Products

Missiles and Fire Control
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LOCKHEED MARTIN

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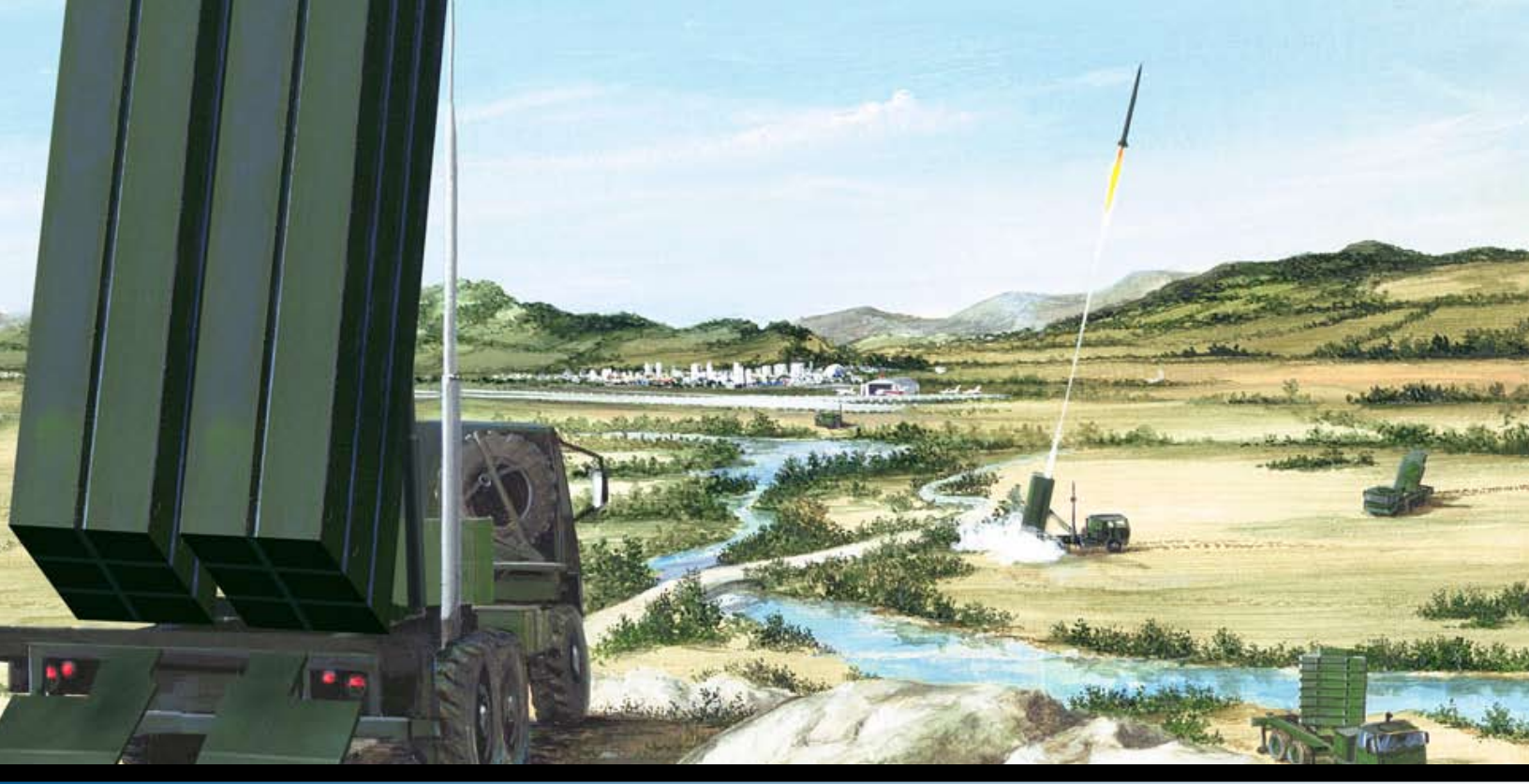
MEADS
PAC-3® MSE
THAAD
PAC-3® Missile



MEADS
Medium Extended Air Defense System

Major Equipment Items

- Missile – Advanced seeker for hit-to kill accuracy at all altitudes and in clutter
- Launcher – C-130 and A400M transportable, tactically mobile, high-firepower design
- Sensors – 360-degree coverage for surveillance and fire control
- BMC4I – Netted, distributed, automated communications network

Features

- Successfully demonstrated in end-to-end simulations against live and injected targets
- Proven PAC-3 hit-to-kill missiles
- Reconfigurable plug-and-fight architecture that optimizes defense effectiveness and interoperability
- Survivable through ECM resistance and distributed workload
- Advanced logistic design for reduced cost of ownership
- Planned to replace Patriot, Hawk, and Nike

Responsive. *Netted-distributed MEADS creates deployable, flexible battle elements*. Commanders tailor the Air and Missile Defense (AMD) force to the mission and support Unit of Employment/Unit of Action missions and operations.

Deployable. *Lightweight, efficient Major End Items (MEIs) packaging enhances strategic and tactical transport*. MEADS drive-on/drive-off system elements let C-130s and A400Ms deliver MEADS to the battlefield, ready to fight.

Agile. *MEADS battle elements match the force to the fight*. MEADS orchestrates force distribution through end item moves – MEADS plug-and-fight features provide ability to integrate, command, and control all AMD resources.

Versatile. *MEADS defeats the full spectrum of advanced threats*. MEADS defeats the entire AMD threat spectrum including tactical ballistic missiles, air-breathing threats, helicopters, UAVs, and cruise missiles.

Lethal. *Proven hit-to-kill technology ensures threat negation at intercept*. MEADS provides 360º coverage with the highest probability of acquisition and destruction of weapons of mass destruction.

Survivable. *MEADS defends the force and defends itself*. MEADS' high mobility, dispersion, availability, and operator/maintainer manning enhance survivability.

Sustainable. *Graceful degradation and optimized on-board provisions yield high operational availability.* Cutting-edge prognostics and diagnostics minimize downtime and reduce resources to sustain fielded systems for extended periods

MBDA MISSILE SYSTEMS LOCKHEED MARTIN MEADS INTERNATIONAL, INC. 21st CENTURY AIR AND MISSILE DEFENSE

PAC-3® Missile
Patriot Advanced Capability - 3 Missile

Specifications

- Greatly expands the defended area
- Increases loadouts by a factor of four
- Hit-to-kill lethality against warheads of mass destruction
- Operates in combined environments of electronic countermeasures (ECM), rain and clutter
- Highly effective against the entire Patriot threat from TBMs to cruise missiles.

Lockheed Martin is producing the battle proven Patriot Advanced Capability (PAC-3) Missile under a production contract for the U.S. Army Air and Missile Defense Program Executive Office. The PAC-3 Missile is being incorporated into the Patriot air defense system.

The PAC-3 Missile is a high velocity interceptor that defeats incoming targets by direct, body-to-body impact. PAC-3 Missiles, when deployed in a Patriot battery, will significantly increase the Patriot system's firepower, since 16 PAC-3s loadout on a Patriot launcher, compared with four of the older Patriot PAC-2 missiles. One hundred percent effective in Operation Iraqi Freedom, PAC-3 Missiles are now deployed with U.S. forces.

The PAC-3 Missile uses a solid propellant rocket motor, aerodynamic controls, attitude control motors (ACMs) and inertial guidance to navigate. The missile flies to an intercept point specified prior to launch by its ground-based fire solution computer, which is embedded in the engagement control station. Target trajectory data can be updated during missile flyout by means of a radio frequency uplink /downlink.

Features

- The 'hit-to-kill' PAC-3 Missile is the world's most advanced, capable and powerful terminal air defense missile. It defeats the entire threat: tactical ballistic missiles (TBMs) carrying weapons of mass destruction, cruise missiles and aircraft. The PAC-3 Missile is a quantum leap ahead of any other air defense missile when it comes to the ability to protect the warfighter in their defining moments.
- The PAC-3 Missile Segment upgrade consists of the PAC-3 Missile, a highly agile hit-to-kill interceptor, the PAC-3 Missile canisters (in four packs), a fire solution computer and an Enhanced Launcher Electronics System (ELES). These elements are integrated into the Patriot system, a high to medium altitude, long-range air defense missile system providing air defense of ground combat forces and high-value assets.
- Shortly before arrival at the intercept point, the PAC-3 Missile's onboard Ka band seeker acquires the target, selects the optimal aim point and terminal guidance is initiated. The ACMs, which are small, short duration solid propellant rocket motors located in the missile forebody, fire explosively to refine the missile's course to assure body-to-body impact.

PAC-3® MSE
Missile Segment Enhancement

Lockheed Martin received a contract for a Missile Segment Enhancement (MSE) to the battle-proven Patriot Advanced Capability-3 (PAC-3) Missile. The PAC-3 MSE provides performance enhancement to the missile that will counter evolving threat advancements.

The PAC-3 program includes flight software, flight-testing, modification and qualification of subsystems production planning and tooling, and support for full Patriot system integration. The MSE program will span 57 months, with flight-testing scheduled to begin in September 2006.

Under the PAC-3 MSE initiative the company will incorporate a larger, more powerful motor into the missile for added thrust, along with larger fins and other structural modifications for more agility. The modifications will extend the missile's reach by up to 50 percent. The larger fins, which will collapse to allow the missile to fit into the current PAC-3 launcher, will give the interceptor more maneuverability against faster and more sophisticated ballistic and cruise missiles.

