded for the 3kw TQG. The First Unit Equipped (FUE) for the TQG sets is scheduled for third quarter FY92.

400 BED EVACUATION HOSPITAL DEPLOYED
IN A FIELD ENVIRONMENT



PATIENT AWAITING TREATMENT IN HOSPITAL
OPERATING ROOM MODULE



DEPMEDS

DEPLOYABLE X-RAY MODULE

Deployable Medical Systems (DEPMEDS)

MISSION:

The DEPMEDS family of equipment is DOD approved equipment packaged into standardized modules for use by all services to equip their theater of operations deployable hospitals.There are seven types of Army hospitals, ranging from forward deployed MASH (Mobile Army Surgical Hospital) units in the combat zone to general hospitals in the Communications Zone (COMMZ). Each is composed of different configurations of standard modules such as operating rooms, laboratories, X-ray units and wards. The DEPMEDS hospital sets standardize the use of the latest medical technology and equipment, expendable supplies, and major non-medical support equipment (power units, TEMPER (Tent Extendable Modular Personnel) tents, tactical shelters, and heating and air conditioning) throughout the Department of Defense. Standard modules improve medical unit mobility and patient distribution densities. The hospital sets can be deployed under all climatic conditions. The fielding of the 129 Army hospital sets will eliminate serious shortages of field medical equipment and achieve major advances in equipping the Total Army. Gaining units will receive their DEPMEDS equipment in one package under the Total Package Fielding concept. This is the largest Total Package fielding effort ever undertaken by the Army Medical Department.

CHARACTERISTICS:

System characteristics vary by type of hospital set. All meet the systems criteria of providing adequate but austere care, being affordable, maintainable, relocatable, having modular configuration and quad-service compatibility, and being transportable by strategic air.

SOVIET COUNTERPART:

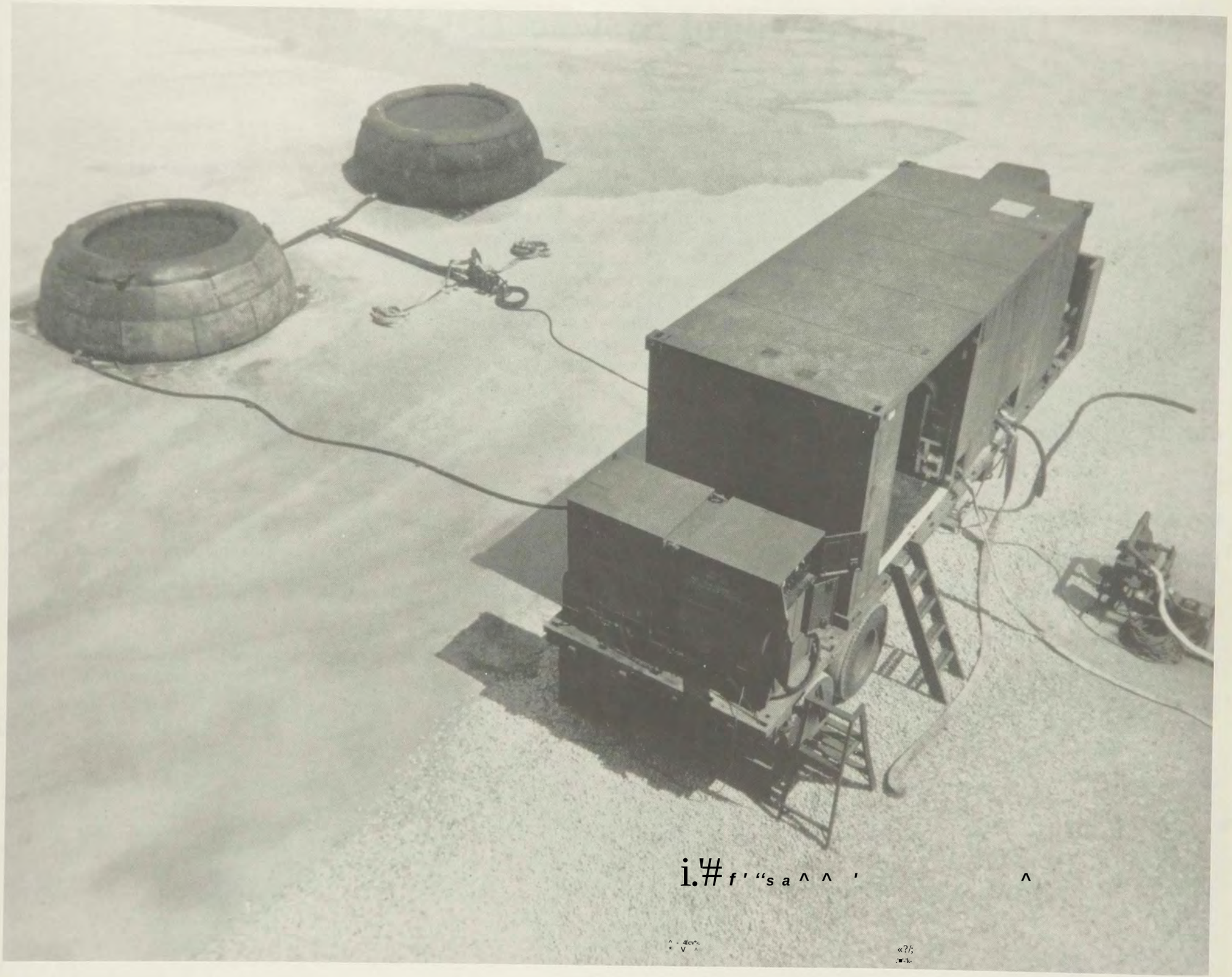
There is no known Soviet counterpart to DEPMEDS.

PROGRAM STATUS:

The DoD Medical Standarization Board insures compatibility among the Services. The Army program is managed by the DEPMEDS Project Manager, operating under the authority of the Secretary of the Army. DEPMEDS hospital sets are being procured and fielding began in the 4th Qtr FY87. By the end of FY89, 36 hospital sets had been fielded to Army combat hospital units.

CONTRACTORS:

A large number of contractors are involved in providing the 3,400 plus medical and non-medical components of DEPMEDS. These components are assembled into modules and hospital sets at the Defense Depot Ogden, Utah.



Reverse Osmosis Water Purification Unit (ROWPU) 3000 Gallons Per Hour (GPH)

MISSION:

The 3000 GPH Reverse Osmosis Water Purification Unit (ROWPU) provides fresh drinking water worldwide. The ROWPU purifies fresh, saline, brackish, and nuclear, biological, and chemical (NBC) contaminated water.

CHARACTERISTICS:

The 3000 GPH ROWPU represents state-of-the-art technology in water purification equipment. The unit consists of a raw water subsystem, clarification subsystem, reverse osmosis (RO) subsystem, NBC post treatment subsystem, chemical feed subsystem, process control station, piping, fittings, and a storage area for pumps and operating supplies. The chemical feed, clarification, RO, and NBC post treatment subsystems, along with the process control station, is enclosed in a 8 foot wide by 8 foot high by 20 foot long ISO container. Support system components of the system include collapsible water storage tanks, hoses, chemicals, tools, distribution and raw water pumps, a 60KW generator set and a M871 semitrailer. This equipment is designed to operate 20 hours a day at a production rate equivalent to 3000 gallons per hour of fresh water and 2000 gallons per hour of sea water. The unit is transportable by two C-230's, one C-141, rail, ship, or standard military vehicles. The ROWPU replaces the the erdlator which can purify only fresh water.

SOVIET COUNTERPART:

The Soviets currently utilize two pieces of equipment to accomplish the task for which the United States has developed the ROWPU. To purify fresh water and NBC contaminated water, the Soviets currently use the MAFS-3, a unit similar to the erdlator. To purify brackish or saline water, the Soviets utilize distillation process equipment, called the OPS, incorporated into their current standard desalinization equipment.

PROGRAM STATUS:

The initial production contract for the 3000 GPH ROWPU has been awarded. The follow-on contract will be fully competitive.

CONTRACTOR:

Aqua Chem, Inc. (Milwaukee, WI)

Integrated Family of Test Equipment (IFTE)

MISSION:

The Integrated Family of Test Equipment (IFTE) supports weapon systems state-of-the-art technology electronics, ensuring combat readiness for the 1900s and beyond. It allows the isolation of weapon systems faults to the electronic Line Replaceable Units (LRUs) at direct support areas for quick turnaround and minimum spares pipeline, isolation of faults in Shop Replacement Units (SRUs) at general support areas and depots, and adapts to and accepts new weapon systems.

CHARACTERISTICS:

IFTE is a modular test, measurement and diagnostic equipment (TMDE) system with standard architecture. IFTE components are: the Base Shop Test Facility (BSTF), Contact Tet Set (CTS), commerical Equivalent Equipment (CEE), Army Test Program Set Support Environment (ATSE), and the soon to be developed Electron-Optics (E-O). The BSTF is a Base Shop Test Station (BSTS) housed in an S-280 shelter, transported on a five-ton truck. This single or dual port test station for direct support (DS), tests the electronic units simultaneously with no degration of accuracy or testing speed. The CTS consists of two portable, self-powered units - one providing an expert-system maintenance aid and the second containing reconfigurable, intrusive test functions. The menu-driven expert system implements a diagnostic test strategy that amplifies the technical skills of the diagnostician and the effectiveness of built-in test in existing weapon systems to isolate faults unambiguously to an LRU. The free-standing CEE configuration provides continuity of testing from the factory to the field, as it identically duplicates the BSTS. It uses TPSs to produce and integrate test programs for electronic subsystems, LRUs and SRUs. The ATSE is an independent software system, open-ended to design, develop, and manage TPSs; will accommodate future TPS tools. Some of the IFTE components features are: System controls, operators' interfaces, various tests capabilities, including optical testing, analog switching/stimuli measurements, spread spectrum, UUT interfaces, softwares/programmings, AC/DC powers, wizard smart probes/ports etc.

SOVIET COUNTERPART:

There is no known counterpart to the IFTE.

CONTRACTORS:

Grumman Electronics Systems Div. (Bethpage, N.Y.)

Small Unit Support Vehicle (SUSV)

MISSION:

The M973 Small Unit Support Vehicle (SUSV), 1½ Ton, is a full tracked logistical support vehicle. There are four versions, a cargo variant, an ambulance variant, command and control variant as well as a flat bed variant; all are highly mobile and helicopter transportable. It is designed to provide mobility for units on improved roads or cross country under all-year-round conditions. The SUSV can advance over bogs and marshland during summer season as easy as it can be driven over snow and ice during winter. It is capable of being sling-lifted by CH-47C helicopter and internally by C-130 aircraft. The SUSV is used to conduct operations in northern and mountainous regions, and can carry selected items of subsistence equipment, ammunition, and supplies required by small units. It is capable of floating in fresh water, can transport a 3,000 pound payload, and (4,000 pounds -flatbed variant) and tow a trailer or light howitzer.

CHARACTERISTICS:

(Cargo Variant)	First Car	Rear Car	Total
Curb Weight:	6100 lbs	3850 lbs	9950 lbs
Payload:	250 lbs	2750 lbs	3000 lbs
Gross Weight:	6350 lbs	6600 lbs	12,950 lbs
Passengers:	2	0	2
Cargo Space:	88 cu ft	194 cu ft	282 cu ft

Length:	270 in	Gradeability, hard surface:	60%	(31 degrees)
Height:	93 in	deep snow:	30%	(17 degrees)
Width:	73 in	side slope:	40%	(23 degrees)
Max speed on roads:	31 mph	Ground pressure:	1.8 psi	
in water:	2 mph			

Fording Depth: Floats Armament: None

In Service for Armies In: United States (1983), Canada, Germany, Italy, Great Britain, Norway, Finland, Spain, and Sweden

SOVIET COUNTERPART: None.

PROGRAM STATUS:

The SUSV is a Nondevelopmental Item (NDI) program. The first production contract was awarded for 268 vehicles in March 1983. An option for an additional 34 vehicles was exercised in June 1983. Vehicles procured under the initial contract have been delivered and fielded. A new multiyear contract was awarded in June 1988 for 453 vehicles. Including contract options, the Army plans to purchase up to 850 vehicles under the new contract.

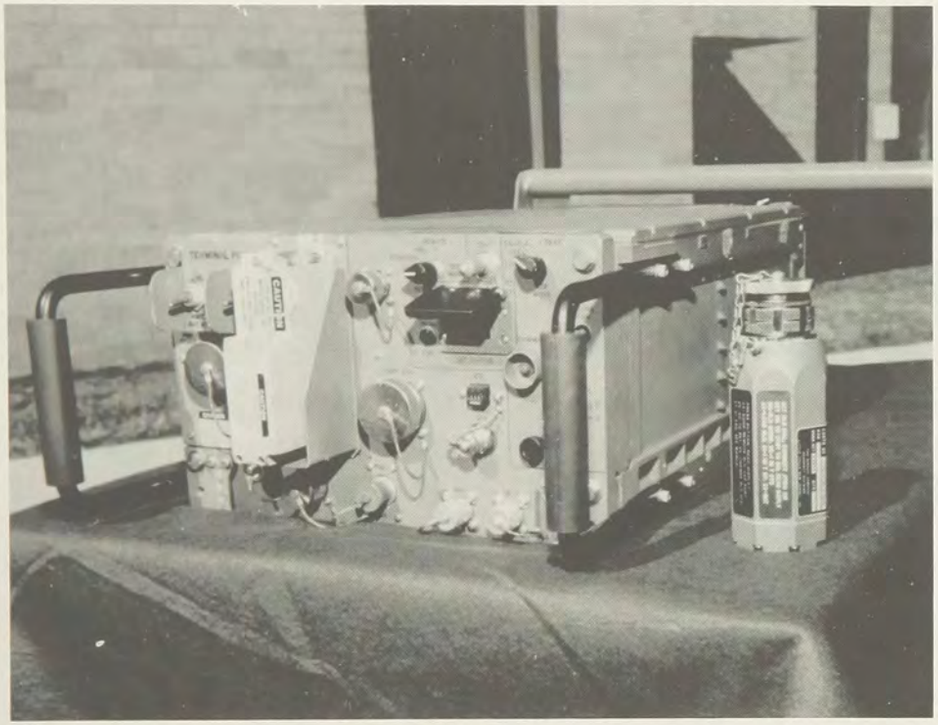
CONTRACTOR:

Hagglund Vehicle AB, (Ornskoldsvik, Sweden.)

The Tactical Command, Control and Communications (C^3) mission area includes resources for providing effective command and control, automation, and communications support to combat units. In order for a commander to effectively control his tactical elements, he must know where they are located and must have a means by which to talk to them even in an enemy electronic countermeasure environment. The systems included in this mission area provide that capability. Without them, the Army would be as helpless as a person without a nervous system.

COMMAND, CONTROL, AND COMMUNICATIONS (C^3)

ARMY DATA DISTRIBUTION SYSTEM (ADDS)



ENHANCED PLRS USER UNIT

(LOW SPEED DATA DISTRIBUTION)

JTIDS CLASS 2M TERMINAL

(HIGH SPEED DATA DISTRIBUTION)

Army Data Distribution System (ADDS)

MISSION:

The Army Data Distribution System (ADDS), formerly called the PLRS (Position Location Reporting System (PLRS)/Joint Tactical Information Distribution System (JTIDS) Hybrid (PJH), will modify, combine, and integrate components of PLRS and JTIDS in an evolutionary five-phase program to take advantage of the advanced state of development of these two projects. The ADDS will support Army near real time data distribution requirements in the Division and Corps area. The ADDS contains three primary equipment elements: Enhanced PLRS User Units (EPUU), JTIDS terminals, and Net Control Stations (NCS). The EPUUs are assigned to almost all units in the Division area that participate in near real-time data communications, identification and position location/navigation. JTIDS terminals will be assigned to those users whose data throughput requirements exceed the capability of the EPUU and who participate heavily in interservice communications. For example, air defense users pass high volume tracking data internally and exchange friendly identification information with the Air Force. The NCS provides overall system network managment. The ADDS system will support data communications requirements in the five functional areas of fire support, air defense, intelligence/electronic warfare, maneuver control and combat service support. The FAAD C2I (Forward Area Air Defense Command, Control & Intelligence) System is heavily dependent on ADDS for data distribution.