Features

- Improves effectiveness through current battlespace
- Expands missile performance battlespace in altitude and range
- Defeats full regime of MEADS targets
- No forebody hardware change and minimal canister modifications required
- Use of proven methodologies and PAC-3 simulation tools and Hardware In The Loop (HWIL) facilities to verify system performance
- Dual pulse technology enables further improvements to overall system performance and lethality

THAAD
Terminal High Altitude Area Defense

The Terminal High Altitude Area Defense Weapon System (THAAD) is a key element of the Ballistic Missile Defense System (BMDS). THAAD will provide rapidly deployable ground-based missile defense components that deepen, extend and complement the BMDS to any Combatant Commander to defeat ballistic missile of all types and ranges while in all phases of flight. THAAD's combination of high-altitude, long-range capability and hit-to-kill lethality enables it to effectively negate the effects of weapons of mass destruction at intercept ranges well beyond the defended area. These attributes, along with THAAD's unique endo-and exo-atmospheric capability, enlarge the battle space to allow multiple intercept opportunities in both the late-midcourse and terminal phases of ballistic missile trajectories. THAAD can accept cues from Aegis, satellites and other external sensors to further extend the battle space and defended area coverage. THAAD will operate in concert with the lower-tier PAC-3 system to provide increased levels of effectiveness. The THAAD element consists of five major components: missiles, launchers, radars, fire control and THAAD-specific support equipment. All components have been successfully integrated, tested and demonstrated during the first program phase that concluded in 1999. Flight testing of the THAAD development program began in late 2005 with the first of 14 flight tests.

Aided Target Recognition (AiTR) System

Arrowhead®

ABL/WASS™

Target Sight System (TSS)

MLD

JSF™

EOTS

NITE Hawk™

Ground Reconnaissance and Surveillance System

Longbow FCR and Missile™

Sniper®

LANTIRN™

ER

ABL/WASS™

Airborne Laser (ABL)/Wide Area Surveillance System (WASS)

Specifications

- Detection and track of ballistic missiles hundreds of kilometers away
- WASS heritage includes the F-14 AN/AAS-42 IRST, AN/AAQ-14 LANTIRN and F-22 Advanced IRST
- Target tracking accuracies sufficient to determine launch site and missile impact locations
- IR data and ranging accuracy to support the detect, track, discrimination, and identification of threat ballistic missiles
- Active Ranging Laser capable of precise ranging of objects hundreds of kilometers away
- Multiple target tracks generated and managed by BMC^{4}I for onboard laser engagement and offboard distribution to other theater missile defense resources

The Airborne Laser (ABL) is the U.S. Air Force's revolutionary new approach for disabling or destroying theater ballistic missiles (TBM) immediately after launch, during their vulnerable boost phase. Onboard a Boeing 747, the ABL will use the Wide Area Surveillance Subsystem (WASS) to detect and precisely locate threat missiles for engagement by the ABL's megawatt-class laser. WASS leverages proven Infrared Search and Track (IRST) and Active Ranging Sensor (ARS) technologies to perform the real-time detection and precise target tracking of ballistic missiles. Employing six IRST sensors, WASS is capable of rapidly searching a large airspace volume, generating precise two-dimensional tracks on threat missiles during both their boost and post-boost phases of flight. The IRST system generates detections at very long ranges, then hands off to the ARS for track refinement and precise range measurement.

Features

- Six production IRSTs (sensors/ controllers)
- Production system with minimal modifications – ABL interfaces
- Provides continuous, wide search volume, rapid TBM detection and initial tracking
- Object sighting message to Battle Management Command and Control, Communications Computers and Intelligence (BMC^{4}I)
- Modified third generation LANTIRN with a ranging laser
- Acquires TBM from IRST cue, tracks TBM, and points laser for ranging
- Object sighting message used for launch point estimation (target prioritization) and impact point (theater resource)

Aided Target Recognition (AiTR) System
Multi-Spectral Sensor Technology for the US Army

The Aided Target Recognition (AiTR) system is a suite of robust, high-performance algorithms that quickly detects, recognizes, and identifies multiple targets at long ranges, using high-resolution images from thermal, visible, and laser sensors for all-weather, day-night surveillance and reconnaissance. AiTR feeds the Future Combat System (FCS) System of Systems environment with timely awareness of threats and targets, enabling warfighters to detect and identify potential targets and react to threats faster than
enemy forces.

AiTR delivers a capability to distinguish targets from friendly forces while supporting the full array of electro-optical/infrared (EO/IR) sensors deployed across the FCS ground vehicle fleet. It reduces time in the sensor-to-shooter link, increasing platform lethality and rapid response to targets or threats. It also provides increased reconnaissance capability during operations. The roles of the AiTR are to reduce the sensor-to-shooter timeline and decrease crew workload – increasing survivability, improving force effectiveness, and reducing fratricide.

The architectural design of the common high-density AiTR processor (HDAP) provides an expandable infrastructure to support all AiTR capabilities, with spare capacity for future growth to accommodate other sensor platforms (e.g., current force ground vehicles, unmanned aerial systems, and fixed and rotary wing surveillance aircraft) and other potential AiTR requirements such as data link.

The Lockheed Martin-led AiTR National Team represents a best-of-breed partnership between industry leaders Lockheed Martin and Raytheon, as well as the Army Research Laboratory, The Aerospace Corporation, BAE Systems, Night Vision Electronic System Directorate (NVESD), Sarnoff, and the University of Central Florida. The AiTR Team captures the essence of industry experience in AiTR technology for ground surveillance systems.

Features

- Supports processing for both passive and active EO/IR sensors – long – and shortwave infrared, black and white television, laser radar (LADAR)
- Supports wide area search on ground and low-altitude platforms
- Quickly detects, recognizes, and identifies multiple targets at long ranges
- Uses images from thermal, visible, and laser sensors
- All-weather, day and night operation
- Powerful HDAP with growth potential for AiTR processing

Arrowhead®
Modernized TADS/PNVS for the Apache

Features

- Greatly improved FLIR performance for accurate flight and fight in day, night, adverse weather, or degraded visual flight environments
- Streamlined, two-level maintenance
- Line-replaceable modules that simplify field maintenance
- TADS/PNVS modernization achieved at the flightline through line-replaceable module removal and replacement
- Digital video for enhanced tracking and recording
- Use of state-of-the-art components derived from Comanche development and compatible with the Future Combat System
- Cueing from Longbow™ fire control radar or radar frequency interferometer to identify targets
- Significant reductions in O&S costs

Operationally fielded in June 2005, Lockheed Martin's Arrowhead is proving it was the right solution to the U.S. Army's Modernized Target Acquisition Designation Sight/Pilot Night Vision Sensor (M-TADS/PNVS) program. Lockheed Martin's innovative design – Arrowhead – provides Apache pilots advanced pilotage and targeting that results in enhanced mission capability during the conduct of day, night, and adverse-weather missions. Arrowhead modules replace legacy TADS/PNVS hardware using a field retrofit kit that can be installed at the flightline. It improves performance and reliability by over 150%, reduces maintenance actions by nearly 60%, and enables two-level field maintenance. These improvements achieve a savings that approaches $1 billion in Army operation and support (O&S) costs over the 20-year system life. Arrowhead incorporates component technology and software algorithms that were developed during the Comanche sensor design. Arrowhead's design opens the growth path to image fusion and airborne-aided target detection.

Targeting

The Arrowhead lower turret contains the targeting system, which has both day and night sensor assemblies. The targeting FLIR sensor uses SADA I technology and has three fields-of-view, a multi-target tracker, multiple-code laser spot tracking, and auto-boresight. A charge-coupled device camera improves day TV viewing. Also, Arrowhead's electro-optics will replace the TADS/PNVS direct-view optics with a new design—the TADS electronic display and control (TEDAC) unit. TEDAC's flat-panel display improves target resolution, situational awareness, and survivable space in the crew station.

Pilotage

The Modernized Pilot Night Vision Sensor, Arrowhead's upper turret, provides highly improved imagery on the pilot's helmet-mounted display for safe nap-of-the-earth flight at night and in degraded visual flight environments. The M-PNVS is a long-wave, high-definition FLIR with 52-degree wide field-of-view optics. The FLIR technology is based on a SADA I integrated detector cooler assembly and electronics modules that are common to the targeting FLIR. These modules convert detector outputs into a video signal that is displayed in the cockpit and on the helmet-mounted display, providing a day-like TV image in day or night conditions. The new system also provides installation provisions for an auxiliary pilotage sensor that augments pilotage in adverse thermal environments and urban scenarios. Arrowhead's advanced processing algorithms give pilots the best resolution possible to avoid obstacles, including wires and trees, during low-level flight. M-PNVS also has full provisions for image fusion.

Ground Reconnaissance and Surveillance System
Multi-Spectral Sensor for the US Army

Attributes

- Long-wave FLIR
- Built-in 3rd Gen growth
- All light level TV
- Multi-function laser: eye-safe ranging, designation, and active identification
- Advanced image processing
- Wide-area search
- Accurate target location
- Elevated on-the-move high performance
- Low life cycle cost, two-level maintenance

Our mast-mounted multi-spectral ground sensor suite provides rapid 360-degree target acquisition capability for long-range reconnaissance, surveillance, and fire support missions. Fully operational in any elevated position on-the-move or in defilade, the adverse-weather-capable system significantly improves vehicle survivability and lethality and provides precision maneuver and precision fires in all environments.

The sensor package serves as the eyes of the future battlefield scout, giving commanders the timely and accurate information they need to out-maneuver, out-think, and out-perform enemy forces. Derived from an advanced mast-mounted sensor prototype with years of development and field testing, it leverages Army and Lockheed Martin investments in Future Scout Cavalry System, Apache, and Comanche sensor technologies to offer a mature and proven system. It is currently in system design and development for the U.S. Army's Future Combat Systems.