SOVIET COUNTERPART:

None known.

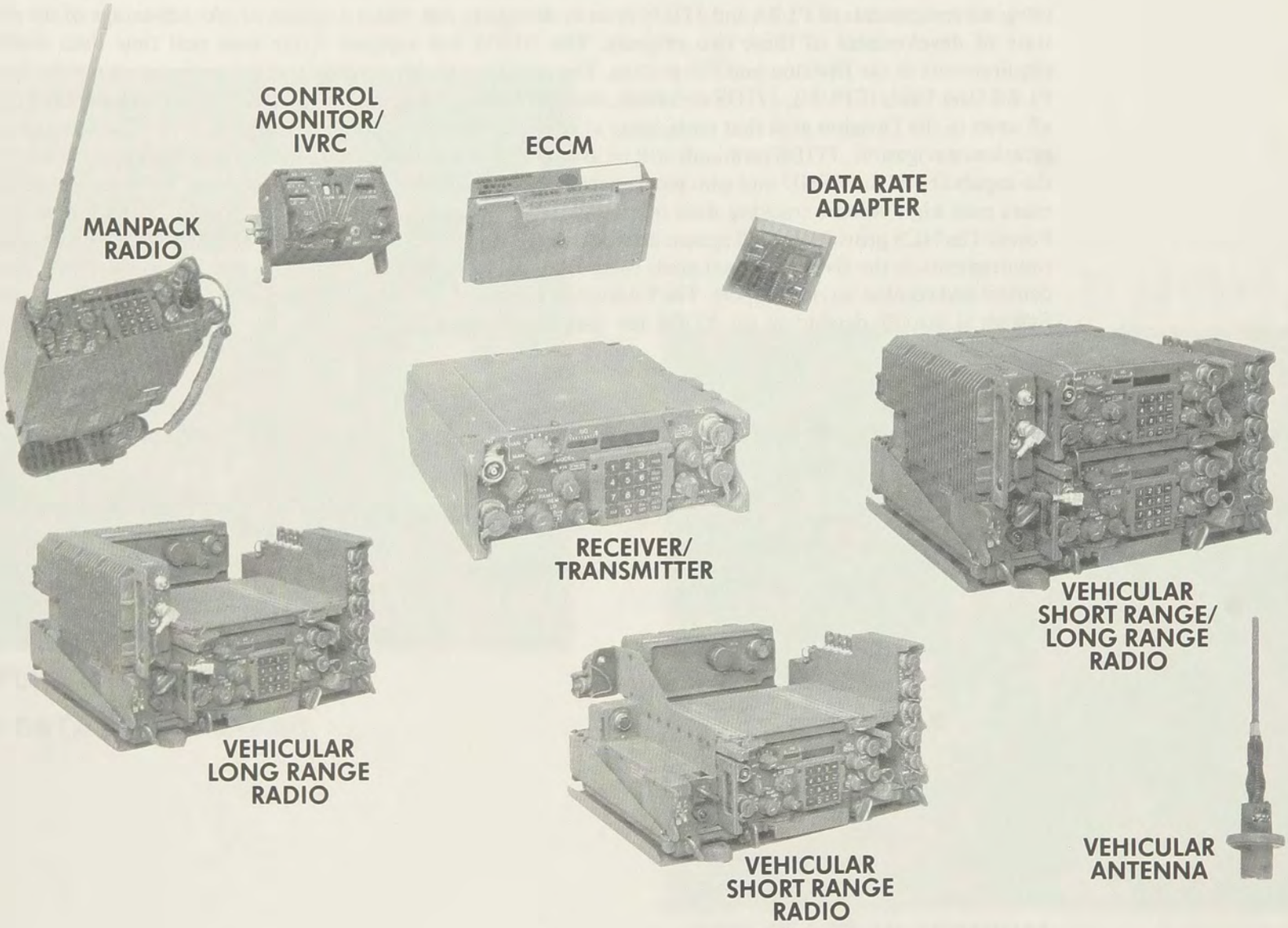
PROGRAM STATUS:

ADDS entered its final phase of development in 1985. Initial pre-planned product improvement production is scheduled for Dec 1989.

CONTRACTORS:

Hughes Aircraft Company, Ground Systems Group (Fullerton, CA)
Plessy Corp (Little Falls, NJ)

SINCGARS COMBAT NET RADIO FAMILY



Single Channel Ground and Airborne Radio System (SINCGARS-V)

MISSION:

SINCGARS provides commanders with a reliable, easily maintained Combat Net Radio (CNR) for command and control. SINCGARS provides effective Electronic Counter-Counter Measures (ECCM) against threat Electronic Warfare (EW). SINCGARS configurations include manpack, vehicular (both low and high power), and airborne models. The first radios fielded do not contain integrated communications security (COMSEC) but, instead, will use the external VINSON COMSEC device. COMSEC will be integrated in later versions of the ground and airborne models (ICOM SINCGARS). SINCGARS radios have greatly improved reliability over the AN/VRC-12 series radios which they replace, and they are exceeding the requirement of 1,250 hour Mean Time Between Failure (MTBF).

CHARACTERISTICS:

Weight:	22.5 lbs w/battery and COMSEC Device
Frequency Range:	ICOM weight 19.6 lbs w/battery
	30.00 to 87.975 MHz
Channels:	2320
Range:	8-35 km

SOVIET COUNTERPART: The Soviets have no known counterpart.

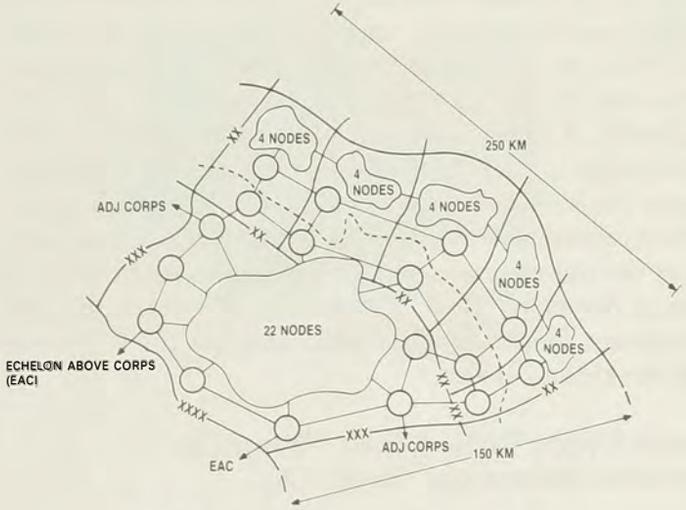
PROGRAM STATUS:

First source SINCGARS ground radios passed First Article Tests in January 1988 and production deliveries began immediately. A Follow-on Operational Test and Evaluation was completed in May 1988. Award for Option 3 for 16,000 radios was made in June 1989. Option 4 for 16,000 radios is scheduled for 1ST QTR FY91, completing the first source contract for 44,100 ground radios. Of this quantity, 27,625 will have integrated COMSEC (ICOM). All SINCGARS produced after FY90 will be ICOM SINCGARS. A second source of ICOM SINCGARS ground radios was selected and a firm fixed price contract was awarded in July 1988 with two options for FY90 and FY91. Full competition will begin in FY92. The 2d Infantry Division in Korea received 145 SINCGARS radios in December 1987, providing commanders with jam-resistant communications for their DMZ forces. Since then, the program office has fielded over 2,000 radios including the training base, limited fielding to Army units in SOUTHCOM and Korea. Major unit fieldings will begin in November 1990. The SINCGARS airborne radio passed First Article Tests in September 1988. There are options on the airborne radio contract for FY90 and FY91. Airborne radios will be fielded concurrently with the ground radios.

CONTRACTORS:

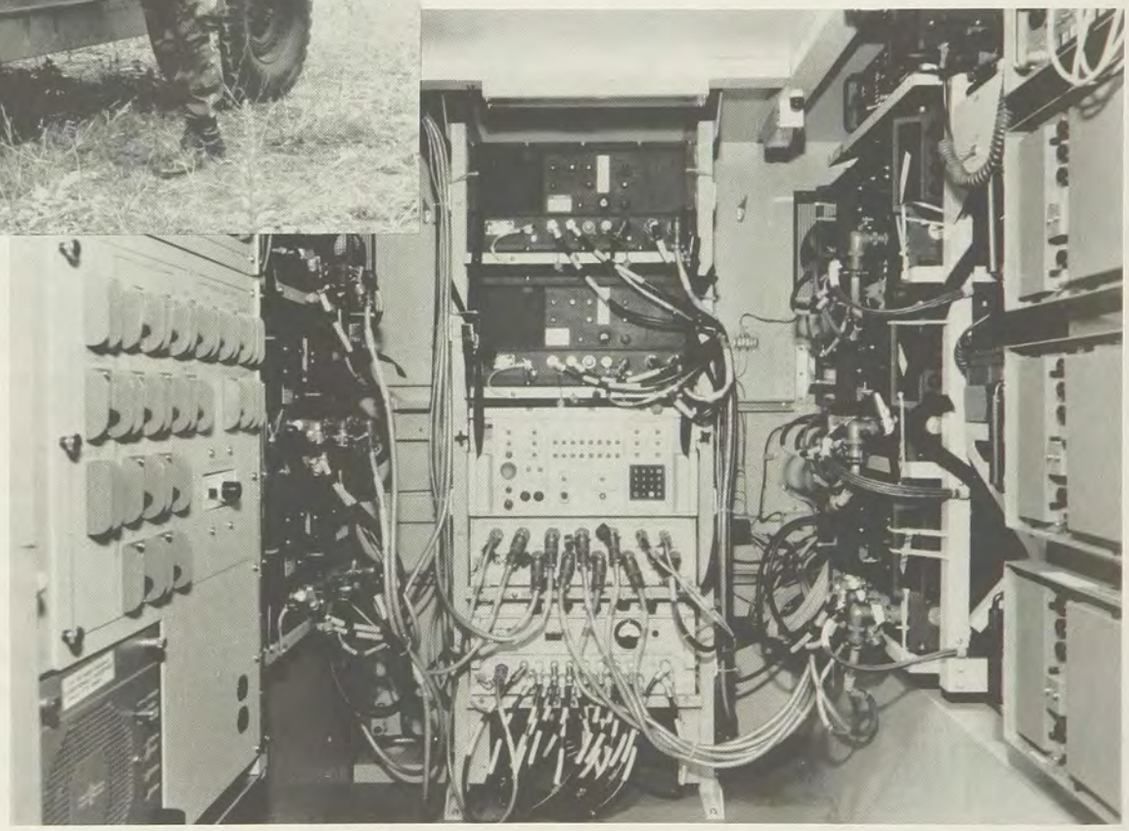
First Source· (ground and airborne radios): ITT Aerospace/Optical Division (Fort Wayne, IN).
Second Source (ground radios): General Dynamics Electronics Systems (San Diego, CA)

HMMWV WITH S250 SHELTER



MSE Deployment - 42 nodes

- **4 nodes per division**
- **22 nodes per corps**



RADIO ACCESS UNIT (INSIDE SHELTER)

Mobile Subscriber Equipment (MSE) Program

MISSION:

The Mobile Subscriber Equipment (MSE) is an area communications system which is being fielded in the Corps and division areas. MSE provides secure static and mobile (on the move) voice/data/facsimile service to principal commanders and key staff officers enabling them to exercise command and control over their forces in the rapidly changing battlefield environment. (An approximate commercial equivalent is a telephone system with mobile radio telephone service and data capability.) The Corps network consists of 5 divisions which are composed of 42 nodes and will provide service to 1,900 mobile and 8,500 static subscribers. MSE is interoperable with TRI-TAC, combat net radios, commercial telephone, and NATO systems. It allows users to keep the same telephone number as they move on the battlefield and will automatically route calls around inoperable nodes. Since market surveys determined that MSE-type systems were already available, the Army decided to follow a non-developmental item (NDI) acquisition strategy to save time, money, and personnel; that is, to accept the best available system.

SOVIET COUNTERPART:

There is no known Soviet counterpart.

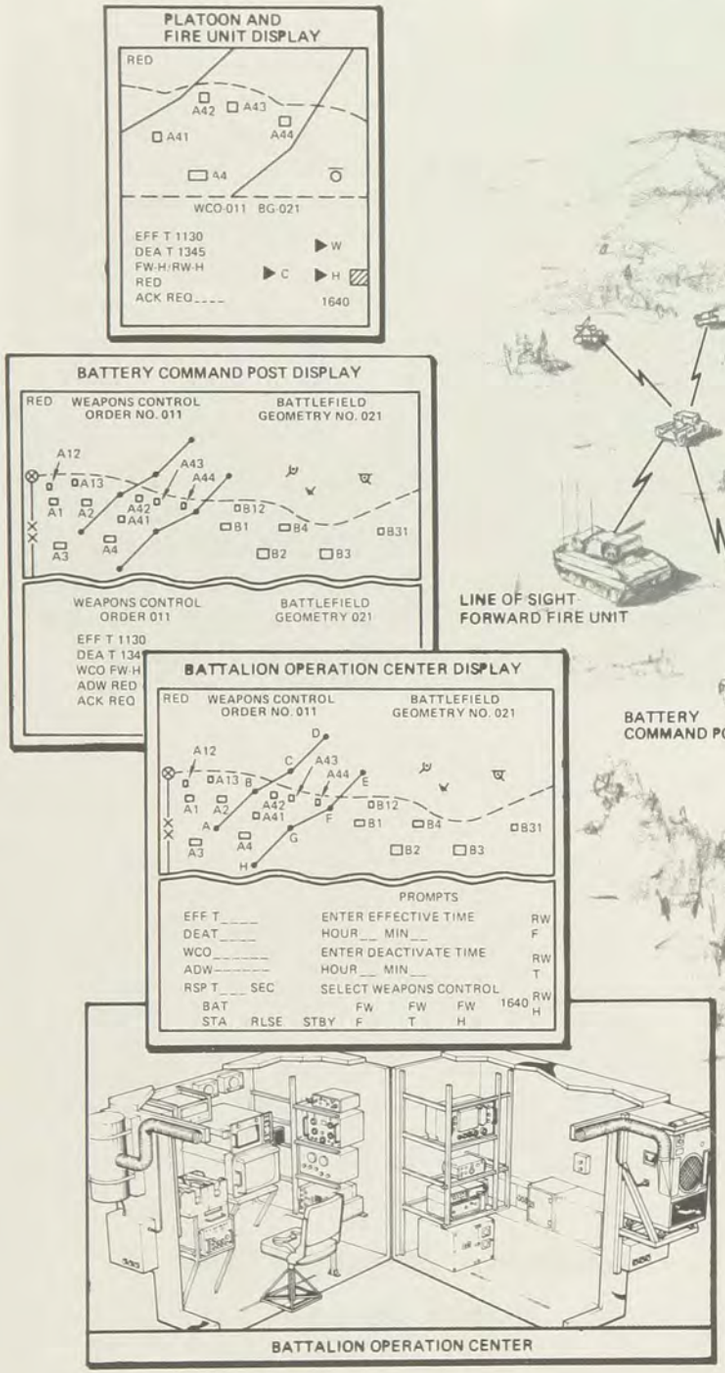
PROGRAM STATUS:

The MSE program is progressing according to the planned acquisition strategy. The basic MSE contract and the 1st Option were awarded in FY86, the 2d Option in FY87, and the 3rd and 4th Option in early FY89. The 3rd Option represented the advancement to full rate production. Procurements from these five awards will equip and field 16 corps signal battalions, 19 division signal battalions with associated MSE division equipment, and the Fort Gordon and Fort Sill training bases. A successful Follow-On Operational Test and Evaluation of MSE was concluded in November 1988. The results of this test showed that MSE is operationally effective and significantly better than currently fielded area communications equipment. Funding in FY90 will procure another 7 division sets and four corps sets.

CONTRACTOR:

GTE selected by competitive process.

Forward Area Air Defense C^2I



Forward Area Air Defense Command, Control and Intelligence (FAAD C2I)

MISSION:

FAAD C2I integrates the Forward Area Air Defense System into a synergistic system of systems capable of defeating the air threat to Army divisions. The distributed FAAD C2I network provides rapid collection, storage, processing, display, and dissemination of critical, time-sensitive air situation and targeting information. Weapon cueing and air situation information is provided by the FAADC2 system which acquires, correlates and disseminates a composite air picture gathered from a suite of sensors and aircraft identification devices (ground and aerial, passive and active). The Army Data Distribution System ensures reliable, real-time, secure transfer of data between the sensors and weapons and other battlefield users. FAAD C2I provides automation for the Air Defense Control segment of the Army Tactical Command and Control System and assists battle captains in planning, coordinating, directing, and controlling the Counter Air fight. FAAD C2I also provides for interoperability with HIMAD, Joint, and Allied Air Defense Control systems.

SOVIET COUNTERPART:

The Soviets have deployed and continue to improve a very robust integrated Air Defense Command, Control and Intelligence System.

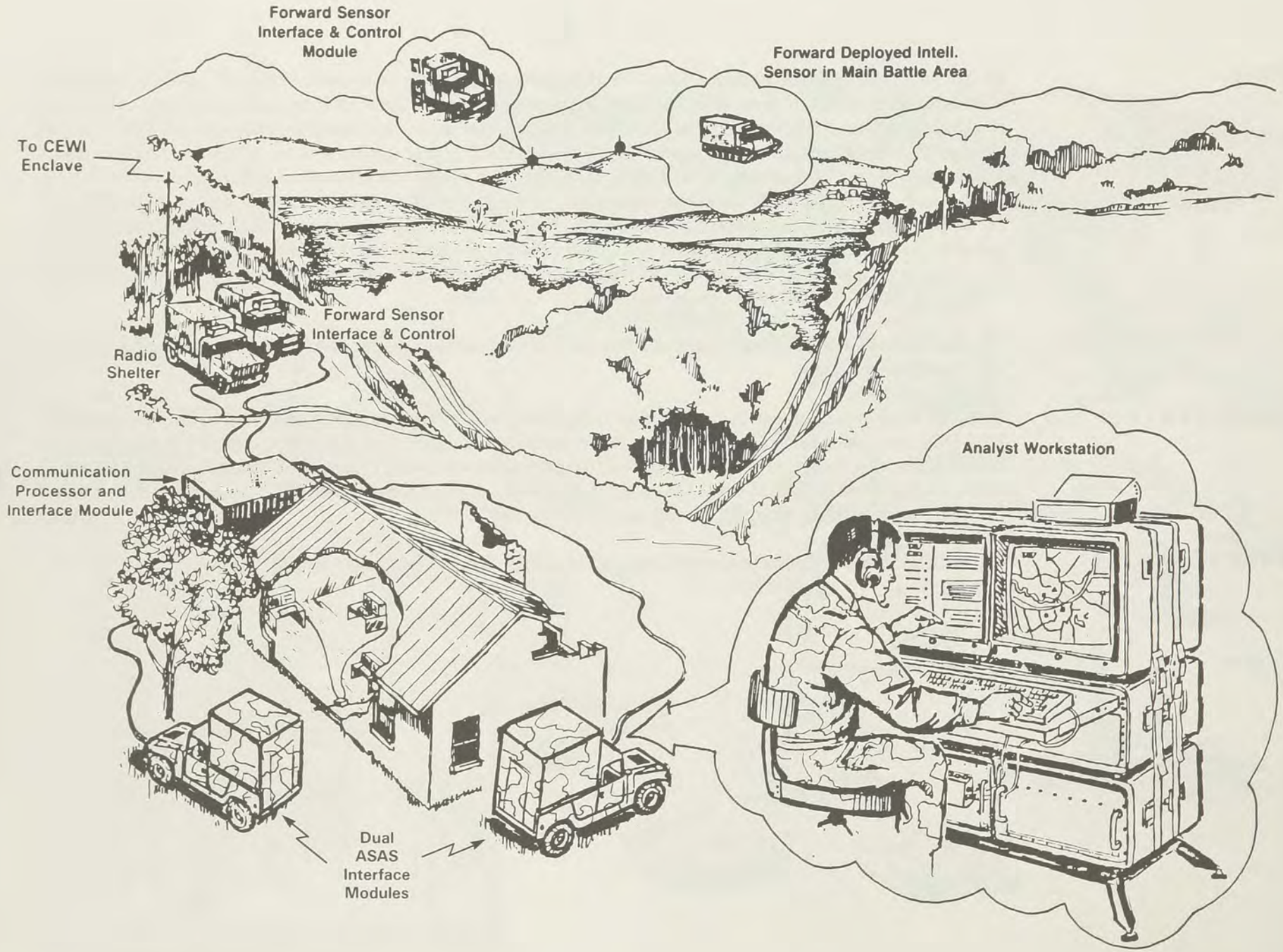
PROGRAM STATUS:

The Full Scale Development contract for software development and systems integration of the first phase of FAADC2 was awarded in FY86. Current status includes completion of the initial system's detailed design, continuation of software development, and software integration on ATCCS common hardware. Initial Software Qualification Testing (SWQT) and laboratory demonstration will take place in 1990. Integration of FAADC2 hardware and software with SICPS will also occur in 1990.

CONTRACTORS:

C2 software and development systems integration: TRW (Prime) (Redondo Beach, CA)

ALL SOURCE ANALYSIS SYSTEM



All Source Analysis System (ASAS)

MISSION:

All Source Analysis System (ASAS) is the central nervous system guiding field commanders to successfully prosecute the AirLand Battle/Deep Attack. As a key tactical sub-element of the Army Tactical Command and Control System (ATCCS), ASAS will automate command and control of Intelligence/Electronic Warfare (IEW) operations. It will generate a near real-time picture of the enemy situation to guide employment of maneuver forces and systems such as the Joint Surveillance and Target Acquisition Radar System (JSTARS) and the Army Tactical Missile System (ATACMS). Sophisticated sensor systems provide targeting information, yet today the capability to process and respond to that information is limited by manual and partially automated methods. ASAS will speed processing and improve accuracy through use of state-of-the-art minicomputers. The Joint Tactical Fusion Program is developing ASAS along with the Air Force Enemy Situation Correlation Element (ENSCE). ASAS/ENSCE architecture is modular. ASAS Division, Corps, Echelon Above Corps (EAC) and ENSCE systems will be configured differently, in accordance with force structure and mission requirements.

SOVIET COUNTERPART:

No known Soviet counterpart.

PROGRAM STATUS:

The program employs an evolutionary acquisition strategy. Testing of system modules began in FY86 and continued through FY89. Initial system components, the Limited Capability Configuration (LCC), were fielded to Ft Hood in FY89. Following a successful Initial Operational Test and Evaluation (IOTE), a Milestone III production decision is scheduled for FY92, and full production systems will commence in early FY93. The objective system will evolve through Evolutionary Development (ED) and software refinement based on user feedback.

CONTRACTORS:

Jet Propulsion Laboratory (Pasadena, CA) (Prime)
Martin Marietta Corporation (Denver, CO)
Ford Aerospace and Communications Corporation (Palo Alto, CA)

Navstar Global Positioning System (GPS)

MISSION: The Navstar Global Positioning System (GPS) is a joint Army, Navy, Air Force program with the Air Force as the lead service. It is a space-based navigation, three dimensional positioning and time distribution system that will provide accurate, continuous, all-weather, common grid, worldwide navigation, positioning and timing information to land, sea, air and space-based users. GPS consists of three segments: (1) Space Segment consisting of 24 satellites; (2) Ground Control Segment; and (3) User Segment. The User Segment consists of receiver configurations for manpack/vehicular, low-to-medium and high dynamic aircraft and seacraft applications respectively. The Army is responsible to the Joint Program Office for the testing of manpack/vehicular and low-to-medium dynamic aircraft receivers. The GPS receiver is a passive device that will be deployed extensively at all echelons and with Army aircraft.

SOVIET COUNTERPART: Global Navigational System (GLONAS)

PROGRAM STATUS: Navstar GPS received consensus from the Joint Resources Management Board in June 1986 to proceed from the Full Scale Engineering Development phase to a Low Rate Initial Production (LRIP). Army testing of the LRIP receivers will be conducted in FY90 with a full production decision made in FY91.

CONTRACTORS: Rockwell International, Collins Government Avionics Division (Cedar Rapids, Iowa)

Advanced Field Artillery Tactical Data System (AFATDS)

MISSION:

AFATDS will replace, broaden and modernize the US Army fire support Command, Control and Communications (C3) TACFIRE system. It will meet automated fire support requirements of the Army Tactical Command and Control System (ATCCS) during the 1990-2010 timeframe. AFATDS will support close, rear and deep operations and nuclear, non-nuclear and chemical fire planning and will coordinate the employment of all Service/Combined fire support assets to complement the commander's scheme of manpower. Compatibility will be provided with all existing and planned US and allied field artillery systems and sensors. The AFATDS will also correct the fire control and distribution deficiencies of the current TACFIRE system with no increase in personnel requirements, with greatly reduced size, and with minimized training burden. AFATDS will provide fully automated support for planning, coordination and control of all fire support assets (mortars, close air support, naval gunfire, attack helicopters, offensive electronic warfare, field artillery cannons, rockets and guided missiles) in the execution of close support counterfire, interdiction, suppression of enemy air defense and deep operations.

PROGRAM STATUS:

A DAB was completed on 25 September 1989. FY90 activities include Full Scale Development of Fire Support software, continued system integration and test with the ATCCS, Common Hardware System (CHS) and also development of installation kits and accessories to support test and initial fielding of AFATDs. The Marine Corps has signed up for the program and will identify their requirements this year.

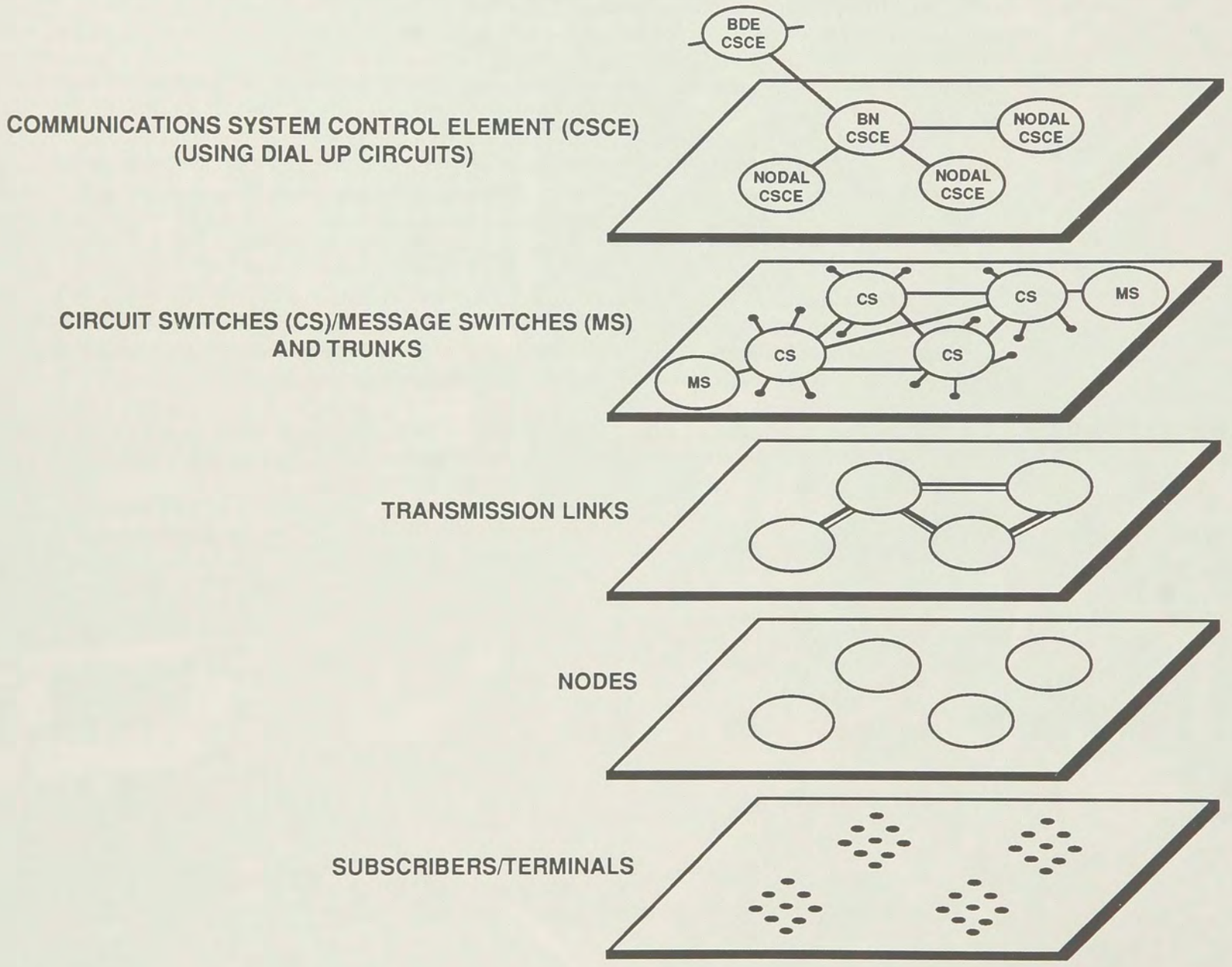
SOVIET COUNTERPART:

The Warsaw Pact has fielded an artillery tactical command and control system. This system has computers at battery, battalion and regiment or brigade level that are digitally linked. These computers perform fireplanning, targeting, logistics and terrain management calculations.

CONTRACTOR:

Magnavox (Ft. Wayne, IN)

THE JOINT TACTICAL COMMUNICATION (TRI TAC) SYSTEM



Joint Tactical Communications Program

The Joint Tactical Communications (TRI-TAC) Program is a joint service and DOD Agency program to develop and field advanced tactical multichannel switched communications equipment. This equipment will provide the combat forces with the tactical communications needed to meet the mobility, security and reliability requirements of the modern battlefield. This program was established to achieve interoperability between service tactical communications systems, interoperability with strategic communications systems, take advantage of recent advances in technology, and eliminate duplication in service developments. Each component of the program is assigned to one of the services to develop and acquire for all of the defense community. The major components assigned to the Army are the AN/TTC-39 family of switches, the AN/TYC-39 Message Switch, multichannel transmission equipment and user message processing devices.