A high degree of commonality with such fielded sensor systems as the Apache's Modernized Target Acquisition Designation Sight, coupled with a modular design and use of ruggedized COTS, lowers life-cycle costs and enables integration of new or spiraled-in technologies. Built-in-test, low-cost line replaceable units, and two-level maintenance provide high system availability and greatly reduced life-cycle costs.

Features

- Reconnaissance, fire support, and targeting overmatch for the Modular Force
- Passive wide-area search displays objects of interest to the operator in seconds
- Multi-spectral sensors perform identification at standoff ranges greater than enemy detection ranges and provide accurate target location
- 360-degree continuous coverage supports rapid distribution of situational information
- Elevated mast designed for stealth in defilade and providing on-the-move performance
- 95% fault isolation to one line replaceable unit; mean-time-to-repair average less than 30 minutes in the field
- Sensor suite and processor designed for evolutionary upgrades via spiral development

JSF™ EOTS
Joint Strike Fighter Electro-Optical Targeting System

Specifications

The EOTS combines a new focal plane array with advanced sensor technology, a low profile sapphire window design, and advanced algorithms to provide long-range target recognition, identification, and tracking. In the IRST mode, the EOTS will locate and track multiple airborne threats at extended ranges ensuring high lethality and survivability.

The EOTS incorporates proven technology and advances in optics, stabilization, and processing. Its modular design and ease of repair make it simple to support and ensure true two-level maintenance.

The Electro-Optical Targeting System (EOTS) is an affordable, high-performance, lightweight, multi-functional system for precision air-to-air and air-to-surface targeting. It provides high-resolution imagery, automatic tracking, infrared-search-and-track (IRST) laser designation and rangefinding, and laser spot tracking at greatly increased standoff ranges. Integrated into the Joint Strike Fighter's fuselage with a durable sapphire window, the low-drag, stealthy EOTS is linked to the aircraft's central computer through a high-speed fiber-optic interface.

Lockheed Martin is teamed with Northrop Grumman Electronic Systems to produce the JSF Electro-Optical Sensor System (EOSS). The EOSS consists of the EOTS, led by Lockheed Martin with BAE SYSTEMS, and the Distributed Aperture System, which provides 360-degree situational awareness, led by Northrop Grumman. A cornerstone of future defense capability for the U.S. and its allies, the EOSS supports situational awareness, target recognition, and precision weapon delivery.

Features

- Rugged, low-profile, faceted window for supersonic, low observable performance
- Compact single aperture design
- Light weight (under 200 lb) including window assembly
- Advanced, 3rd generation, focal plane array
- Air-to-surface FLIR tracker and air-to-air IRST modes
- Modular design for two-level maintenance to reduce life cycle cost
- Automatic boresight and aircraft alignment
- Tactical and eye-safe, highly reliable, diode-pumped laser
- Laser spot tracker
- Passive and active ranging
- Highly accurate geo-coordinate generation to meet precision strike requirements

LANTIRN™ ER
Enhanced Reliabilty, Resolution, and Range

Specifications

Navigation Pod	
Weight	450 lb
Height	21.8 in
Diameter	13.7 in
Length	78.2 in
Detector Array	640 x 512 (staring)
Field of View	21 x 28 deg
Detector Material	InSb
Wavelength	3 to 5 microns
Targeting Pod	
Weight	549 lb
Diameter	15 in
Length	98.5 in
Detector Array	640 x 512
Dual FOV CCD TV	4x4 deg and 1x1 deg with continuous zoom

Low Altitude Navigation and Targeting Infrared for Night Extended Range (LANTIRN ER) navigation and targeting pods provide today's warfighters with enhanced range, resolution, and reliability. LANTIRN ER, an upgraded version of the highly successful LANTIRN, delivers multi-mission success with a significantly reduced cost of ownership.

LANTIRN ER allows aircrews to operate worldwide, in daylight or darkness, at mission altitudes from sea level to 40,000 feet, all with outstanding targeting performance. With LANTIRN ER, reliability has been improved by 50 percent and operation and support costs have been reduced by more than 66 percent.

LANTIRN ER, which is the latest LANTIRN production configuration, is offered as a newly fabricated pod or as an upgrade to existing pods. LANTIRN ER responds to pilots' new mission requirements with:

- Greater standoff range, high-altitude environment
- More stringent target identification
- Laser spot tracking for close air support missions
- Geo-locations for targeting GPS-guided weapons
- Streamlined maintenance

Features

Navigation Pod

- Terrain-Following Radar
- 3rd Generation Mid-Wave FLIR
- Enhanced Image Signal Processing

Targeting Pod

- 3rd Generation Mid-Wave FLIR
- CCD TV with continuous zoom
- 40K Laser
- Laser Spot Tracker
- Digital recorder system
- Inertial measurement unit
- Laser marker
- Missile boresight correlator
- J-Series weapons compatibility
- Digital high resolution bomb damage assessment
- Positive ID from longer range

Longbow FCR and Missile™

Fire Control Radar and RF Longbow HELLFIRE™ Fire-and-Forget Missile for the Apache

Specifications

Fire Control Radar (AN/APG-78)		
Range	8 km	
Frequency	Ka band	
Modes	Surveillance, targeting, RFI cued, terrain profiling, and air overwatch	
Weather Environments	Clear to adverse All battlefield obscurants	
Missile (AGM-114L)		
Range	0.5 – 8 km	
Guidance	Millimeter wave radar	
Compatability	Launch from multiple platforms	
Commonality	Bus and warhead with Hellfire II	
Weight	108 lb	(49 kg)
Length	69 in	(175 cm)
Diameter	7 in	(17.8 cm)

NORTHROP GRUMMAN

The Longbow system is manufactured by a Joint Venture of Lockheed Martin and Northrop Grumman. Integrated capabilities enhance Apache's lethality fourfold and survivability sevenfold. The mission equipment package is in production for the U.S. and international governments. Longbow makes a major contribution to the warfighting capability of the Apache. It is a proven force multiplier tested in rigorous independent operational evaluations as well as during U.S. Army exercises at the National Training Center. Longbow is combat-proven.

Fire Control Radar

The radar provides high performance with very low probability of intercept. Longbow's radar rapidly and automatically searches, detects, locates, classifies, and prioritizes multiple moving and stationary targets on land, air, and water in adverse weather and battlefield conditions to the maximum range of the Longbow missile. Target coordinates are automatically available to all sensors and weapons-enabling target confirmation, reducing fratricide, and permitting rapid launch. Target data is also digitally available through the improved data modem for real-time transfer to other platforms and command posts. The self-contained radio frequency interferometer (RFI) ensures rapid identification and accurate azimuth to enemy air defense units. High system reliability and two-level maintenance provide high operational availability with low support costs. The radar is fielded with the Apache AH-64D Longbow attack helicopter system in the U.S. Army.

Longbow HELLFIRE™ Missile

The Longbow system incorporates a fire-and-forget RF missile, allowing the Apache to launch from defilade, increasing battlefield survivability. The missile is capable of locking-on before or after launch and has been extensively tested against multiple countermeasure environments.

The M299 Launcher™ has a fully digital interface to the Apache and is capable of firing any HELLFIRE missile. The missile and launcher system are fielded by the U.S. Army and several other armed forces throughout the world.

MLD
AN/AAR-56 Missile Launcher Detector

Lockheed Martin's AN/AAR-56 Missile Launch Detector (MLD) is a mature and affordable defensive system capable of providing long-range detection and declaration of both airborne and surface-launched threats.

Currently in production for the US Air Force, the MLD is suited to all fixed-wing aircraft operating envelopes. An MLD shipset for each aircraft is comprised of six sensors, three common interface processing cards, and six low-observable window frame assemblies. An established and tested algorithm base provides maximum performance that matches the aircraft platform mission with the threat environment.

Lockheed Martin continues to advance the modular design of MLD with the development of both high-resolution and multi-spectral sensor variants and an expanded algorithm base that incorporates aircraft detection and tracking, as well as missile threats.

Simulation Database:

- Full system simulation developed and verified
- Extensive clutter library collected from both ground-based and airborne platforms
- Extensive live-fire missile data collected from both ground-based and airborne platforms
- Operational performance defined against all clutter environments

Features

- Real-time threat warning with low false alarm rate
- Low-observable windows for survivability
- IR staring focal plane sensors for long-range threat detection and declaration
- State-of-the-art image processing
- Mature missile detection algorithms
- Internal rate sensors for improved threat tracking
- Two-level maintenance for reduced life-cycle cost
- Modular design for technology refresh

NITE Hawk™
The Night Strike Advantage

Specifications

The AN/AAS -38B multifunction autotracker can toggle between scene track or centroid target trackers for improved acquisition and maintenance of target lock-on during air-to-ground target attack. NITE Hawk provides a pilot with a passive beyond visual range, raid count capability to assess the size of an enemy attack force, and the ability to identify airborne targets.

Field-of-View (deg)	NFOV: 3 x 3 WFOV 12 x 12
Field-of-Regard (deg)	Pitch +30; -150 Roll ±540
Diameter (in)	13 (33 cm)
Length (in)	72 (184 cm)
Weight (lb)	370 (168 kg)
MTBF (hr)	80 (specified)
MTTR (min)	12

The NITE Hawk Targeting FLIR (Forward Looking Infrared) AN/AAS-38B system provides F/A-18 pilots with a proven combat advantage. Day or night, fair or adverse weather, the system locates, positively identifies, and automatically tracks tactical targets. The pilot is presented with real-time thermal imagery from the FLIR on a cockpit display.