Circuit Switch and Message Switch

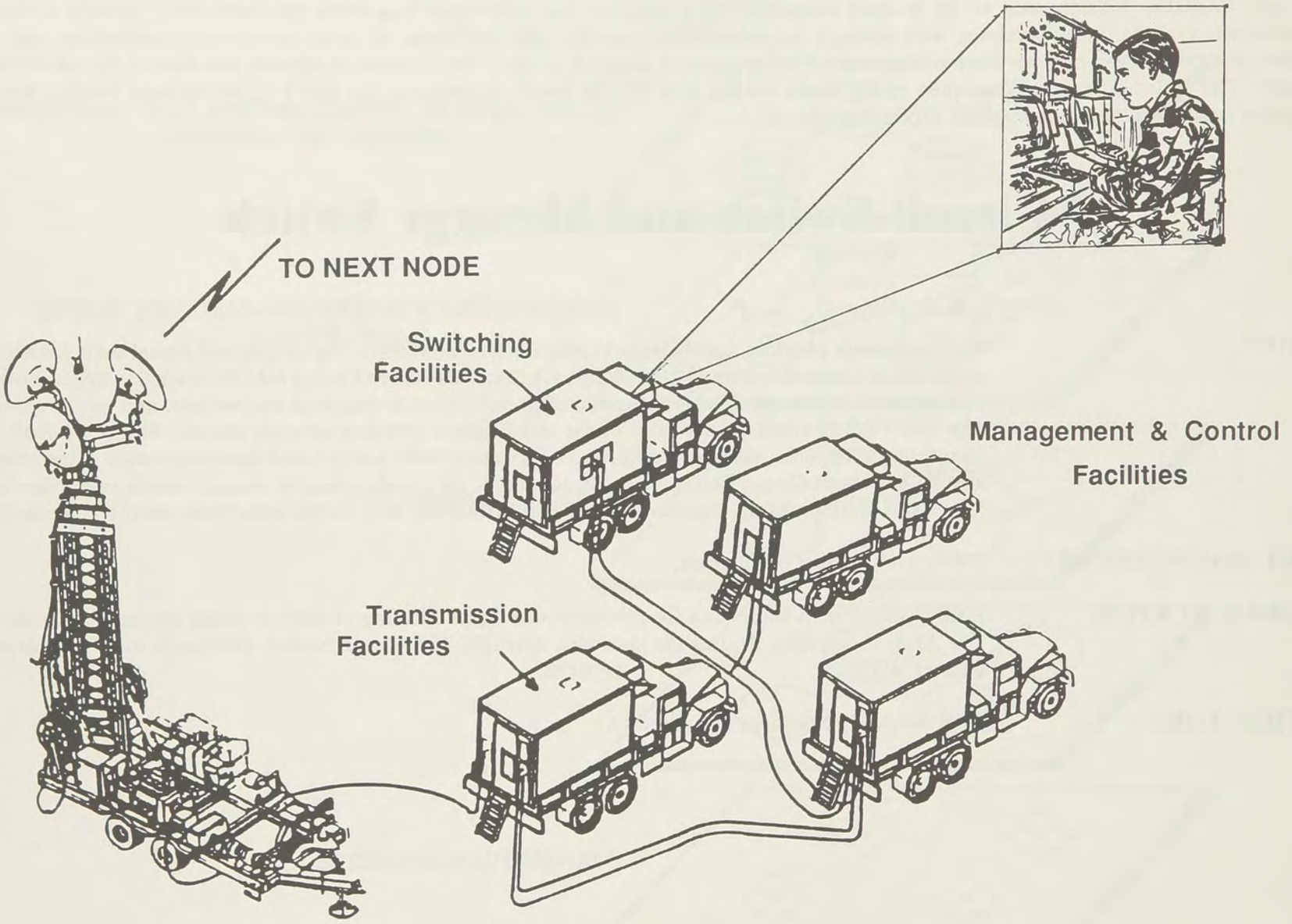
MISSION: This equipment provides automatic switching service, interconnecting analog and digital users between tactical and Defense Communication System (DCS) switches, and between US and NATO national switches. Both switches employ micro-electronic components and design techniques to minimize size, weight, and power consumption. The AN/TTC-39 system is the heart of the multichannel switched network and is a highly efficient means of connecting telephones, message traffic, and data users in both a secure and nonsecure mode in the area network at echelons above Corps. Future plans are to modify the circuit switch to include mobile subscriber functions, i.e., flood search routing, automatic subscriber affiliation, and mobile subscriber radio telephone features.

SOVIET COUNTERPART: There is no known counterpart.

PROGRAM STATUS: Both switches were authorized for production in FY80. Fielding of these switches was accomplished in FY86. The Army is currently fielding the improved AN/TTC-39A Circuit Switch. Fielding is to be completed second quarter, FY95.

CONTRACTOR: GTE Sylvania (Needham Heights, MA)

TRI TAC Nodal Configuration



Digital Transmission Assemblages

MISSION: This equipment represents a family of high capacity, digital radio systems which link circuit and message switches into communications networks supporting telephone and message traffic at the theater tactical level. They also provide the transmission path for linking extension switches at subscriber locations into the main switching network.

SOVIET COUNTERPART: Unknown.

PROGRAM STATUS: Fielding was begun in FY88 and is expected to be completed in FY95.

CONTRACTOR: Digital Group Multiplex Equipment - Raytheon, Marlboro, MA.
Assemblages - Laguna Industries Inc., Laguna Pueblo, NM.

Communications Systems Control Element

MISSION: This network management provides the capability to plan, engineer, and control the circuit switched network, the message switched network and the transmission network at signal brigades, battalions, and nodal levels. The distribution of this system and its proximity to the switches provide for the rapid dissemination of directives and reports to the appropriate elements in the network at the time they are needed.

SOVIET COUNTERPART: Unknown.

PROGRAM STATUS: These equipments were authorized for production in FY86, and will be fielded starting FY90 and continue through FY95.

CONTRACTORS: Software: GTE Raleigh, NC
Hardware: ESI, Richardson, Texas.

Maneuver Control System (MCS)

MISSION:

Maneuver Control is one of the five battlefield functional areas (BFA) of the Army Tactical Command and Control System (ATCCS). The Maneuver Control System (MCS) is the force level commander's information system and integrates the maneuver function with the command and control (C2) systems of the other four functional areas (Fire Support, Air Defense, Intelligence/Electronic Warfare and Combat Service Support). MCS serves the commander and staff at corps, division, brigade, and maneuver battalion, and provides automated assistance in the coordination of plans, dissemination of orders and guidance, and the monitoring and supervision of operations. MCS is a network of stand-alone computer devices with no central node whose loss could cause system failure. It is a hybrid system consisting of both fully militarized and ruggedized commercial non-development Item (NDI) equipment linked together by standard Army communications systems. Software is written in the DOD standard language, Ada. Since the initial MCS was introduced in Europe in 1981, this program has been, and will continue to be, an evolutionary development. The MCS capability continues to expand in pre-planned, time-phased steps toward the objective system in the mid 1990's. The recent insertion of an NDI Tactical Computer Processor (TCP) version of the full-militarized Tactical Computer Terminal (TCT) enables the integrated MCS system to capitalize on state-of-the art, ruggedized commercial equipment and reduce life cycle costs. In its final configuration in the mid-90's, MCS will utilize common hardware being procured for all ATCCS C2 systems.

PROGRAM STATUS:

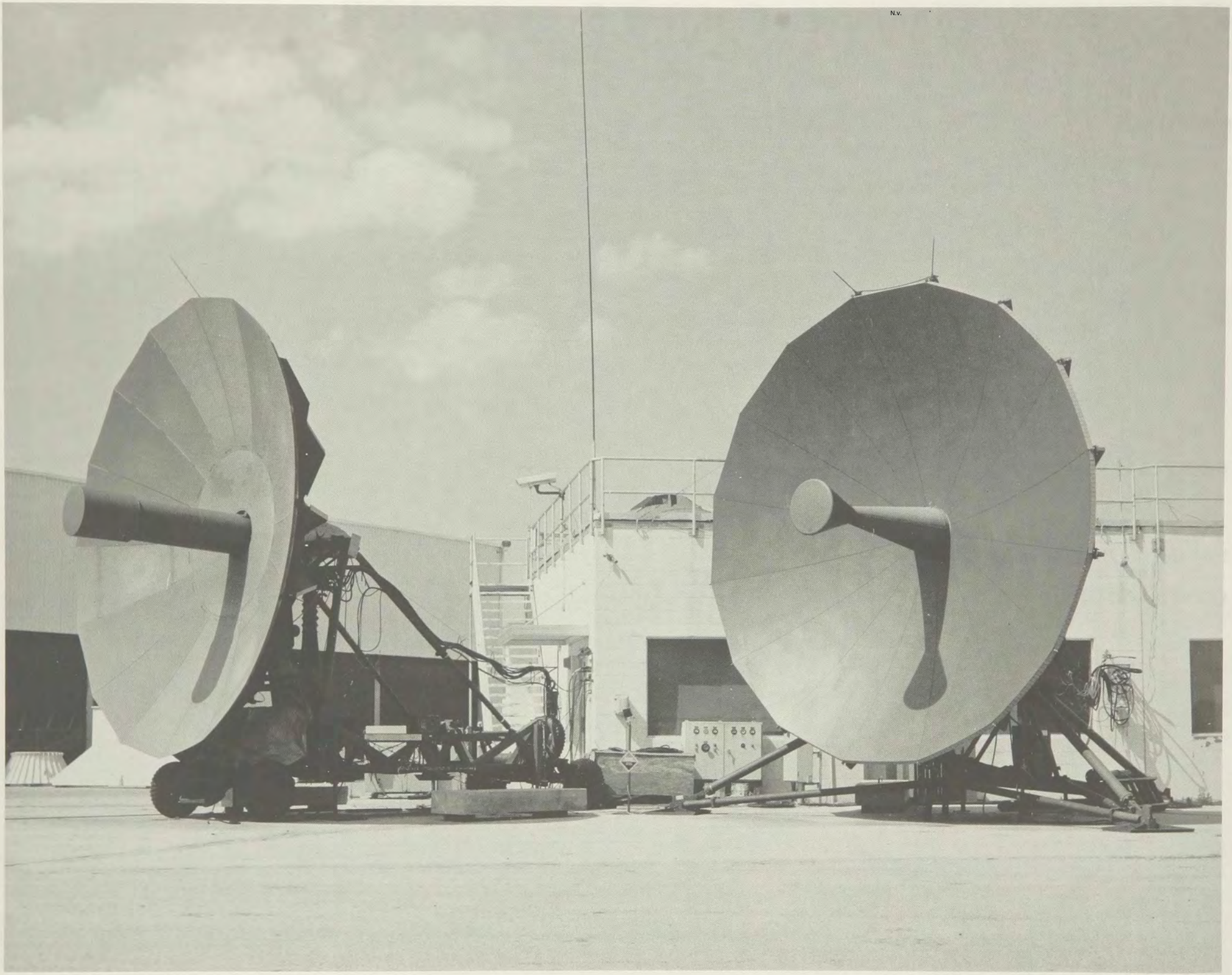
The final quantity of full militarized hardware was procured in FY87 and will continue fielding until completion in FY91. NDI deliveries began in FY89 (first to III Corps) with fielding also to be completed in FY91. Common Hardware fielding begins in FY93.

SOVIET COUNTERPARTS:

There is no known comparable Soviet system.

CONTRACTORS:

Singer Librascope (Glendale, CA) (militarized)
Ford Aerospace & Communications Corp. (Colorado Springs, CO) (NDI)
TRW (Redondo Beach, CA) (System Engineering and Integration)
MILTOPE (Melville, NY) (Common Hardware/Software)



Military Satellite Communications (MILSATCOM)

MISSION:

The Army's Military Satellite Communication (MILSATCOM) programs include the procurement and development of strategic and tactical satellite terminals, related terminal equipment, and satellite control equipment necessary to satisfy JCS-validated command, control, communications, and intelligence requirements supporting the President, CINCs, National Command Authority (NCA), Military Departments, intelligence community, NATO, and the UK. The MILSATCOM Systems for which satellite terminal, terminal related, and satellite control equipment is being developed and procured by Army include the worldwide Joint ultra high frequency (UHF) FLTSAT/AFSAT system; global super high frequency (SHF) Defense Satellite Communications System (DSCS); and evolving worldwide extremely high frequency (EHF) Military Strategic/Tactical Relay (MILSTAR) system.

SOVIET COUNTERPART:

Primary Soviet communications connectivity is provided by the MOLINYA and STATSIONAR MILSATCOM systems which enable Russia to bridge its large land mass and provide command and control to its forces. Soviet MILSATCOM systems are augumented by less reliable high frequency (HF) and UHF radio systems.

PROGRAM STATUS:

In support of the FLTSAT/AFSAT system, Army is procuring additional new AN/PSC-3, AN/VSC-7, LST-5, and HST satellite terminals and related equipment to support SOF requirements as well as studying new antenna technologies to provide SOF and other Army forces terminals with added capability and flexibility. In the tactical DSCS, Army is currently modifying the AN/TSC-85A and AN/TSC-93A terminals to provide the commanders in the field with a new anti-jam (AJ) capability and started effort to provide the network a demand assigned control capability to increase the capacity of the existing system. Strategically, Army will continue to modify existing Jam Resistant Secure Communications (JRSC) terminals for a high altitude electro-magnetic pulse (HEMP) capability; expand the control subsystem to enhance satellite and communications payload control operations and survivability globally; and commence implementation of a fully automatic Tri-Service simulation system to simplify equipment, network, and system operation and maintenance. In the extremely high frequency (EHF) worldwide MILSTAR system, Army is continuing its AN/TSC-124 terminal test and development program and progressing toward award of the production contract of 222 terminals.

CONTRACTORS:

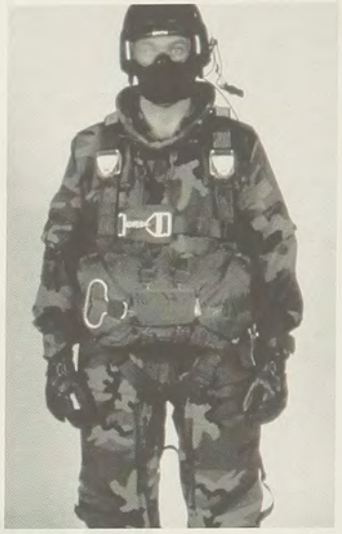
Harris Corp. (Melbourne, FL)
Ford Aerospace Corp. (Palo Alto, CA)
GE Corp. (Valley Forge, PA)
M/A—Comm Linkabit Corp
(San Diego, CA)
Magnavox (Torrence, CA) and (Leesburg, VA)

The Soldier Support mission area includes those items that directly support the individual soldier. This mission area includes organizational clothing and individual equipment, chemical-biological defense equipment, night vision devices and individual weapons (further described on the pages following). As we modernize the Army with new equipment, we must keep the individual soldier equally up-to-date.

SOLDIER SUPPORT

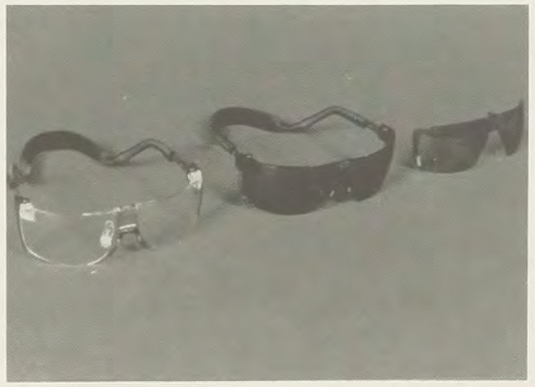
SOLDIER SUPPORT ITEMS

LOAD BEARING EQUIPMENT =
RECENTLY TYPE CLASSIFIED LOAD BEARING EQUIPMENT PROVIDES SOLDIER GREATER COMFORT AND LOAD TAILORING)



PARACHUTISTS ROUGH TERRAIN SYSTEM =
(DEVELOPMENT ITEM TO BE USED BY SPECIAL OPERATING FORCES)

FIELD PACK LARGE WITH INTERNAL FRAME =
(RENCENTLY TYPE CLASSIFIED PACK TO REPLACE ALICE PACK AND EXTERNAL FRAME)



BALLISTIC/LASER EYE PROTECTION=
(DEVELOPMENTAL ITEM TO PROVIDE SOLDIER WITH PROTECTION FROM SMALL GRAIN FRAGMENTS AND SELECTED LASERS)

BODY ARMOR COUNTERMINE=
(DEVELOPMENTAL ITEMS TO BE USED TO DEFEAT SMALL MINES PRIMARILY FOUND IN LOW INTENSITY ENVIRONMENTS)

Soldier Support

OBJECTIVES AND CHARACTERISTICS

SOLDIER SUPPORT includes several related programs which respond to changing threat requirements and advances in state-of-the-art technology to enable the soldier to fight more effectively and survive better under all battlefield conditions. These include:

CLOTHING AND INDIVIDUAL EQUIPMENT (CIE) research and development provides quality dress and personal uniforms, as well as quality and effectiveness in combat clothing and individual equipment. Currently, emphasis is placed on combat CIE to improve soldier capability to counter newly emerging battlefield threats. Research and development is focused on the design of lighter weight equipment, ballistic and laser eye protection, and improved chemical protective clothing which take advantage of the latest progress in technology and advanced materials. Over thirty projects are in progress to enhance soldier survivability and effectiveness. CIE research and development is managed by the Project Manager-Clothing and Individual Equipment, Woodbridge, Virginia. Natick Research Development and Engineering Center, Natick, Massachusetts is the Army's primary developer for CIE.

CHEMICAL-BIOLOGICAL DEFENSE (CBD) EQUIPMENT is being developed to permit the soldier to survive and continue his mission with minimal performance degradation on the chemical-biological contaminated battlefield. CBD development includes items for improved eye and respiratory protection, personal and individual equipment decontamination, collective protection and detection and warning of chemical and biological hazards. The Chemical Research, Development and Engineering Center, Aberdeen Proving Grounds, Maryland is the Army's primary developer of CBD equipment.

NIGHT VISION DEVICES allow the individual soldier to function as well during night operations as during the day. These devices enable the soldier to locate, identify, and engage targets during periods of darkness and reduced visibility (haze, fog, and smoke). Future technology will focus on miniaturizing and reducing weight of the device, while lowering life cycle costs. The objective is to make these devices available to more soldiers, while insuring that the sights are effective and convenient to use. Night vision development is conducted at the Night Vision and Electro-Optics Laboratory at Fort Belvoir, Virginia.

INDIVIDUAL WEAPONS. The M16A2 rifle (5.56mm) is an improved version of the older M16A1 rifle. The 9mm handgun will replace the .45 cal and .38 cal pistols with 4 inch barrels.

PROGRAM STATUS:

Currently there are 43 clothing and individual equipment R&D projects ongoing which have been approved by the Chief of Staff, Army. Projects include laser/ballistic eye protection, self contained chemical uniform, flechette ballistic vest, aircrew battledress uniform, aircrew cold weather uniform, improved gloves and boots, and equipment airdrop containers. Also, 24 product improvements to fielded items are being worked. These include improved aircrew/CVC cooling vest, light duty leather glove, vapor barrier boot, extra large PASGT helmet, chemical/biological glove, combat boot sock, and wet weather parka/trousers. During 1989/90, 11 items are expected to be approved and type classified. These will include the 40 mm grenade vest, aircrew NBC uniform, extreme cold weather canteen, aircrew flight uniform, interim self contained chemical uniform, enhanced SPH4 aviator helmet, gross chemical liquid protection overgarment, laser/ballistic eye protection, aviator survival vest, snow/ice traversing equipment, sleeping bag pad, and parachutists rough terrain suit.

NUCLEAR, BIOLOGICAL, AND CHEMICAL DEFENSE

M17 LIGHT WEIGHT
DECONTAMINATION SYSTEM

AN/VDR-2 RADIAC SET

VITAL SIGNS MONITOR

M40 PROTECTIVE MASK
M1 CHEMICAL AGENT MONITOR

Nuclear, Biological, and Chemical Defense

MISSION:

Nuclear, biological and chemical (NBC) defense provides essential technologies and defensive materiel to allow US forces to sustain warfighting capability on the contaminated battlefield, across the spectrum of conflict. NBC defense doctrine requires contamination avoidance when the scheme of maneuver permits; soldier protection from incapacitating or lethal agent effects, including self-and buddy-aid as well as medical management to rapidly return casualties to duty and prevent morbidity and mortality; NBC survivable equipment, and effective decontamination. Implementation of this doctrine requires effective capabilities for reconnaissance, detection and identification of radiation, biological and chemical agents; individual physical and medical protection from agent effects; collective personnel protection for vehicles and shelters; decontamination of soldiers; patients and equipment; and medical management of NBC casualties. Fielding an effective NBC defensive capability contributes to both the deterrence of, and constrains development of, the hostile use of NBC weapons against US forces whether their mission is one of nation building and peace keeping or one of high intensity warfare.

SOVIET COUNTERPARTS:

The Soviet Union has fielded the world's largest and most capable inventory of chemical weapons and an extensive chemical force structure. The Soviet Union is known to possess the means to field biological weapons. The extensive use of chemical weapons in the Iran-Iraq war has apparently lowered the threshold for chemical warfare and the widespread proliferation of nations with potential chemcial and biological weapons capabilities are a significant potential threat to our National security goals and objectives.

PROGRAM STATUS:

Technology base initiatives include advanced transition technology demonstrations (ATTDs) for Advanced Chemical and Biological Defense and the Soldier Integrated Protective Ensemble as well as therapeutic drugs and protective vaccines from the DoD Drug and Vaccine Program. The ATTDs facilitate early transition of enhanced capabilities for agent detection and identification (Bio-chemical detector and Chem/Bio Mass Spectrometer), filter technology effective against emerging threats, self-stripping decontamination coatings and soldier protective clothing and equipment against the spectrum of battlefield hazards (e.g., blast, thermal, laser, environmental, chemical and biological). DoD Drug and Vaccine program efforts include an improved anthrax vaccine, a Rift Valley fever vaccine, a broad spectrum antiviral drug, and an enhanced therapeutic drug against nerve agents, and topical protectants against multiple chemical threats. Medical materiel being developed include: the skin decontamination kit, XM291; a convulsant antidote for nerve agents; a multi-chambered autoinjector; botulinal toxoids types F and G; and the Q-fever CMR vaccine. These medical items will enhance soldier survivability and sustainability while providing reduced morbidity and mortality among those that become casualties. Also contributing to enhanced soldier survivability are the M40/M42 Protective Mask, the M1 Chemical Agent Monitor, the M17 Lightweight Decontamination System and the AN/VDR 2 Radiac Set. All these systems are currently in production and the M1, M17, and the AN/VDR 2 are being fielded. The AN/VDR 2 provides soldiers with the first new radiation detection instrument in more than 20 years. The XM93 NBC Reconnaissance System (NBCRS) is currently near the completion of its Proposal Evaluation and Shootoff Phase. When a winner of this phase is selected, 48 interim systems will be purchased to meet urgent requirements and a System Improvement Phase will begin to satisfy all ROC requirements which were not met by the selected system. The NBCRS will provide a first time capability to find, identify, report and avoid battlefield contamination. Also during this period, two automatic detectors effective against all standard chemical threat agents, the XM22 Automatic Chemical Agent Alarm for point detection and the XM21 Remote Sensing Chemical Agent Alarm for remote sensing, are being developed. The XM22 has just entered the engineering development phase and XM21 is nearing type classification.

CONTRACTORS:

Battelle Memorial Institute - (Columbus, OH)
Brunswick Defense - (Deland, FL)
Duphar - (Amsterdam, Holland)
Engineered Air Systems Inc. - (St. Louis, MO)
Environmental Technology Group, Inc. - (Towson, MD)
Nuclear Research Corp. - (Dover, NJ)
Porton Products Ltd. - (Washington, D.C.)
Rohm and Haas Co. - (Springhouse, PA)
Salk Institute, Government Products Divsion - (Swiftwater, PA)

NIGHT VISION DEVICES

THE AN/PVS-4 INDIVIDUAL SERVED WEAPON SIGHT

THE AN/AVS-6 AVIATION NIGHT VISION IMAGING SYSTEM (ANVIS)

THE AN/PVS-7 NIGHT VISION GOGGLE

Night Vision and Electro-Optics

MISSION:

The soldier is enabled to operate effectively during nighttime missions by utilizing and integrating night vision, electro-optic technologies and laser/thermal technologies. Some of the systems fielded are shown on the opposing page. The AN/PVS-4 Individual Served Weapon Sight provides passive sighting and viewing using second generation image intensification techniques. The AN/PVS-4 is designed primarily for use with the M14 and M16 rifles, the M60 machine gun, the M72A1 rocket launcher and the M203 grenade launcher. It can also be used by a commander for surveillance. The AN/PVS-7 Night Vision goggle provides passive sighting and viewing using third generation (high performance) image intensification techniques. The AN/PVS-7 is a lightweight, headmounted monocular unit. It is used to operate ground vehicles, for navigation, map reading, maintenance, first aid, etc. The AN/AVS-6 Aviation Night Vision Imaging System (ANVIS) is a light weight, high performance binocular unit using third generation image intensification techniques. The AN/AVS-6 was designed specifically for use by helicopter pilots during night flights including Nap-of-the-Earth (NOE) mission.

SOVIET COUNTERPARTS:

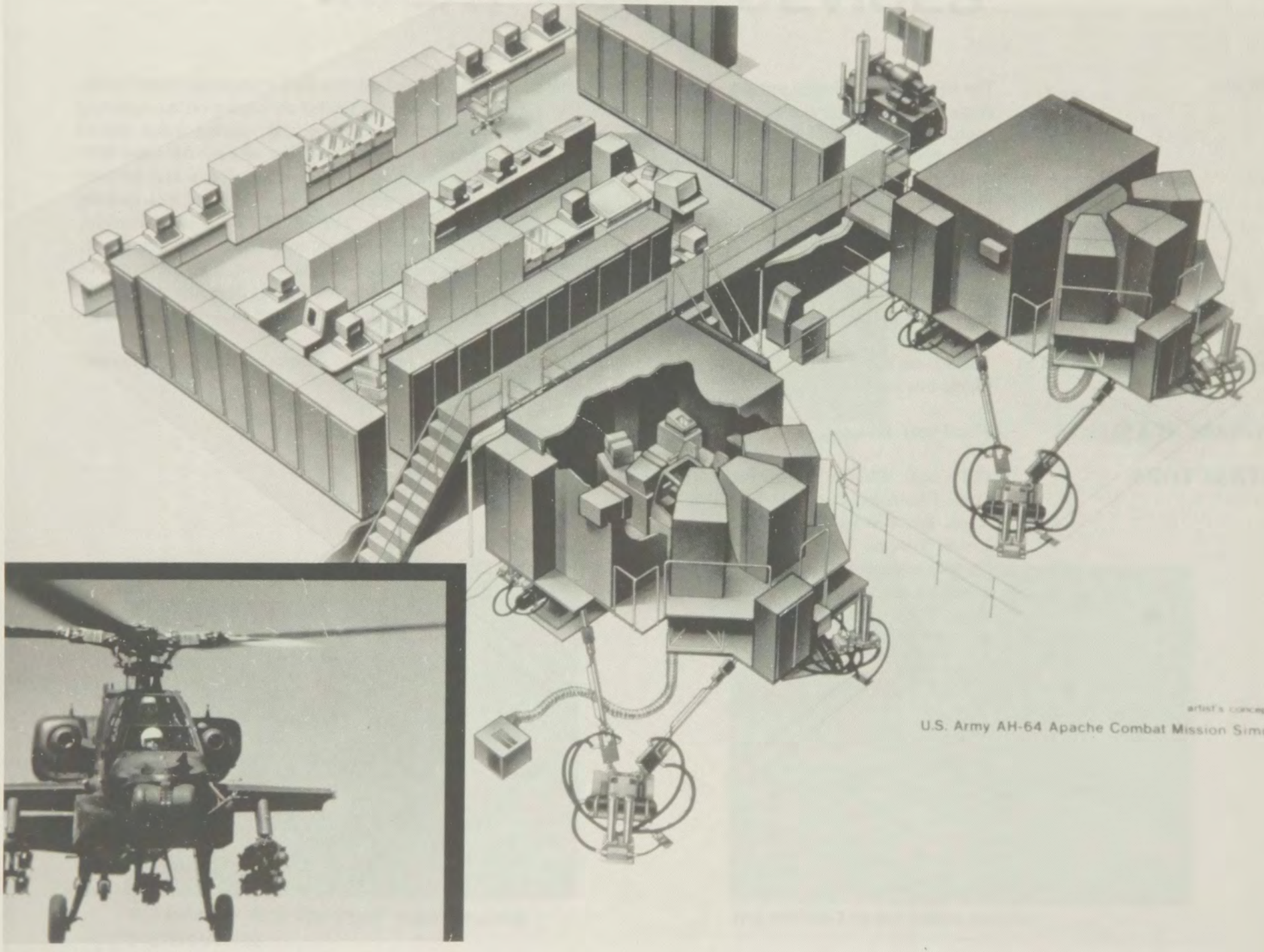
The Soviets have some second generation devices, however, they do not have third generation (high performance) image intensification technology.

PROGRAM STATUS:

Fiscal year 1991 will be the second program year of two 3-year multiyear contracts.

CONTRACTORS:

ITT Corp., Electro-Optical Production Division (Roanoke, VA)
Optic-Electronic Corp. (Dallas, TX)
Varo, Inc. (Garland, TX)
Litton Systems, Inc., Electron Devices Division (Tempe, AZ)
Varian Associates, Varian Image Tube Division (Palo Alto, CA)
Hughes Optical Products Inc. (Des Plaines, IL)
Baird Corp. (Bedford, MA)
S-Tron (Redwood City, CA)



artist's conception of
U.S. Army AH-64 Apache Combat Mission Simulator

Synthetic Flight Training Systems

MISSION:

The Army is acquiring flight simulators to improve training effectiveness, maintain combat readiness, and cope with current and future operating costs. This is being accomplished by providing high fidelity simulations of helicopter flight including nap-of-the-earth, combat environment, day/night, instrument flight, and weapons engagements with enemy interaction, while at the same time, providing realistic and cost effective trainers. The Army's Synthetic Flight Training Systems (SFTS) are high fidelity, computer driven, flight weapon and mission simulators for the UH-1, MH/CH-47, AH-1, MH/UH-60 and AH-64 helicopters. The UH-1 simulator is an instrument flight and emergency procedures trainer mounted on a 5-degree-of-motion base. The remaining simulators are more complex devices mounted on advanced technology 6-degree-of-motion platforms, with cockpit window visual presentations for tactical, nap-of-the-earth mission training. All weapons systems in the attack helicopters are replicated for aircrew gunnery training. The Army is currently involved in a development program which will integrate the effects of all aircraft to include other services and the threat, plus ground systems to provide a network type training system. The aviation system is called AIRNET and is being integrated into DARPA's SIMNET program.

SOVIET COUNTERPART:

There is no known comparable Soviet flight simulation capability but they do have flight simulators.