Features

- Advanced, passive, day/night ground attack and reconnaissance
- Passive, air-to-air, long-range detection and tracking
- Thermal imaging sensor
- High-altitude laser target designator/ ranger
- Automatic multifunction target tracker
- Reliable, maintainable, modular design with built-in-test

Sniper®
The World's Most Advanced Targeting Pod

Contract Specifications

Field of View	
WFOV	4 deg
NFOV	1.0 deg
Field of regard	
Pitch	+35 deg; -155 deg
Roll	Continuous
Diameter	11.9 in (30 cm)
Length	94 in (239 cm)
Pod Only Weight	397 lb (181 kg)
MTBF	600 hr

The Sniper Advanced Targeting Pod (ATP) selected by the United States Air Force and Air National Guard is a flight tested, extended-range precision targeting system in a single, lightweight, affordable pod that provides positive identification, automatic tracking and laser designation of tactical size targets via real-time imagery presented on cockpit displays.

Sniper ATP's revolutionary design provides the "leap-ahead technology" demanded by 21st century combat operations to meet the requirements of the precision strike mission.

Sniper ATP's third-generation FLIR combined with image enhancing algorithms, automatic boresighting, and breakthrough stabilization techniques delivers greater than three times the performance of the best systems now flying. Its revolutionary optical bed design, optimal partitioning, and diagnostic capabilities result in true two-level maintenance thus eliminating costly I-level support.

Features

- High-resolution, third-generation, midwave targeting FLIR with state-of-the-art image processing
- Supersonic/low-observable design
- Substantial weight/drag reduction
- Modular design for true two-level maintenance
- Automatic boresight and aircraft alignment
- Tactical and eye-safe, highly reliable diode-pumped laser with no altitude restrictions
- Laser spot tracker
- Laser marker
- Advanced target/scene imager with inertial tracker
- Passive air-to-air target detection and tracking
- Highly accurate passive ranging
- Precision geo-coordinate generation for J-series weapons

Target Sight System (TSS)
Electro-Optical/Infrared Targeting System for the US Marine Corps AH-1Z

The Target Sight System (TSS) is the multisensor EO/IR fire control system (AN/AAQ-30) for the US Marine Corps AH-1Z attack helicopter. TSS consists of a large-aperture midwave FLIR, color TV, laser designator/rangefinder (with eyesafe mode), laser spot tracker, and on-gimbal inertial measurement unit. These largely COTS/NDI components are integrated into a highly stabilized turret that mounts to the nose of the aircraft via the Lockheed Martin-developed aircraft interface structure. TSS provides the capability to identify and laser designate targets at maximum weapon range, significantly enhancing platform survivability and lethality.

Features

- 8.55-inch aperture, four-FOV, midwave IR, staring FLIR for maximum image resolution and long-range performance
- Multimode (point and scene), multitarget (3 image, 10 inertial), robust tracker with coast-through-obscuration capability
- Gimbal stabilized to <15 microradians
- On-gimbal inertial measurement unit for reduced image blur due to jitter and precise LOS pointing, target geo-location, and multitarget tracking
- Qualified COTS/NDI hardware provides high performance at low cost
- Advanced image processing for optimum gain and level, sharper imagery, and extended range algorithm for enhanced recognition and identification range performance
- High magnification, continuous zoom, color TV with FOV matched to the FLIR
- State-of-the-art 640 x 512 InSb, low noise equivalent delta temperature, high modulation transfer function detector with a high reliability cooler
- Versatile modular architecture for future growth

JASSM™

WCMD™

MRTS

Paveway II DMLGB

LGTR

Paveway II LGB

LongShot® Smart Wing Adaptor Kit

JASSM™
Joint Air-to-Surface Standoff Missile

Specifications

JASSM's design incorporates proven technologies and subsystems into a highly survivable air vehicle to meet today's threats and those of the 21st century.

Weight (lb)	2250
Length (in)	168
Storage (yr)	15
Range (nmi)	Over 200

The Joint Air-to-Surface Standoff Missile (JASSM) is an autonomous, long-range, conventional, air-to-ground, precision standoff missile for the U.S. Air Force and Navy. JASSM is designed to destroy high-value, well-defended, fixed and relocateable targets. JASSM's significant standoff range keeps Air Force and Navy aircrews well out of danger from hostile air defense systems. The missile's mission effectiveness approaches only a single missile required to kill each target. With this superior performance and affordable price, JASSM offers the best value of any weapon in its class.

Features

- Long standoff range
- Simple mission planning
- High survivability
- Adverse weather operable
- Global Positioning System (GPS)/Inertial Measurement Unit inertial guidance
- Autonomous terminal guidance
- Pinpoint accuracy
- High lethality
- Low cost of ownership
- Full loadout on F-16, B-52, B-1, B-2, and F-18 aircraft
- GPS jam resistant
- Full carrier compatibility

LGTR
Laser Guided Training Round

Specifications

Platform	F/A-18, A-6, A-7, F-14, F-16 Aircraft
Weight	89 pounds
Length	75 inches
Diameter	4 inches
Guidance	Semi-active laser
Controls	Pneumatically actuated (Nitrogen)
Logistics	All-up-round & maintenance free
Shelf Life	42 months

The Lockheed Martin Laser Guided Training Round (LGTR) provides realistic Paveway II Laser Guided Bomb (LGB) (GBU-10/12/16) tactical employment training as an alternative to expending operational LGB assets. The LGTR accurately emulates the laser guided bomb envelope, flight characteristics and guidance system of the Paveway II system. Since its deployment in 1992, Lockheed Martin has sold over 50,000 units to U.S. and nine allied nations to successfully train aircrews in place of more expensive Laser Guided Bombs. The LGTR has provided the U.S. Navy and International customers the optimal training solution for semi-active, laser guided weapons in a very cost effective manner. Live-fire training with the LGTR permits aircrews to practice delivery tactics in a real-mission environment and experience actual weapon characteristics with today's range limitations. The LGTR emulates the GBU-10, -12 and -16 LGBs and replicates mission parameters for realistic tactics and employment of the Paveway II system. In addition, the lower unit cost of the LGTR leads to more aircrew training opportunities.

Features

- Delivers inert realistic mission rehearsals for laser guided weapon tactical deployment
- Trains for delivery effectiveness at a fraction of the tactical weapon cost
- Utilizes standard uploading and laser designation equipment and procedures
  - Practice bomb handling procedures
  - LGB functions
- Allows local range training while satisfying demanding environmental requirements
- Enhances laser designation timing and accuracy
- Conserves precision guided weapon inventory levels for tactical missions
- Provides peak combat readiness in an affordable manner

LongShot® Smart Wing Adaptor Kit
Low Cost Range Extension for Air-to-Surface Munitions

The LongShot range extension system is a low-cost, self-contained wing adaptor kit that provides range extension and autonomous guidance capability to a family of existing air-to-surface munitions. By using the suspension lug wells of the munition as the attachment points, the kit is easily adapted to general purpose bombs, cluster bombs, laser guided bombs, and sea mines.

LongShot is compatible with all 1760 and non-1760 equipped fighter and bomber aircraft. No aircraft modification is required to deploy a LongShot equipped munition. LongShot weapon control is done with a knee pad device that plugs into the cockpit intercom, allowing the pilot to establish two-way communication via the aircraft UHF radio. This allows any combat aircraft without a 1760 smart weapons interface to have immediate, long standoff, precision strike capability.

The system is completely self-contained, including a flight control computer, a GPS-based navigation system, power sources; and does not require a hard electrical interface with the aircraft. Only conventional 14-inch weapon mounts are needed for compatibility with LongShot. No hardware or aircraft OFP software modifications are required. Thus, Lockheed Martin provides a one-stop source for a family of LongShot equipped standoff weapons – MK82, MK83, GBU-12, GBU-16, CBU-58, CBU-87, and CBU-97.

Features

- Autonomous GPS/INS guidance
- Deployable from altitudes up to 35,000 feet
- Up to 50 nautical mile range
- Operable at night and in adverse weather
- Weapon generated “in-range” signal

Targets

LongShot can be deployed against a wide range of fixed and relocateable targets.

- Buildings, industrial sites, including manufacturing plants and power stations
- Electronic warfare or ground-controlled intercept sites
- Petroleum refineries and tank farms
- Airfields, aircraft, and aircraft shelters
- Ports, naval storage and repair facilities
- Troop and equipment formations

TTU-594A/E Mission Readiness Test Set (MRTS)
Provides Mission Ready Test of Paveway II Precision Guided Weapons

Specifications

Weight	50 lb
Dimensions	18” x 18” x 12”
Power	115 VAC, 60 HZ standard power 110 and 220 VAC, 50-60 HZ domestic/international power sources
Operational Temperature	-40 to 54 degrees C Consistent with the anticipated test environment

The Lockheed Martin TTU-594A/E Mission Readiness Test Set (MRTS) is a man portable, self-contained system used to ensure Paveway II Laser Guided Bomb (LGB) kits are mission capable. The MRTS verifies full operation of the LGB computer control group (CCG) - laser detector and guidance unit for mission readiness and provides a go/no go solution for flight line test requirements. It is intended to replace the TTU-373, TTU-392, and TTU-394 currently fielded to test Paveway II systems. The MRTS will conduct specific automated tests to check the functionality of the CCGs and ensures that an LGB is operating correctly and ready for employment. The MRTS is easy to set up, lightweight, and allows for one person testing.