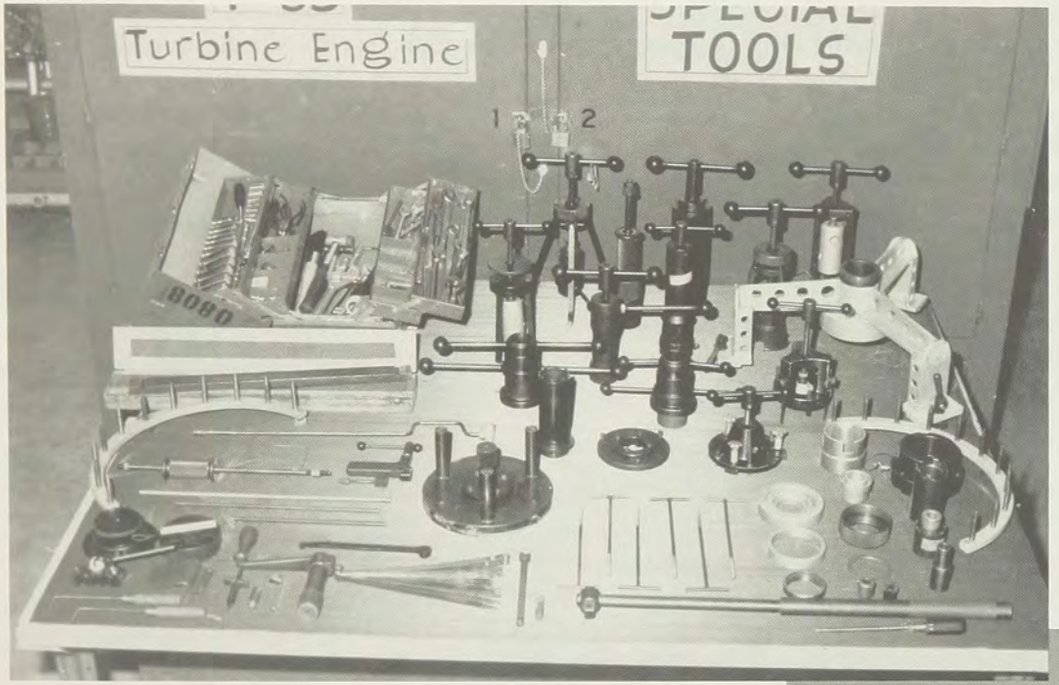
PROGRAM STATUS:

The total program is for 22 UH-1, one MH47, six CH-47, one MH-60, 16 UH-60, nine AH-1, and 12 AH-64 combat mission simulators. Twenty-two UH-1, six Ch-47, five AH-1, eight UH-60 and five AH-64 simulators have been fielded. Additional UH-60 and AH-64 simulators will be fielded through FY94. In addition there will be 18 Combat Weapons Effects and Emergency Procedures Trainers to begin fielding in FY91 for the AH-64. A contract for one MH47E Simulator (with option for one MH60K Simulator) was awarded in September 1988 to support the Special Operations Forces.

CONTRACTOR:

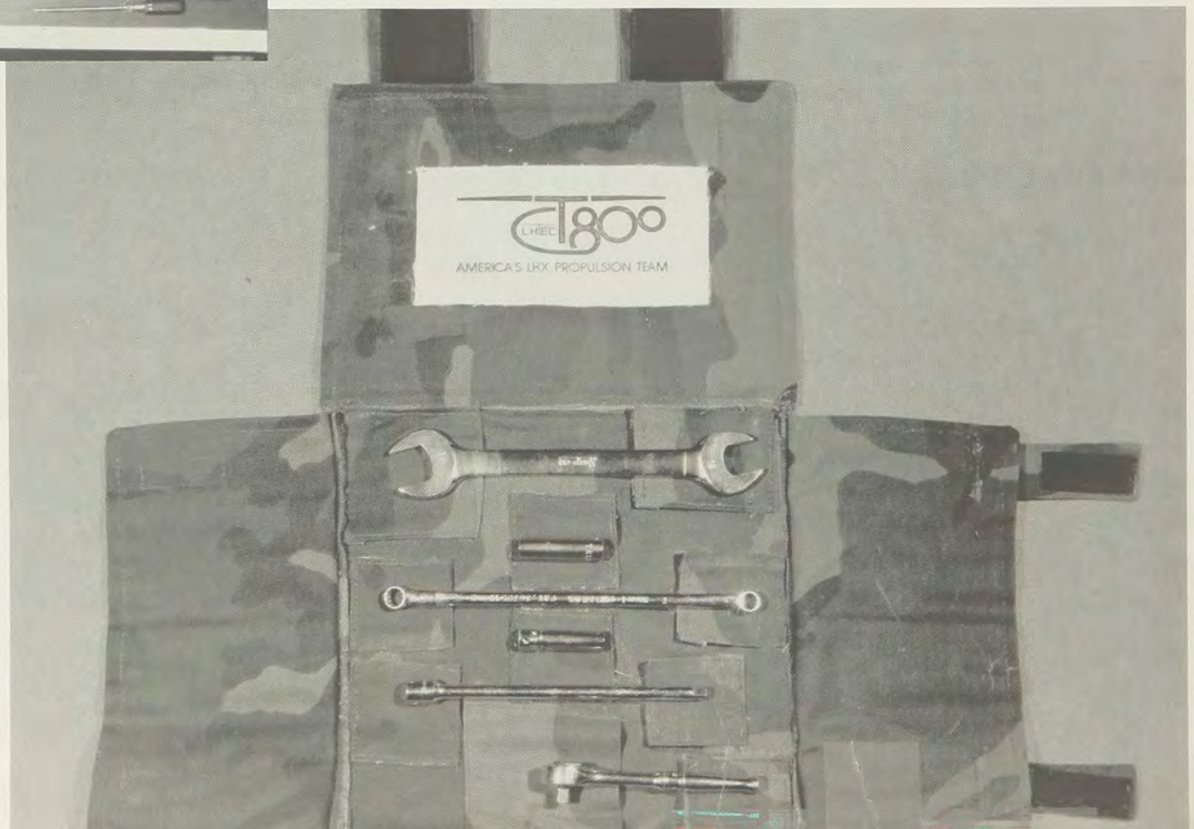
CAE - Link Corporation, a CAE Industries LTD. Company (Binghamton, NY)

A MANPRINT SUCCESS: SIMPLIFICATION OF MAINTENANCE TASKS



TOOLS TO MAINTAIN CURRENT AVIATION ENGINE

TOOLS TO MAINTAIN PROPOSED FUTURE AVIATION ENGINE



MANPRINT

Integrating soldier performance early into the acquisition process maximizes the total system performance on the battlefield. Rapid changes in hardware and software technologies have made people the limiting factor in the effective design, development, operation, and support of military equipment. Equipment and system failures, attributed to human error, often result from insufficient consideration of the capabilities of the operators and maintainers in the field. The Army's Manpower and Personnel Integration (MANPRINT) Program considers human capabilities throughout the acquisition process. The MANPRINT approach benefits warfighting capabilities through the following objectives:

- Influence soldier-machine system design for optimum total system performance.
- Ensure Army system designs conform to the capabilities and limitations of the fully equipped soldier.
- Integrate training considerations into early design concepts.
- Improve control of total life-cycle costs of soldier-materiel systems.

For the 400 new types of weapon systems and equipment introduced into the Army under the Force Modernization Program only 20 percent of their life cycle costs are captured by research, development, and acquisition costs. To lessen the burden of operation, maintenance, and support costs, the MANPRINT program provides emphasis upon effective and efficient soldier-machine interface. Design decisions accommodating human resource considerations early in the acquisition process avoid costly support alternatives.

MANPRINT achieves its emphasis upon total system performance by integrating the analyses of six domains:

- MANPOWER: The number of human resources, both men and women, military and civilian, required and available to operate and maintain Army systems.

- PERSONNEL: The aptitudes, experience, and other human characteristics necessary to achieve optimal system performance.

- TRAINING: The requisite knowledge, skills and abilities needed by the available personnel to operate and maintain systems under operational conditions.

- HEALTH HAZARDS: Inherent conditions in the operation or use of a system (e.g. shock, recoil, vibration, toxic fumes, radiation, noise) that can cause death, injury, illness, disability, or reduce job performance of personnel.

- SYSTEM SAFETY: The inherent ability of the sytem to be used, operated and maintained without accidental injury to personnel.

- HUMAN FACTORS ENGINEERING: The comprehensive integration of human characteristics into system definition, design, development and evaluation, to optimize the performance of human-machine combinations.

Successful institutionalization of MANPRINT program benefits relies upon five areas of focus:

- Commitment: Dedication at all levels toward the productivity improvements achieved from producing quality products.

- Training and Education: Providing government and industry managers and engineers the concepts and the technical methods of analysis imbedded in the MANPRINT program.

- Research: Supporting the technical base activities that lead to the enhanced capabilities of new processes and technologies necessary to optimize total system performance.

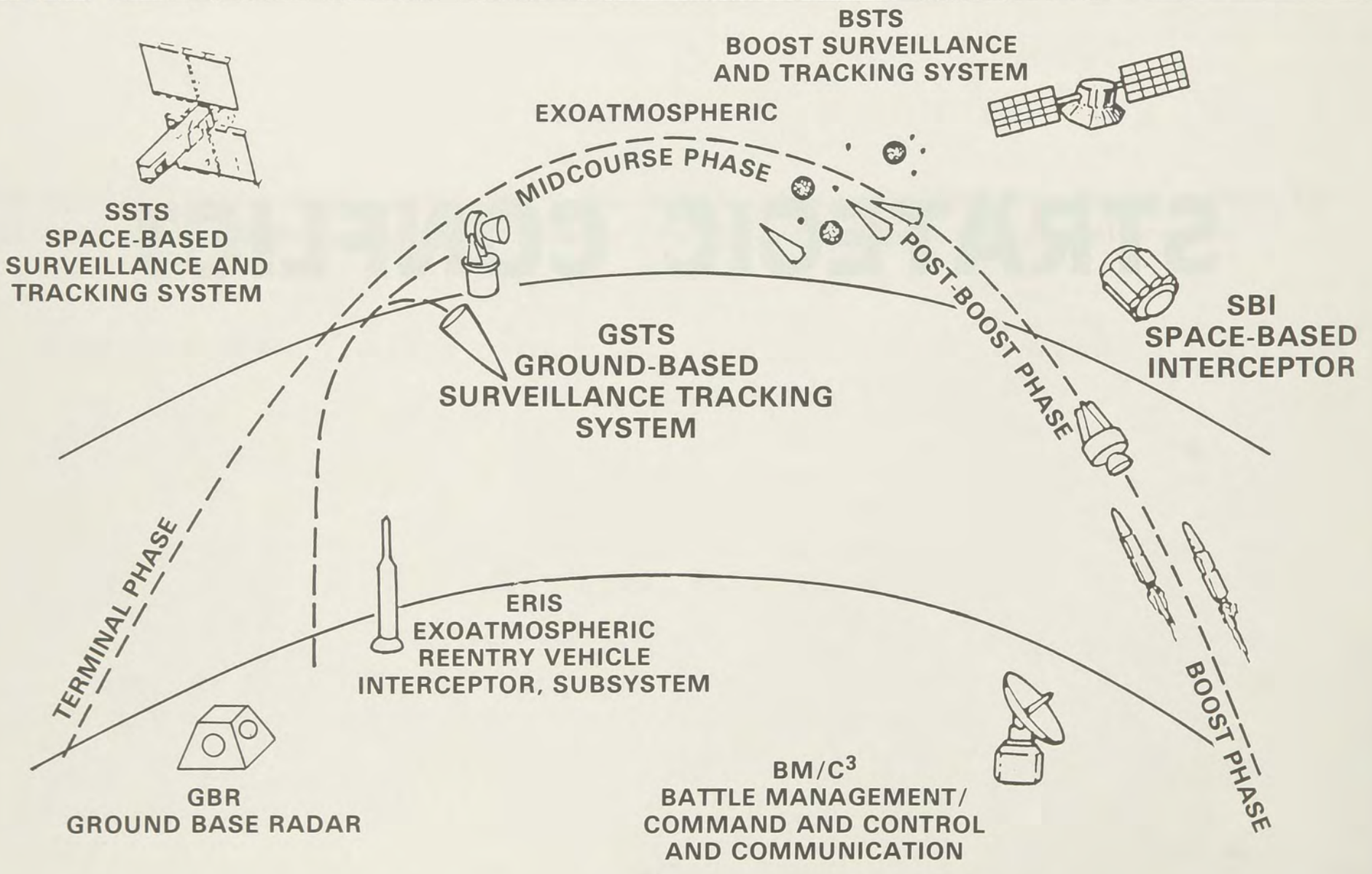
- Data Standards: Develop the data bases, management systems, and data controls to provide timely information on soldier requirements and characteristics and their design implications.

- Policies: Facilitating the acquisition process to ensure human resource considerations are accommodated early and continuously throughout the process.

The Strategic Conflict mission area relates to inter-continental or transoceanic inter-theater conflict. The US Army Strategic Defense program is the Army's only strategic weapons development program.

STRATEGIC CONFLICT

SDS MILESTONE 1



US Army Strategic Defense Command

MISSION:

The US Army Strategic Defense Command (USASDC) is a major contributor to the Department of Defense Strategic Defense Initiative (SDI). The mission of the command is to conduct a coordinated research program, in coordination with Defense, SDI and Army guidance, to insure a timely, cost effective development of technologies for defense against ballistic missiles. Explicitly included in this mission is the development of Tactical Missile Defense technologies and management of Kwajalein Atoll as a National Missile Range. Additionally, the command has the DoD-directed mission to develop a national Kinetic Energy (KE) antisatellite (ASAT) capability.

PROGRAM STATUS:

In FY 90 USASDC is managing a research program of about $1.3 Billion in the five functional areas of ballistic missile defense: Surveillance, Acquisition, Tracking, and Kill Assessment (SATKA); Kinetic Energy Weapons (KEW); Directed Energy Weapons (DEW); Systems Analysis/Battle Management (SABM); and Survivability, Lethality and Key Technologies (SLKT). This research focuses on demonstrating the technologies which will allow for the deployment of a multitiered Strategic Defense System (SDS). Also included in this funding are efforts in coordination with our allies for the development of the architectures, system technologies, and testbeds required for an effective theater missile defense.