Features

- Quick set up time
- Operator friendly
- Multiple power sources
- Upgradeable for future systems
- Low cost
- Operating manuals and simplified instruction cards

Paveway II Dual Mode Laser Guided Bomb
Effectively Combines Technology at a Low Cost

Specifications

Warheads	MK 82 (500 lb) (Future: MK83, MK84)
Carriage and Release Envelopes	GBU-12 (Future: GBU-10, GBU-16)
Target Types	High priority fixed and relocatable; and mobile targets
Guidance Methods	Semi-Active Laser (SAL) terminal guidance GPS aided inertial (all weather)
Employment Modes	Laser only, all weather only, dual mode
Impact Accuracy	Laser: <4 m CEP All-weather: 9 m SEP (goal); Dual w/terminal laser: <3 m CEP (goal)
Aircraft Compatibility	F/A-18, F-16, F-15, F-117 and others
Fire Control Interface	Emulate JDAM (goal: no changes to aircraft software)
Mission Planning	Simuliar to existing LGB and JDAM planning methods and tools
Weapons Logistics (storage, handling, assembly, test)	Maximize compatibility with Paveway II logistics, Eceptions: TTU-373/MRTS replaced by CMBRE; BIT added

The Lockheed Martin Paveway II Dual Mode Laser Guided Bomb (DMLGB) is the next generation laser guided bomb kit that uses the existing Paveway II Laser Guided Bomb infrastructure and upgrades the existing Computer Control Group (CCG) system with an Inertial Navigation System/Global Positioning System (INS/GPS), an all-weather guidance system that provide dual-mode guidance capability. With the combination of the upgraded INS/GPS system, existing SAL (semi-active laser) seeker and anti-jam technology, the DMLGB minimizes collateral damage and improves mission effectiveness by providing precision strike capabilities in all weather at extended standoff ranges. The DMLGB is effective against fixed, relocatable and moving targets.

The Paveway II GBU-12 kits are used on 500-lb bombs, while GBU-10 and GBU-16 kits are used on 2,000-lb and 1,000-lb bombs, respectively. Lockheed Martin kits are capable of employment by F/A-18, F-16, F-15, F-117 and other aircraft currently configured to carry and release Laser Guided Bombs. The SAL seeker technology and upgraded INS/GPS guidance system are mature, affordable and proven in combat.

Features

- Combines proven Paveway II laser terminal guidance with GPS/INS
- “Fire & Forget”
- Utilizes MIL-STD-1760 interface to aircraft
- Incorporates anti-jam technology
- DMLGB provides increased accuracy with reduced collateral damage and number of sorties to accomplish mission requirements

Paveway II LGB
Laser Guided Bomb

Specifications

	GBU-10	GBU-12	GBU-16
Weight	2,080 lbs	600 lbs	1,090 lbs
Length	170”	131”	145”
Diameter	18”	10.75”	14.2”
Guidance	Semi-active Laser		
Controls	Pneumatically Actuated		
Logistics	No change to current Paveway II		
Shelf Life	10 years		

The Lockheed Martin Paveway II Laser Guided Bomb (LGB) kit is a state-of-the-art, modern system that converts “dumb gravity” bombs into precision guided munitions. The system accuracy allows target destruction while reducing collateral damage and risks to U.S. and allied ground forces. Each guidance kit consists of a computer control group (CCG), which is the front-end guidance system, plus an Air Foil Group, which includes the flight fins, which provide lift and stability. The CCG utilizes a semi-active laser seeker and pneumatically controlled guidance canards. Paveway GBU-12 kits are used on 500-lb. bombs, while GBU-10 and GBU-16 kits are used on 2,000-lb. and 1,000-lb. bombs respectively. Lockheed Martin kits are capable of employment by all air force and naval aircraft currently authorized to carry and release LGBs. The kits are also compatible with the existing LGB logistics infrastructure, equipment, procedures and aircrew operations. LGBs have been used extensively and successfully in Operation Iraqi Freedom and the war against terrorism.

Features

- Low-cost design
- Form, fit, function equivalent to inventory GBU-10, -12 and -16
- Flight tested/cleared on all aircraft currently qualified to carry Paveway II kits
- Provides competitive source for LGBs
- No change to aircraft software, ballistic tables, or operational tactics
- No change to LGB integrated logistic support
- Precision strike leads to one bomb, one target
  - Fewer sorties
  - Increased survivability
  - Decreased attrition
  - Lower costs
  - Lower risk of collateral damage

WCMD™
Wind Corrected Munitions Dispenser

Specifications

Accuracy	85 ft CEP
Mission Planning	Common AFMSS module
Aircraft	F-15E, F-16, F-117, B-1, B-2,
Compatibility	B-52, MIL-STD-1760B-52, MIL-STD-1760
CBU	CBU-87/B CEM
Compatibility	CBU-89/B GATOR CBU-97/B SFW

The Wind Corrected Munitions Dispenser (WCMD) is an inexpensive tail kit that turns existing cluster munitions into all-weather precision-guided weapons. By correcting for launch transients, ballistic errors, and winds aloft, Lockheed Martin's WCMD provides strike aircraft with an accurate pattern lay-down capability for cluster munitions from any operational altitude or weather condition.

Now in full production, this next-generation, low-cost dispenser guidance kit consists of an inertial measurement unit, active control surfaces, and unique wind estimation and compensation algorithms.

Our "one kit fits all" approach provides a MIL-STD-1760 interface, common retrofit kit hardware, and common mission planning software for all CBUs. Each weapon can be independently targeted to achieve maximum operational effectiveness.

Affordability is a driving factor in Lockheed Martin's WCMD design. Through acquisition reform initiatives and our team's aggressive implementation of design and manufacturing producibility initiatives, kit parts count, and assembly times have been dramatically reduced to provide a very low average unit production price.

Low cost of ownership and maximum logistics flexibility are provided by our easy field-retrofit procedures, wooden round logistics concept, and product warranty. The single kit configuration minimizes physical inventory, storage, training, and supportability requirements.

Features

- Autonomous, all-weather attack operations
- Compatible with all Air Force strike aircraft
- All-altitude and off-axis delivery
- Preplanned and in-flight mission planning
- Independently programmable for attacking multiple targets per pass
- Real-time wind compensation to achieve accurate dispense point
- Precision ground footprint placement and submunition density
- Common field-retrofit kit for inventory weapon
- Wooden round logistic concept, product warranty, and high commonality with existing logistics footprint

ATACMS®

HELLFIRE II®

HIMARS®

CKEM

GMLRS™ Unitary

GMLRS™

Longbow FCR and Missile™

Joint Common Missile

MLRS®

Javelin™

M299 Missile Launcher™

ATACMS®
Army Tactical Missile System

Specifications

Length	Approximately 13 feet
Diameter	Approximately 24 inches
Range	More that 100 miles (more than 165 km); extended-range versions to more than 180 miles
Propellant	Solid fuel rocket motor
Guidance	Block I - ring laser gyro; others - inertial Navigation with GPS
Warhead	Antipersonnel/antimateriel; precision unitary and future variants
Load	Two missiles per launcher (two pods with one missile each); one missile with HIMARS

The Army Tactical Missile System (ATACMS) is a long-range guided missile that gives commanders the immediate firepower to shape the battle space. Each ATACMS missile is packaged in a Multiple Launch Rocket System (MLRS) look-alike launch pod and is fired from the MLRS family of launchers.

ATACMS is the only long-range tactical surface-to-surface missile ever fired in combat by the U.S. Army. When used in Operation Desert Storm, it destroyed or rendered inoperable every target it engaged. More than 450 ATACMS missiles were successfully fired during Operation Iraqi Freedom.

Features

- ATACMS is an evolutionary family of missiles that includes the Block I, Block IA, Block IA QRU and Block IA Unitary PIP missiles.
- The Block IA missile nearly doubles the Block I range of earlier variants by reducing the payload of AP/AM bomblets and adding Global Positioning System Inertial Guidance for increased accuracy with equivalent lethality.
- The Block IA QRU delivers a monolitic high explosive warhead where limited collateral damage is an operational consideration. The Block IA QRU uses Block IA guidance and has a range of 300 kilometers.
- The TACMS Penetrator Advanced Concept Technology Demonstration residuals will carry an Earth Penetrator Warhead to defeat hard targets. The system provides the commander a unique capability that is all-weather, day/night, and the most responsive of all weapons.
- The Block IA ARU is the near-term system that has a blast fragment warhead. The Block IA Unitary provides a multimode capability to go against Block I/IA, Unitary, and hard target sets. Both the QRU and Unitary PIP have vertical impact capability, and collateral damage is much less than 100m from the point of impact. This system will have a much more efficient logistical trail and will also expand the target set for ATACMS.

CKEM
Compact Kinetic Energy Missile

Specifications

- Hit-to-kill
- 60 inches long
- <100 lbs
- Extended ranges
- Novel lethality system
- RF uplink for existing and future communications links
- Long range fires beyond tank main gun
- Easily integrated into multiple platforms

The Compact Kinetic Energy Missile (CKEM) is the next generation hypervelocity anti-tank missile. CKEM will provide both current and future forces with overwhelming lethality to defeat multiple target sets. CKEM capability negates an adversary's ability to reduce its lethality and survivability through the development of new passive active protection systems.

CKEM Characteristics

Increased Lethality

- High probability of kill from minimum to maximum range
- Countermeasure resistant KE missile speed
- Rapid detection, acquisition and engagement target

Enhances Survivability

- Range overmatch against all threat armor
- Near Fire and Forget
- Passive target acquisition and engagement

Lockheed Martin is developing the CKEM missile under a 36-month Advanced Technology Demonstration contract administered by the Aviation and Missile Research Development and Engineering Center. CKEM will provide the curent and future force with the capability to destroy enemy formations at longer ranges while delivering devastating target effects. The development of Kinetic Energy missiles is critical to the transformation of our joint forces if it is to maintain its lethality overmatch, survivability, and full spectrum dominance.

GMLRS™
Guided Multiple Launch Rocket System

Specifications

- Supports units of the Future Force
- Incorporates a Global Positioning System Aided Inertial Guidance package
- 70+ km Range
- Greatly Reduced Logistics
- Operational Test completed in 2004
- Full Rate Production contract awarded December 2005
- Guided Unitary Spiral 1 fielded
- 5 Nation International Cooperative Program

The Guided Multiple Launch Rocket System (GMLRS) supports the U.S. Army's Future Force with increased overmatch capabilities and reduced logistics footprint over current free-flight rockets. GMLRS is fired from the Multiple Launch Rocket System (MLRS) M270A1 and the High Mobility Artillery Rocket System (HIMARS) launchers. GMLRS is an international cooperative program between the United States, France, Germany, Italy, and the United Kindom.

In 2003, Lockheed Martin received a Low-Rate Initial Production contract to begin producing GMLRS for the U.S. Army. Operational Test was completed in 2004 with full rate production contract awarded in December 2005.

GMLRS is an all-weather, precision-guided rocket that provides increased accuracy thus reducing the number of rockets necessary to defeat current targets by 80 percent. The GMLRS program, viewed as transformational because of its increased precision and maneuverability, finished a 48-month System Development and Demonstration phase in January 2003 after successfully completing Production Qualification Flight Testing. The U.S. Army is planning to produce more than 100,000 GMLRS rockets.

GMLRS™ Unitary

Guided Multiple Launch Rocket System Unitary

The Guided Multiple Launch Rocket System (GMLRS) Unitary rocket is a pre-planned product improvement to the (MLRS) and integrates a unitary warhead. The Guided Unitary rocket will expand the current target set of GMLRS, giving maneuver commanders a precision capability while greatly limiting collateral damage in restrictive terrain and urban areas.

The GMLRS Unitary rocket has a Global Positioning System (GPS)-aided inertial guidance package integrated on the MLRS Extended-Range rocket body. Additionally, small canards on the rocket's nose add basic maneuverability to further enhance the accuracy of the system. The GMLRS Unitary rocket carries a 196-pound unitary warhead that detonates upon impact, giving battlefield commanders the ability to attack targets up to 70 kilometers away with high precision. Production was approved in 2005 for Guided Unitary Spiral 1 variants as part of an Urgent Need Statement. The first 498 rockets were delivered to the U.S. Army in 2005.

Features

- Enhanced anti-jam and accuracy processor
- Reduced collateral damage
- One round, one-kill capability
- Reduced logistical footprint
- Improved lethality
- Improved insensitive munitions compliance
- Lethal and non-lethal effects
- Combat proven in Operation Iraqi Freedom

HELLFIRE II®
21st Century Precision Missile System

Specifications

Range	0.5 – 8+ km
Guidance	Semi-active laser (SAL)
Warheads	HEAT, blast fragmentation, MAC
Weight	99 lb (45 kg)
Length	64 in (163 cm)
Diameter	7 in (17.8 cm)
Platforms	Helicopters, ground-mounted tripod, boats, motor vehicles (from pedestal-mounted to full integration)

AGM-114K (HEAT)	
Weight	45 kg (99 lb)
Length	163 cm (64 in)
Diameter	17.8 cm (7 in)

AGM-114M (Blast Frag)	
Weight	48 kg (105 lb)
Length	163 cm (64 in)
Diameter	17.8 cm (7 in)

AGM-114N (MAC)	
Weight	45 kg (99 lb)
Length	163 cm (64 in)
Diameter	17.8 cm (7 in)

The Hellfire missile system defeats advanced armor and urban point targets in the presence of severe electro-optical countermeasures. The missile can be launched from multiple air, sea, and ground platforms, autonomously or with remote designation.

Hellfire II is a combat-proven, very successful weapon system for precision kills of high-value armor, air defense, ship, waterborne, and fixed targets. The missile may be employed by lock-on before or lock-on after launch for increased platform survivability. The Hellfire II missile system can engage multiple targets simultaneously.

Features

- Modularity – Multiple platforms against multiple targets
- EOCM immunity proven by test; reprogrammable
- Three HELLFIRE II variants: AGM-114K high-explosive anti-tank (HEAT) warhead neutralizes even the most advanced armored threats; AGM-114M blast fragmentation warhead defeats ships, light armor, and urban targets; AGM-114N metal augmented charge (MAC) warhead is highly effective against enclosed structures (caves and bunkers)
- Effective target tracking in presence of backscatter, dust, water vapor, smoke, and sea spray
- Trajectory shaping for performance in degraded weather
- Automatic target reacquisition after loss of track in low clouds
- Digital electronics for seeker growth applications
- Combat proven in the war on terrorism

HIMARS®
High Mobility Artillery Rocket System

Specifications

- A Future Force capability that supports lighter, more mobile fighting forces
- C-130 Transportable (combat loaded)
- Uses MLRS tactics, training and munitions
- Three-man crew; one-man operation if necessary
- Heavyweight fire support for early entry and light forces
- Maximum commonality with M270 units
- Will replace select Migs cannon and M270 units

The High Mobility Artillery Rocket System (HIMARS) is the newest variant of the Multiple Launch Rocket System (MLRS) launcher family. HIMARS carries a single six-pack of MLRS rockets, or one Army Tactical Missile System (ATACMS) missile, on the Army's new FMTV5-ton truck. HIMARS is designed to launch the entire MLRS Family of Munitions, including the M26 Rocket, Extended-Range Rocket, the Reduced-Range Practice Rocket, the transformational Guided MLRS and all ATACMS variants.

HIMARS received approval to enter production in March 2003 and is currently in Full Rate Production. HIMARS successfully completed initial operational test and evaluation in November 2004. In May 2005, the 3rd Battalion, 27th Field Artillery Regiment, XVIII Airborne Corps Artillery was the first unit equipped with HIMARS. HIMARS has been a joint system since 2000 when the U.S. Marine Corps joined the program. The HIMARS System concept was combat-proven in Operation Iraqi Freedom.

Features

- HIMARS offers the Army and Marines an early-entry weapon that can provide intimidating firepower support for light forces. The HIMARS system rolls off a C-130, combat loaded and deliver MLRS and ATACMS munitions with pinpoint accuracy. HIMARS uses similar fire control as the M270A1 launcher. Due to its reduced weight, HIMARS can be moved into areas previously inaccessible.

- HIMARS will require 30 percent fewer airlifts to transport a battery. This mobility will serve as a deterrent to future conflicts because the long-range firepower of HIMARS and the MLRS family of munitions will be rapidly available in more locations.

- The combat proven HIMARS provides precision fires against time-critical targets and supports conventional and Special Forces Operations around the globe.

Javelin™
Anti-Tank Weapon System

Specifications

Range	2.5 km
Guidance	Passive target acquisition/ fire control with integrated day/thermal sight
Magnification	4x day and 4x or 9x thermal
Warhead	Tandem shaped-charge
Weight	21.6 lb (11.8 kg) missile
	14.1 lb (6.4 kg) CLU
Length	42.6 in (108.1 cm) missile
	47.2 in (119.8 cm) launch tube
Diameter	5.0 in (12.7 cm) missile
	5.6 in (14.2 cm) launch tube

Raytheon

The world's premier shoulder-fired multi-purpose (anti-armor/anti-structure) system, Javelin™ takes the fight to the enemy. Javelin automatically guides itself to the target after launch, allowing the gunner to take cover and avoid counterfire. Soldiers or Marines can reposition immediately after firing, or reload to engage another threat. Javelin continues to be combat-proven in Afghanistan and Iraq.

Using an arched top-attack profile, Javelin climbs above its target for improved visibility and then strikes where the armor is weakest. To fire, the gunner places a cursor over the selected target. The Javelin command launch unit then sends a lock-on-before-launch (LOBL) signal to the missile. This LOBL feature greatly minimizes the chance of unintentional injury and collateral damages. With its soft launch design, Javelin can be safely fired from inside buildings or bunkers.

Javelin's long-wave infrared (IR) seeker enables it to engage even in obscurants and reduced visibility, and resist countermeasures. It is effective against tanks, bunkers, buildings, small boats, and slow-moving helicopters. It is adaptable to many platforms, including tripods, trucks, light armored vehicles, and remotely piloted vehicles.

Javelin was developed and is produced for the U.S. Army by the Raytheon/Lockheed Martin Javelin Joint Venture.

Features

- Shoulder-fired, lightweight, one-man-portable and employable
- Lock-on-before-launch fire-and-forget, combined with soft-launch, increases gunner survivability and probability of hit
- Unmatched lethality: >94% missile reliability: >94% probability of 1st time gunner hit
- Long-wave IR seeker enables engagement in obscurants and reduced visibility, minimizes effects of countermeasures
- Versatile, effective against tanks, bunkers, buildings, small boats, slow-moving helos
- Adaptable to many platforms: tripods, LAVs, trucks, and RPVs
- Wide range of effectiveness (<65m to >2500m) increases employment options
- Sold and delivered in Europe, in the Pacific, and in the Middle East

Joint Common Missile
Next-Generation Aviation Missile

Specifications

Range	>16 km RW, >28 km FW
Guidance	Tri-mode: MMW/I²R/SAL
Warhead	Multi-purpose tandem shaped-charge fragmentation
Weight	108 lb (49 kg)
Length	69.9 in (177.5 cm)
Diameter	7 in (17.8 cm)
Wingspan	12.8 in (32.5 cm)

The Lockheed Martin Joint Common Missile (JCM) builds on an unmatched foundation of combat-proven precision air-to-ground missile performance. We have successfully fielded missiles with all three of the JCM seeker modes: precision-strike semi-active laser (SAL) on HELLFIRE®, passive fire-and-forget imaging infrared (I²R) on JASSM and Javelin, and all-weather fire-and-forget millimeter wave (MMW) on Longbow. To this firm foundation we add the latest technology to give warfighters expanded operational flexibility and combat effectiveness with a single, low-cost missile and a low-risk path to put that missile in the field.