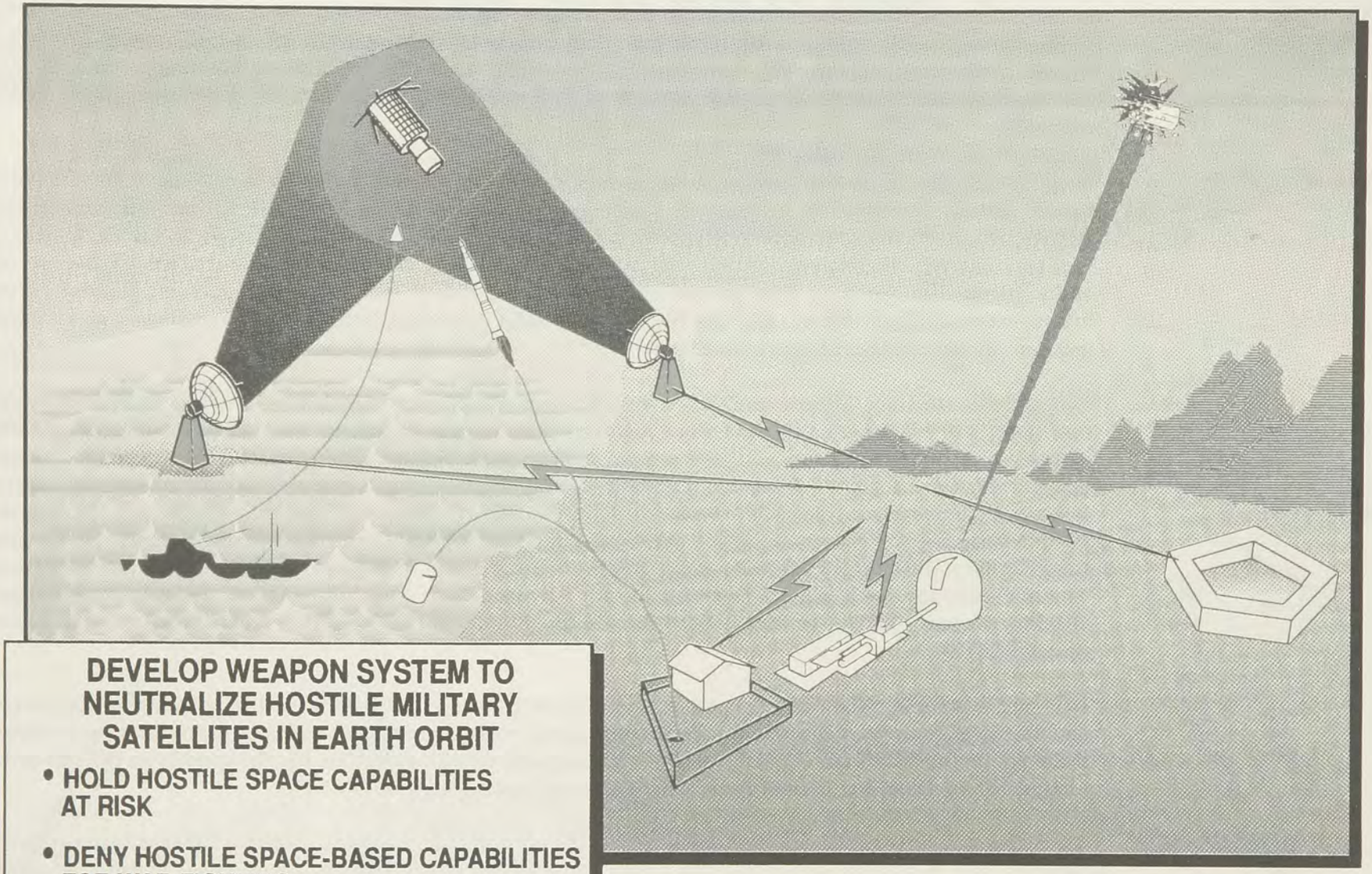
In September 1987 and October 1988 the Defense Acquisition Board completed a review of the SDS and directed that Phase I of the program proceed from concept validation into demonstration and validation. Component systems in the follow-on phases will continue to undergo basic technological research. The schematic drawing depicts the major elements of Phase I of the SDS system. Army components include: the Exoatmospheric Reentry-Vehicles Interceptor Subsystem (ERIS), the Ground-based Surveillance and Tracking System (GSTS), and the Battle Management, Command, Control and Communications (BM/C3) support for these systems. The Ground Based Radar (GBR) has recently been approved as a Phase I element to move into demonstration and validation. The Air Force has developmental responsibility for the remaining Phase I systems: the Boost Surveillance and Tracking System (BSTS), the Space Based Interceptor (SBI), and the Space-Based Surveillance and Tracking System (SSTS).

In FY91 the program will build upon past technological developments through focused investigations, experiments, and functional technology validations in the five functional areas. The emphasis will be to demonstrate and validate technologies for the Phase I systems, while sustaining the technological base for the systems in the follow-on phases. Major USASDC initiatives are detailed on the pages which follow.

SOVIET COUNTERPART:

The Soviets are maintaining and upgrading the world's only operational Ballistic Missile Defense System around Moscow, and in addition are conducting a very active research and development program in more advanced BMD technologies.

ANTI-SATELLITE (ASAT) PROGRAM (U)



DEVELOP WEAPON SYSTEM TO NEUTRALIZE HOSTILE MILITARY SATELLITES IN EARTH ORBIT

- HOLD HOSTILE SPACE CAPABILITIES AT RISK
- DENY HOSTILE SPACE-BASED CAPABILITIES FOR WAR FIGHTING
- ELIMINATE HOSTILE CAPABILITY FOR ELECTRONIC INTELLIGENCE GATHERING

Ground Based ASAT System

MISSION:

The objective of the Ground Based Anti-satellite (ASAT) System is to achieve space control. Space control is a warfighting mission of the U.S. Space Command and its components. ASAT weapons and their command and control elements constitute the space forces necessary to execute space control operations. Accomplishing this mission requires the ability to provide space surveillance, actively defend friendly space systems against a variety of threats, disrupt, degrade, and destroy the warfighting potential of enemy space systems, and engage enemy forces attacking in space.

The military strategy for space supports U.S. policy objectives and Army mission requirements: deterrence and, if necessary, defense against enemy attack; assured access to and freedom of action in space; negation of hostile space systems; and enhancement of the operations of U.S. and Allied forces. The ASAT system will operate across the spectrum of conflict.

SOVIET COUNTERPART:

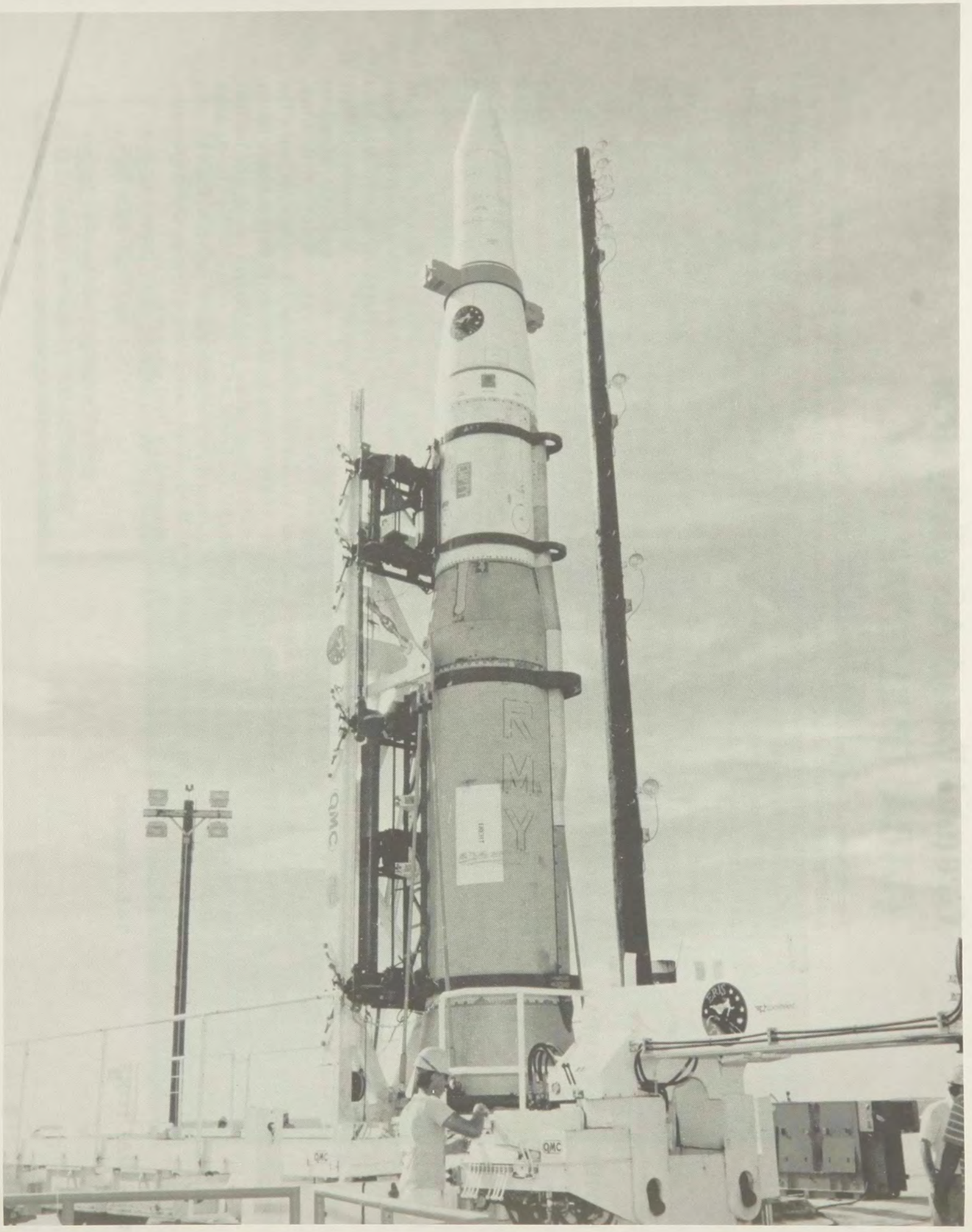
Indicative of the Soviets' military program of space is their development and maintenance of the world's only currently operational ASAT system, a ground-based co-orbital interceptor. Using a radar sensor and a pellet-type warhead, the interceptor can attack all current low-altitude satellites. Other Soviet systems have ASAT capabilities. The nuclear-armed GALOSH ABM interceptor deployed around Moscow has an inherent ASAT capability against low-altitude satellites. Some of the lasers located at the Sary Shagan Missile Test Center may be capable of damaging sensitive components onboard satellites. The Soviets also have the technological capabilities to conduct electronic warfare against space systems.

PROGRAM STATUS:

As the result of a January 1989 Defense Acquisition Board decision, the Department of Defense designated the Army as interim lead service for the development of a Kinetic Energy (KE) ASAT system. The Army selected BG J. Morgan Jellett to lead the Joint ASAT development effort. A Joint Program Office has been established at the Army Strategic Defense Command facilities in Huntsville, Alabama, and the Navy has provided a Deputy Program Manager. Alternative concepts for land and/or sea based versions were presented at a Defense Acquisition Board Review for final concept selection. A small land based set option was selected to be managed by the Army. In preparation for the Milestone I decision, an initial Cost and Operational Effectiveness Analysis, and a Test and Evaluation Master Plan have been developed along with Life Cycle Cost Estimates for both the Kinetic Energy weapon system and the surveillance and BM/C^3 portion of the program. In addition to the KE ASAT effort, the Defense Acquisition Board also directed parallel Directed Energy ASAT development efforts by the Army and the Air Force. The prime candidate for a directed energy ASAT system is the Ground Based Free Electron Laser which is being developed by the Army Strategic Defense Command under the Strategic Defense Initiative. A Milestone I for Directed Energy ASAT system is planned for fiscal year 1991.

CONTRACTORS:

To be determined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Ground Based Interceptor (GBI)

MISSION:

GBI is designed to conduct non-nuclear intercepts of reentry vehicles (RV) dispersed from Intercontinental Ballistic Missiles (ICBM) and Submarine-Launched Ballistic Missiles (SLBM). Midcourse sensors will acquire, track, and pass target information to the battle manager element which will discriminate (determine which objects are reentry vehicles), assign GBI interceptors to targets, provide trajectory launch data to the interceptor, and communicate target state vector upgrades to the interceptors in-flight.

CHARACTERISTICS:

The GBI is a lightweight sytem designed to provide a low cost per RV kill, estimated to be $1-2 million. The GBI kill mechanism will be non-nuclear, and is designed to hit the RV with a kinetic kill vehicle. A lethality enhancement device may be utilized to increase the interceptor's lethal radius and negate threat countermeasures.

PROGRAM STATUS:

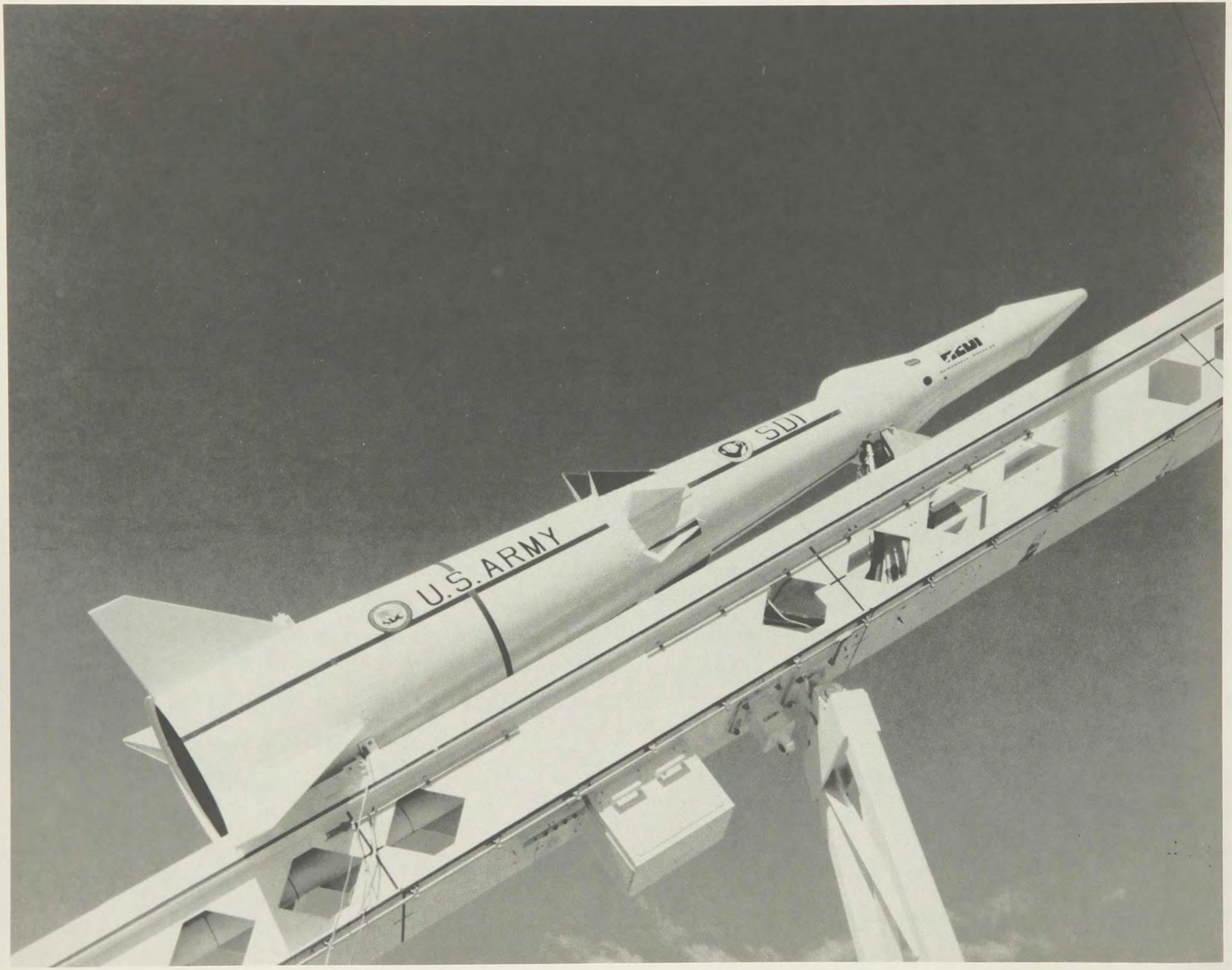
The GBI program consists of two phases, ERIS FTV and GBI-X, to resolve one set of critical issues. The basic interceptor functions wil be validated in a series of three FTV flight tests taking place in FY 90-91. Each test will address increasingly stressing threat levels. Once these basic functions are demonstrated, validated advanced technologies from GBI-X will be introduced in FY 92-94. The Exoatmospheric Test Bed will use the same FTV booster and test hardware and will flight test GBI-X components based on new technologies such as: improved seeker, cooled optics, fiber optic gyro, improved avionics, new kill vehicle concepts, and reduced system size.

CONTRACTORS:

ERIS FTV
Lockheed (Prime)-(Sunnyvale, CA)
Texas Instrument (Seeker) - (Dallas, TX)
Honeywell (Avionics) - (Clearwater, FL)
Kearfott Navigation Controls Co (IMU) - (Little Falls, NJ)
TRW (Divert Propulsion) - (Redondo Beach, CA)
Hercules (Booster Propulsion) - (Magna, UT)
Rocket Research (Lethality Enhancement)-(Redneon, WA)

GBI-XTechnology Studies*
Atlantic Research Corporation
Ball Aerospace
Boeing
Lockheed
Hughes Aircraft Company
AEROJET Technical Systems
Rockwell International
Booz-Allen and Hamilton
Martin Marietta
Charles Stark Draper Labs
Honeywell
Science Applications International Corporation
SEP (Bordeaux, France)
Morton Thiokol
Westinghouse

*Prime Contracts to be competitively awarded in FY90.