Fire-and-forget engagement modes allow JCM users to stand off threat defenses and actively or passively engage stationary and moving targets—armor, air defense units, patrol craft, artillery, transporter erector/launchers, radar sites and C^2 nodes, bunkers, and other structures in urban and complex terrain—despite adverse weather, battlefield obscurants, and countermeasures. Point designation engagement modes allow JCM users to apply deadly force to a specific target with a single round, avoiding unintentional injury or friendly fire accidents and collateral damage.

Lockheed Martin's single-configuration missile provides an affordable, low-risk solution that meets all Army, Navy, and Marine Corps requirements—with high modularity for rapid response to future requirements.

Features

- Lock-on-before-launch and lock-on-after-launch operations
- Autonomous and cooperative targeting supports net-centric operations
- Fire-and-forget engagements against moving and stationary targets in clear and adverse weather
- Precision-point engagements with performance better than HELLFIRE II
- Tri-mode sensor provides unmatched countermeasures, robustness, and operational flexibility
- Integrates seamlessly with AH-64D, AH-1Z, MH-60R/S, F/A-18, and JSF
- Leverages mature technologies and early testing to reduce cost and risk

Longbow FCR and Missile™

Fire Control Radar and RF Longbow HELLFIRE™ Fire-and-Forget Missile for the Apache

Specifications

Fire Control Radar (AN/APG-78)		
Range	8 km	
Frequency	Ka band	
Modes	Surveillance, targeting, RFI cued, terrain profiling, and air overwatch	
Weather	Clear to adverse	
Environments	All battlefield obscurants	
Missile (AGM-114L)		
Range	0.5 – 8 km	
Guidance	Millimeter wave radar	
Compatability	Launch from multiple platforms	
Commonality	Bus and warhead with HELLFIRE II	
Weight	108 lb	(49 kg)
Length	69 in	(175 cm)
Diameter	7 in	(17.8 cm)

NORTHROP GRUMMAN

The Longbow™ system is manufactured by a Joint Venture of Lockheed Martin and Northrop Grumman. Integrated capabilities enhance Apache's lethality fourfold and survivability sevenfold. The mission equipment package is in production for the U.S. and international governments. Longbow makes a major contribution to the warfighting capability of attack helicopers such as the Apache, the Cobra, and the Tiger. It is a proven force multiplier tested in rigorous independent operational evaluations as well as during U.S. Army exercises at the National Training Center. Longbow is combat proven.

Fire Control Radar

The radar provides high performance with very low probability of intercept. Longbow's radar rapidly and automatically searches, detects, locates, classifies, and prioritizes multiple moving and stationary targets on land, air, and water in adverse weather and battlefield conditions to the maximum range of the Longbow missile. Target coordinates are automatically available to all sensors and weapons-enabling target confirmation, reducing friendly-fire accidents or unintentional injuries, and permitting rapid launch. Target data is also digitally available through the improved data modem for real-time transfer to other platforms and command posts. The self-contained radio frequency interferometer (RFI) ensures rapid identification and accurate azimuth to enemy air defense units. High system reliability and two-level maintenance provide high operational availability with low support costs. The radar is fielded with the Apache AH-64D Longbow attack helicopter system in the U.S. Army.

Longbow HELLFIRE™ Missile

The Longbow system incorporates a fire-and-forget RF missile, allowing the Apache to launch from defilade, increasing battlefield survivability. The missile is capable of locking onto a target before or after launch, and has been extensively tested against multiple countermeasure environments.

The M299 Launcher™ has a fully digital interface to the Apache and is capable of firing any HELLFIRE missile. The missile and launcher system are fielded by the U.S. Army and several other armed forces throughout the world.

M299 Missile Launcher™

The Smart Launcher Solution for Multiple Aircraft and Ground Platforms

Specifications

Weight (empty)	66 kg (145 lb)
Weight: loaded with 4 AGM-114K missiles	245 kg (541 lb)
Dimensions (4 missiles)	559 x 737 mm (22 x 29 in)
Operating Envelope	-43°C to +49°C to 4,570m above sea level
Environments	Sand, dust, rain, snow, ice, salt, fog, fungus

Marvin Engineering Company

Under contract to the U.S. Army, Lockheed Martin and Marvin Engineering Company have partnered to deliver all-digital M299 “smart” launchers to the U.S. Army. Marvin Engineering also provide maintenance and spares under the agreement.

The M299 operates in severe helicopter flight environments. State-of-the-art digital design allows the launcher to interface with a variety of helicopters, and to recognize and fire all AGM-114 HELLFIRE® variants in any sequence. As the prime contractor for the M299 launcher and HELLFIRE II and Longbow missiles, Lockheed Martin can provide integration for the system onto multiple platforms.

Designed for ease of maintenance, the M299 comprises four line replaceable units (LRUs). Any LRU can be replaced by an aviation unit with a 30-minute mean time to repair. Built-in test capabilities identify malfunctions without removing the launcher from the aircraft. The launcher is compatible with fielded test sets to simplify maintenance.

Features

- MIL-STD-1760 interface
- Digital 1553 data bus compatibility
- Two- and four-missile capacity
- Fires any HELLFIRE missile, in any order
- Embedded training missile emulation
- Two-level maintenance design
- In production and exportable

Under contract to the U.S. Army, Lockheed Martin manages the launcher depot. The depot provides repair capability for launchers in service to the U.S. Army, U.S. Navy, and foreign military sale (FMS) customers. Our commitment to Mission Success, from design to field support, has made the HELLFIRE weapon system one of the most respected and most reliable in the world.

MLRS®
Multiple Launch Rocket System

Munitions in Development

Guided Unitary MLRS

Leverages the Guided MLRS experience and investment to integrate a unitary warhead with a multi-mode fuze to provide increased precision and lethality with reduced collateral damage.

Guided Cargo Round

The next generation munition system, guided cargo will destroy stationary or moving high-payoff targets.

TACMS-Penetrator

This joint Navy/Army program integrates a TACMS booster with a Navy warhead to destroy hard and deeply-buried targets.

The Multiple Launch Rocket System (MLRS) is designed and produced by Lockheed Martin for the U.S. Army, as well as the armies of several allied nations. MLRS is a highly mobile, automatic system that fires surface-to-surface rockets and missiles from the M270, M270A1 and High Mobility Artillery Rocket System (HIMARS) platforms. MLRS launchers successfully fired MLRS rockets and Army Tactical Missile System (ATACM) during Desert Storm and Operation Iraqi Freedom. The MLRS Family of Munitions meets the complete Army requirement for tactical and operational support.

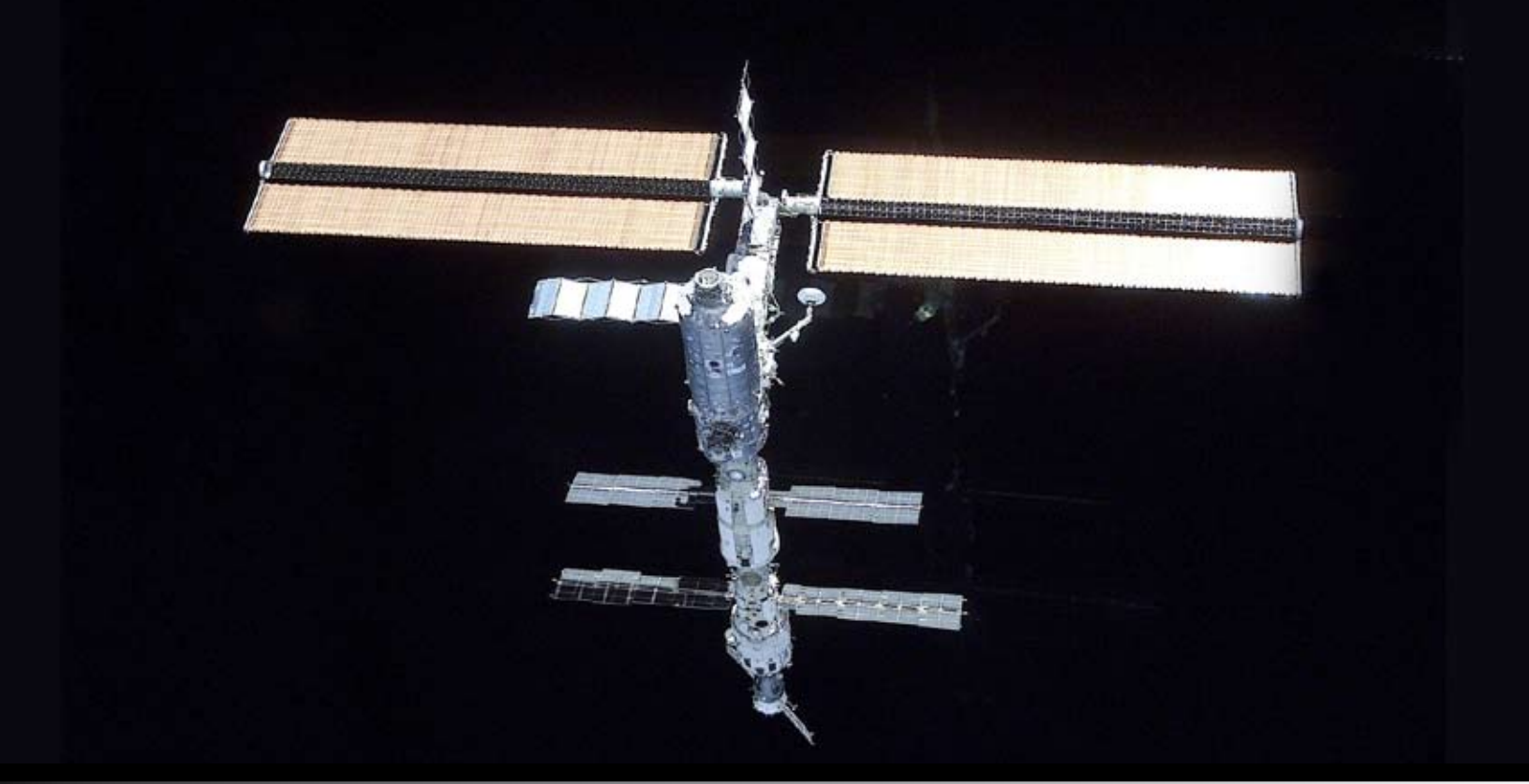
Family of Munitions

- Basic M26 Rocket
- Extended-Range M26A1/A2 Rocket (ERR)
- AT2 (Made in Germany)
- Reduced-Range Practice Rocket (RRPR)
- Guided MLRS (GMLRS)
- ATACMS Block I
- ATACMS Block IA
- ATACMS Unitary

TOPSCENE™ MULE™

Heat Rejection Radiators™

Space Shuttle Thermal Protection



Heat Rejection Radiators™
Heat Rejection System

Lockheed Martin Missiles and Fire Control designs and develops the large-scale heat rejection system (HRS) radiator and the photovoltaic radiator (PVR) assemblies for the International Space Station (ISS).

The ISS is a large, hospitable, permanent human outpost in space. When complete, its size will equal the interior space of three Boeing 747 aircraft and will weigh more than a million pounds. In addition to providing facilities where an international crew of seven astronaut-scientists can live and work in space, it will provide important laboratory research facilities for performing basic research in life sciences, biomedical and material sciences, as well as space and engineering technology development which cannot be accomplished on Earth.

Features

- The company produced and delivered six 2,470-pound HRS radiator assemblies and four 1650-pound PVR assemblies to NASA. The HRS Radiators comprise two wings of three assemblies each, one on either side of the ISS main truss. Each HRS assembly consists of eight panels measuring 9 ft. x 11 ft. When retracted in the launch configuration -- folded accordion fashion -- the radiator assemblies will fit easily into the payload bay of the Space Shuttle Orbiter. When attached to the ISS in orbit, each HRS assembly will extend to 11 ft. x 75 ft. via an electric motor driven “scissor” mechanism.
- Each HRS assembly is capable of rejecting at least 11.8 kilowatts of excess ISS heat, thereby providing cooling to the crew compartment, spacecraft subsystems and experiments. The Lockheed Martin Missiles and Fire Control-produced radiator assemblies will mate with a pumped liquid ammonia heat transfer system to cool the ISS crew and equipment.
- The radiator panels are made of an aluminum bonded honeycomb material with imbedded freeze tolerant Inconel flow tubes and painted with a white ceramic material selected to withstand the space environment.
- Each HRS assembly is designed to have a 10-year life. Lockheed Martin Missiles and Fire Control is a subcontractor to Boeing, Huntington Beach, Calif. – formally McDonnell Douglas – on the program.

MULE™
Multifunction Utility/Logistics and Equipment Vehicle

Specifications

- Common chassis for all variants
- C-130/CH-47 internally transportable
- UH-60 transportable by slingload
- 6x6 independent articulated suspension
- Each wheel independently driven
- Diesel-electric propulsion
  (Growth to hybrid-electric)
- Run-flat tires with central tire inflation system
- Highly survivable

Lockheed Martin is developing the Future Combat System (FCS) Multifunction Utility/Logistics and Equipment/Armed Robotic Vehicle-Assault (Light) (MULE/ARV-A(L)) vehicle under a contract from the FCS Lead System Integrator The Boeing Company. The vehicle was selected to move into System Development and Design phase in 2003 and ultimately into production. The SDD phase is anticipated to be a $200 million-plus program.

The MULE offers an extraordinary capability that will support the U.S. Army's transformation to a lighter and more mobile fighting force. The MULE's unique mobility will enable it to go everywhere the soldier can go and more. It will allow soldiers of the transformed Army to use technology to do the dull, dirty and dangerous jobs of the current forces, freeing them to focus on the success of their missions.

The MULE will increase the efficiency of the total force by complementing, not replacing, manned and unmanned platform functions. It provides for future growth through spiral development, and possesses an open architecture designed to take full advantage of the rapid evolution of technology.

The highly mobile platform is designed specifically to meet the requirements of the Future Force soldier for dismounted operations. The MULE's unique, highly advanced 6x6 independent articulated suspension, coupled with in-hub motors powering each wheel, provides extreme mobility in complex terrain, far exceeding that of vehicles utilizing more conventional suspension systems.

The MULE, a 2.5-ton class vehicle for the FCS, includes three variants: Transport, Armed Robotic Vehicle - Assault (Light) (ARV-A (L)) and Countermine.

The ARV-A (L) version will be armed with a line-of-sight gun and an anti-tank capability. It is designed to provide immediate, heavy firepower to the dismounted soldier.

The Countermine variant is designed to provide detection and neutralization of mines, and marking of cleared lanes through minefields, greatly increasing the safety and mobility of the infantryman.

It will climb at least a 1-meter-step, far exceeding requirements, and provides the vehicle with the mobility performance and surefootedness required to safely follow dismounted troops over rough terrain, through rock and debris fields and over urban rubble. This technology also allows the MULE to cross 1.0 meter gaps, traverse side slopes greater that 40 percent, ford water to depths over 0.5 meters, and overpass obstacles as high as 0.5 meters, while compensating for varying payload weights and center of gravity locations.

Space Shuttle Thermal Protection
Shuttle Program Support-Return to Flight

Each time the space shuttle orbiter makes its fiery re-entry through the Earth's atmosphere, a unique structural material called Reinforced Carbon-Carbon (RCC) has one of the most demanding tasks of the mission - protecting the vehicle's nose section, wing leading edges and chin panel against metal-melting temperatures approaching 3,000 degrees Fahrenheit.

RCC, developed by Lockheed Martin Missiles and Fire Control, is basically an all-carbon material processed for increased strength and treated to resist oxidation during the orbiter's encounter with the atmosphere at speeds near 17,000 miles an hour each time it returns from space.

Features

- At temperatures devastating to metals, RCC paradoxically increases in strength. It provides excellent shock resistance, permitting rapid transition from 250 degrees below zero (-156 C) in the cold of space to nearly 3,000 degrees (1,648 C) during re-entry. The material also demonstrates outstanding structural fatigue life, necessary in meeting the design goal of 100 orbiter missions.
- Each orbiter wing contains 44 RCC panels which form the leading edge airfoil structure, plus 44 sealing strips and numerous pieces of attachment hardware.
- Together with the 4-1/2-foot-diameter nose cap and chin panel, these panels form more than 400 square feet of protective structure for the spacecraft's peak heat areas.
- The RCC sections and associated insulation limit the temperatures reaching adjacent metal structure in the orbiter to 350 degrees (177 C) during ascent and re-entry, low enough to permit the use of conventional aluminum airframe materials in the vehicle's design.

TOPSCENE™

Specifications

- TOPSCENE 4800 Image Generator
- TOPSCENE 4000
- TOPSCENE 400
- High performance, multi-sensor solutions that meet the demands of high-end mission rehearsal visualization and training.

Lockheed Martin produces the Tactical Operational Scene (TOPSCENE) mission rehearsal system for the U.S. Navy, Air Force, Army, Marines and Special Operations Forces. TOPSCENE utilizes overhead image data from satellites and other sources by converting the two dimensional images into three-dimensional "fly through" and "walk through" battlefield visualization simulation scenarios.

The TOPSCENE systems support mission preview, mission planning, mission rehearsal and mission training. Using real-world images, warfighters can repeatedly practice a mission, taking advantage of visually significant clues and aim points. By knowing exactly what the terrain and built-up areas will look like during the real mission, the chance of a successful mission is greatly increased.

- **TOPSCENE 4800 Image Generator (IG)**
  The TOPSCENE 4800 IG provides high-resolution imagery and sensor data for real-time combat mission simulation of large area databases. Mission rehearsal and mission training applications are supported with a complete set of mission functions and environment simulations. Host interface options are available to support integration with a variety of weapon systems. Open architecture system of hardware and software is expandable for additional channels, line rates and functionality.
- **TOPSCENE 4000**
  The TOPSCENE 4000 provides photo-based imagery, physics-based sensor simulation, and battlefield situation awareness for large terrain databases. Databases, which are acquired from various sources (photographic, sensor, satellite, National Imagery and Mapping Agency (NIMA)), have been processed by one of the TOPSCENE Database Generation Systems. The resulting imagery and elevation data are stored on removable digital disks and transported to the user. Databases can be updated in the field in near-real time. TOPSCENE systems have a highly responsive, operational support system and are deployed worldwide for the Joint Services.
- **TOPSCENE 400**
  The TOPSCENE 400 is a compact, low-cost version of the TOPSCENE 4000 providing photo-based imagery and sensor databases for near real-time simulations over large terrain databases. The systems provide interfaces for connection to various planning systems for near real-time threat and route feeds.

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