U.S. ARMY
SDI

High Endoatmospheric Defense Interceptor (HEDI)

MISSION:

HEDI is a ground-based, hypervelocity, high acceleration, area defense interceptor which will engage ballistic missile reentry vehicles high in the endoatmosphere. This battlespace requires HEDI to intercept short-range and depressed trajectory SLBMs as well as those ICBM RVs which penetrate the midcourse defense layer. The midcourse sensors and associated battle manager elements will provide target detection and discrimination, determine the desired target intercept point, select the appropriate trajectory for engaging each threat, and issue a launch command to the HEDI.

CHARACTERISTICS:

The requirement for HEDI to function in the atmosphere at a high velocity requires it to be a lightweight interceptor with emphasis on propulsion and rapid divert capabilities. The vehicle and its individual components also must be able to withstand the high temperatures generated by atmospheric friction. A laser rangefinder will fuze a non-nuclear fragmenting warhead.

PROGRAM STATUS:

Test results have verified the basic technology for the window cooling concept and the warhead shape, fragmentation pattern, and velocity. The Kinetic Kill Vehicle Integrated Technology Experiment (KITE) program is an ongoing study program structured to resolve critical issues using existing and developing technologies. In FY90, the kill vehicle will be integrated into the interceptor and tested in a launch at White Sands Missile Range, NM. Another KITE test will occur with the completion of the seeker and laser rangefinder. These flight tests will be followed by intercepts of strategic targets at the US Army Kwajalein Atoll.

CONTRACTORS:

McDonnell Douglas (Prime) - (Los Angeles, CA)
Hughes (Seeker) - (El Segundo, CA)
Aerojet (Controls) - (Sacramento, CA)


BOEING
U.S. ARMY

Airborne Optical Adjunct (AOA)

MISSION:

The Airborne Optical Adjunct (AOA) program is an ABM (Anti-Ballistic Missile) Treaty compliant technology experiment to determine how sophisticated, airborne electro-optical sensors can best provide early warning and tracking of enemy ballistic missile warheads. The system holds the promise of being able to detect a wide range of objects during their flight outside the atmosphere and, as these objects generate heat on reentering the atmosphere, to discriminate warheads from decoys, debris, and chaff which may reenter with them. As such, the AOA supports sensor technology for the boost, midcourse and terminal phases of ballistic missile defense. It also provides for functional validation of the performance of airborne platforms for real-time, onboard processing of integrated sensor components.

CHARACTERISTICS:

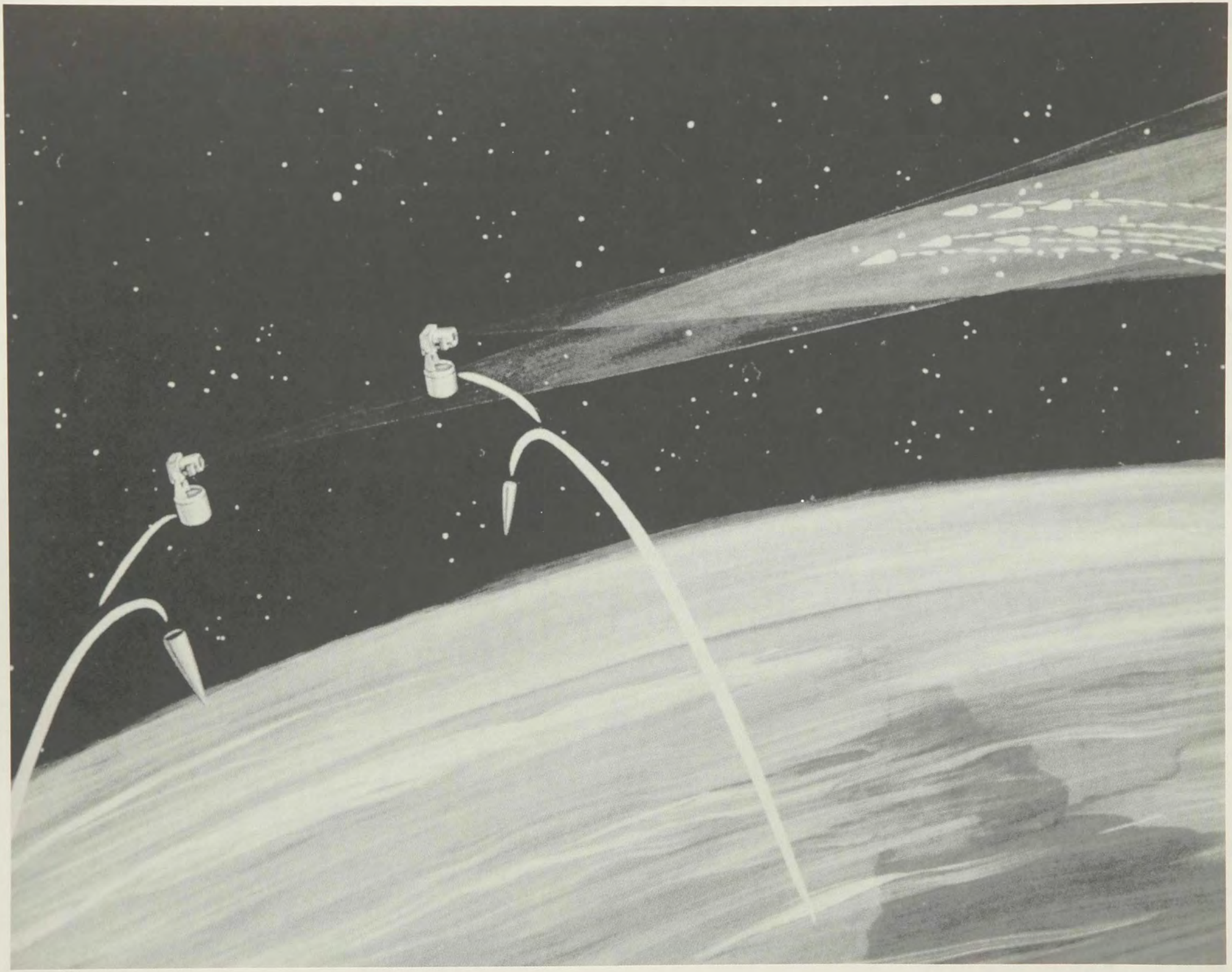
The system consists of a state-of-the-art Long Wave Infrared (LWIR) sensor and data processor installed in a modified Boeing 767 commercial jet aircraft. The key to AOA performance is ability of the LWIR sensor system to detect the heat of objects at long ranges against the cold space background within its field of view. The system will be used to test LWIR and data processing performance and as a testbed vehicle for other sensors and SDI systems.

PROGRAM STATUS:

Modifications to the AOA aircraft have been completed to permit installation of the sensor subsystem and airworthiness tests. The sensor subsystem has been completed and is now undergoing systems integration testing. In addition, detection and operating algorithms continue to be developed for the sensor and data processing system. The AOA system will be used in a series of experimental flights designed to validate the functional performance of an LWIR sensor on an airborne platform in detecting and tracking ICBM reentry vehicles, and discriminating warheads from other objects. Beginning in 1990 AOA flights will validate and test onboard computer and other electronic equipment necessary for analog and digital processing of data. Test flights are to be initiated in CONUS while operational flights will be conducted at the US Army Kwajalein Atoll missile range.

CONTRACTORS:

Boeing (Prime) - (Kent, WA)
Hughes (Sensors) - (El Segundo, CA)
Honeywell (Data Processing, Computer Hardware) - (Clearwater, FL)



Ground-Based Surveillance and Tracking System (GSTS)

MISSION:

The GSTS will support tracking and discrimination in the midcourse phase of the battle space using sensors carried into space by a rocket booster. The operational concept calls for GSTS sensors, launched at appropriate times after receipt of attack warning from boost-phase sensors, to provide to the battle manager correlated data on reentry vehicles during the midcourse phase. This system will be used to augment performance of space-based sensors, to cover gaps created by antisatellite attacks or nuclear detonation, and to provide taskings for the Ground Based Radar.

CHARACTERISTICS:

GSTS will use a passive Long Wave Infrared (LWIR) sensor to perform discrimination and tracking. This system incorporates devices to provide high speed signal throughput and rapid onboard data processing.

PROGRAM STATUS:

A prototype GSTS is being developed to provide for technical validation experiments and test flights to support midcourse discrimination and tracking. The GSTS will be integrated with the Boost Surveillance and Tracking System (BSTS) and other midcourse sensors (the Space-Based Surveillance and Tracking System and the Ground-Based Radar) for a full end-to-end tracking and discrimination experiment. A validated GSTS system concept will complete demonstration and validation in the mid-1990s.

CONTRACTORS:

McDonnell Douglas (Prime) - (Huntington Beach, CA)
Hughes (Sensors) - (El Segundo, Ca)
Rockwell (Sensors) - (Anaheim, CA)
TRW (Software) - (Huntsville, AL)
Honeywell (Data Processor) - (Clearwater, FL)
SPARTA (Systems Engineering) - (Huntsville, AL)

Ground-Based Radar (GBR)

MISSION:

The Ground-Based Radar (GBR) performs object discrimination in the midcourse and high endoatmospheric phases of a ballistic missile trajectory. The GBR-X (Experimental) will demonstrate and validate the concepts and technology applicable to an operational GBR concept. GBR-X will also provide an instrumentation sensor for interceptor and ballistic missile testing at the U.S. Army Kwajalein Atoll.

CHARACTERISTICS:

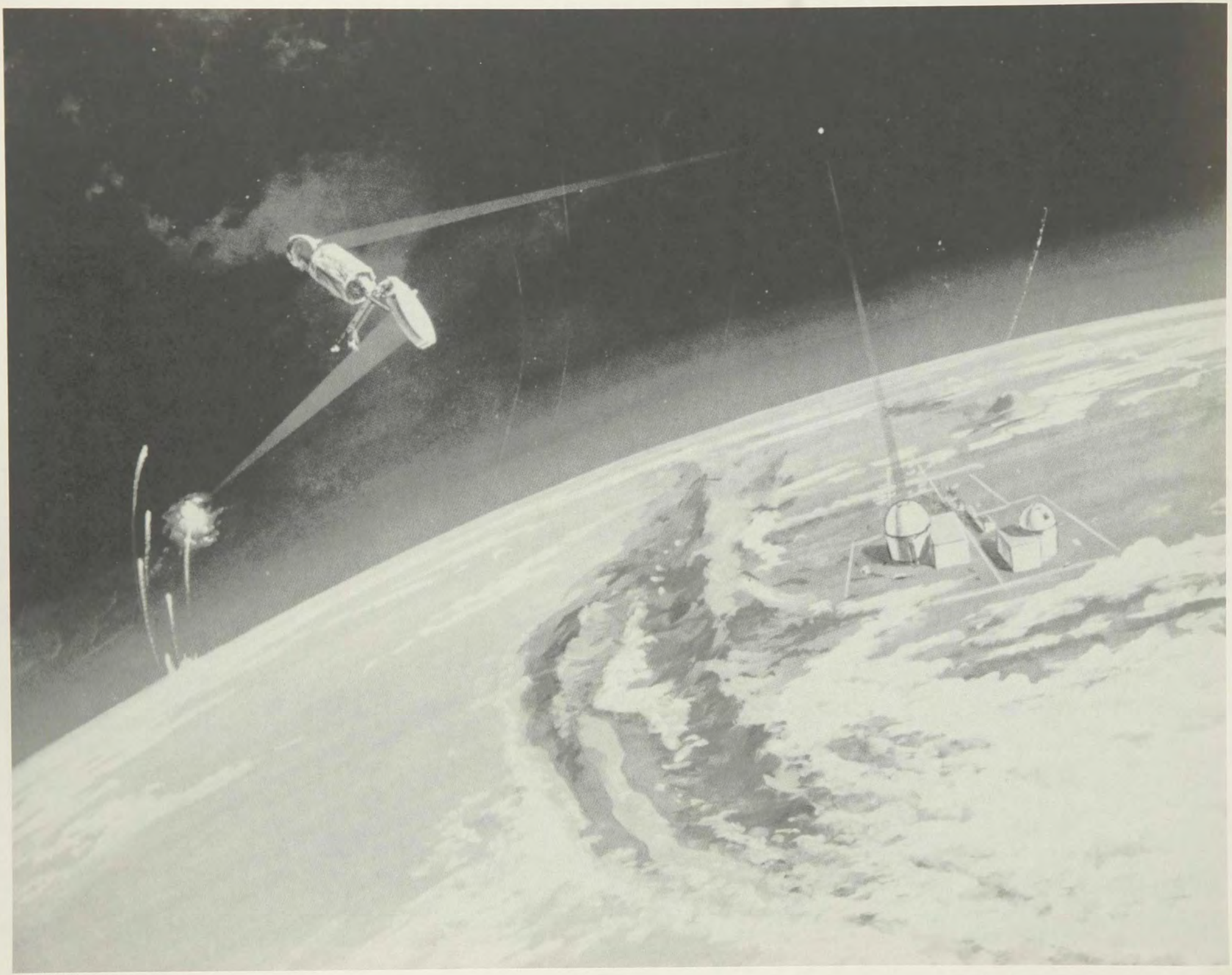
GBR is a high power, single-face, dual-use, phased-array radar. The full field and limited field-of-view antennas each contain over 21,000 elements used for steering the antenna beam. The antenna itself is a 100-meter structure. Standard traveling wave tubes will form the heart of the transmitter power group. The radar will depend heavily on new software development to control all aspects of the system and perform the crucial acquisition, tracking, and discrimination functions.

PROGRAM STATUS:

The Ground-Based Radar Experiment (GBR-X) will be an SDI Phase I technology validation experiment which will form the basis for an operational GBR. A 48-month development contract has been awarded and the GBR-X will be operational in 1993 at USAKA. A number of significant studies relating to GBR-X utilization and capabilities have been performed. The analyses have validated the design concepts incorporated into GBR-X and form a basis for developing detailed algorithms and operational procedures.

CONTRACTORS:

Raytheon (Prime) - (Boston, MA)
TRW (Software) - (Redondo Beach, CA)
Control Data (Data Processing) - (Redondo Beach, CA)



Ground Based Laser (GBL)

MISSION:

The GBL program will involve a series of high energy experiments at White Sands Missile Range, NM. These experiments will provide the technology base that will contribute to the development of a laser system capable of destroying incoming threat missiles and warheads. The diagram at left shows the major components of the system. A powerfull free electron laser (FEL) is fired from a position on the ground. The beam is reflected first off a high altitude relay mirror in orbit. The beam is then reflected off a "fighting mirror," from which it can intercept enemy missiles during their boost phase, just after launch, when they are most vulnerable. The test program will show that multi-megawatt power lasers are possible, that a GBL system can direct the laser energy and deposit it on a space based target, and that an operational system is possible by the integration of the major components. The GBL program will provide the ability for scaling to a larger operational system in the future.

PROGRAM STATUS:

The free electron laser (FEL) provides a frequency tunable high energy laser beam. The FEL has experienced rapid gains in technology during the past several years. In experiments at the Lawrence Livermore and Los Alamos National Laboratories, the FEL demonstrated high efficiency for both long and extremely short wavelengths. Solutions to technical problems concerning beam degradation caused by the atmoshphere and battle management control are progressing well. Construction is progressing on the facilities at the White Sands Missile Range. Detailed design and acquisition for the laser will begin in FY90. Following a successful experiment, the ground segment technology will provide the basis for full-scale development of an operational system.

CONTRACTORS:

Boeing (RF FEL) -(Seattle, WA)
Lockhead (Beam Control) - (Sunnyvale, CA)
TRW FEL (System Engineering) - (Redondo, CA)
Fluor (Facilities) - (Irvine, CA)