



Abrams tank

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gle M157 smoke-generating set. The two generators, mounted on the roof of the vehicle under armor, are remotely controlled from inside the vehicle. A 120-gallon fog-oil tank located within the vehicle can generate smoke for approximately one hour without refueling. The Army initially fielded approximately 200 M1059 systems between 1988 and 1990. Many of these vehicle systems have now been converted to the M1059A3 configuration with the reliability improvement for selected equipment power upgrade.

The **M6 Countermeasure Discharger** is a four-tube smoke grenade launcher that enables combat vehicles to conceal themselves from hostile surveillance, target acquisition and weapon guidance systems. The M6 can fire all Q-STAG 401 conforming grenades (66 mm) and interfaces with vehicle integrated defense systems.

TRACKED VEHICLES

The **M1 Series Abrams Tank** provides the Army with mobile, protected firepower and will remain the cornerstone of the Army's counterattack and containment forces as the Army transforms to the Future Force. The Abrams tank provides soldiers with the lethality, survivability and staying power to successfully close with and destroy enemy forces on the integrated battlefield. The 120 mm main gun on the M1A1 and M1A2, combined with the powerful 1,500-hp turbine engine and special armor, make the Abrams tank particularly suitable for attacking or defending against large concentrations of heavy armor forces on a highly lethal battlefield and for other roles that require shock effect and mobile direct firepower to support Army mission requirements.

Two major programs maintain and recapitalize the Abrams fleet: the M1A2 systems enhancement program (SEP) and the M1A1 Abrams integrated management (AIM) program.

The M1A2 program provides the Abrams with the necessary improvements in lethality, survivability and fighting ability required to defeat advanced threats. It is the Army's first digitized, direct fire, combat vehicle.

The M1A2 has a digital command and control system that provides situational awareness updates to all the other tanks in a unit. Vetrionics architecture ties all electronic components in the tank together and provides increased survivability and supportability. The commander's indepen-

dent thermal viewer gives it a hunter-killer capacity. The M1A2 also has improved on-board diagnostics that allow the tank to troubleshoot itself without any additional special tools or equipment.

Further M1A2 improvements, through the SEP, are under way. The M1A2 SEP is the backbone of the Army's first digitized division and the counterattack corps of the Army's current force. It is the only weapon system that can withstand the impact of high-energy warheads and remain lethal in high-mobility and sustained operations. It has integrated combat command and control (IC³), which incorporates Force XXI Battle Command Brigade and Below (FBCB²) to provide command and control and situational awareness.

Its sights use the latest thermal-imaging system (second-generation forward-looking infrared or FLIR) for increased lethality and survivability. The M1A2 SEP tank takes advantage of computer/electronic industry advances by including improved electronics developed since the introduction of the M1A2. The SEP package includes a new computerized mass-memory

Bradley fighting vehicle



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unit and color maps and displays. A thermal management system increases electronic reliability and decreases crew fatigue.

Production deliveries of the M1A2 SEP tank began in September 1999. These vehicles were used extensively during OIF.

The Army must sustain the readiness and reduce the operations and support costs of approximately 4,300 older M1A1 Abrams main battle tanks in its active and reserve component units.

The **Abrams Integrated Management Program (AIM)** is the recapitalization program for the M1A1 tank. Under AIM, M1A1 tanks are completely disassembled at Anniston Army Depot, Ala. The depot refurbishes many of the tank's components. The assemblies are then shipped to the Joint Systems Manufacturing Center (JSMC) in Ohio, where General Dynamics Land Systems reassembles the tanks to a zero time/zero miles standard.

The AIM program has fielded tanks to units at Fort Hood, Texas, and in Germany. Annual production now stands at 135 tanks per year and will continue until 2012. AIM also serves as the venue to apply modifications and upgrades to the tank, including embedded diagnostics. AIM also serves as a means to combat electronic obsolescence by introducing improved line-replaceable units (LRUs) for those that face technical obsolescence. The AIM process also incorporates redesigned hull and turret network boxes.

The **Bradley M2A3 Infantry/M3A3 Cavalry Fighting Vehicle (IFV/CFV)** facilitates enhanced command and control capabilities, provides mobile protected transport of an infantry squad to critical points on the battlefield and performs cavalry scout and other essential (Bradley-

equipped fire-support and Stinger teams) missions in the 21st century. Upgrades in this program include advanced technology in the areas of command and control, lethality, survivability, mobility and sustainability, required to defeat current and future threat forces while remaining operationally compatible with the main battle tank. The M2/M3 vehicle armament includes the 25 mm M242 Bushmaster cannon, the TOW II missile system and a 7.62 mm M240C machine gun.

The M2A3/M3A3 provides overwatching fires to support dismounted infantry and to suppress and defeat enemy tanks, reconnaissance vehicles, infantry fighting vehicles (IFVs), armored personnel carriers, bunkers, dismounted infantry and attack helicopters. The infantry version (M2) of the A3 Bradley fighting vehicle is used most often to close with the enemy by means of fire and maneuver. The primary tasks performed by the cavalry version (M3) as part of a troop and/or squadron are reconnaissance, security and flank guard missions.

The A3 is the consummate digitized platform, with a core electronics architec-

ture on a 1553 data bus and an improved target acquisition system that includes a full ballistic fire-control package with hunter/killer functionality via a commander's independent viewer (CIV). Optical improvements also include two second-generation FLIRs and day television cameras, which can be displayed to the squad members in the back of the vehicle via the rear-mounted squad leader's display. This feature significantly improves the real-time situational awareness for the entire dismounted or mounted crew.

The A3 integrated combat command and control (IC³) package incorporates the Army's digital command and control suite of automated messages, overlays and friend or foe graphics that meet the Army's objectives for a fully digitized force. This same digital command and control capability was incorporated into the A2 Operation Desert Storm (ODS), including a squad leader's display for messages and graphics.

The A3 variants reflect the latest iterations of a fighting vehicle family that includes the Bradley M2/M3A0, A1, A2, A2 ODS, IFV/cavalry fighting vehicle (CFV), Bradley fire-support team (BFIST) vehicle and M2A2 ODS engineer vehicle. Additional Bradley variants, based on the associated tracked M270 multiple-launch rocket system (MLRS) chassis, range from command and control systems to armored medical treatment vehicles.

The **M4 Command and Control Vehicle (C²V)** program emerged from lessons learned during Operation Desert Storm. Based on the Bradley family's MLRS chassis, the M4 C²V is a self-contained platform with onboard support subsystems capable of providing adequate power for mission equipment and NBC protection and environmental control.

Platform components include a primary power unit that can provide 21,000 watts of AC and 4,600 watts of DC power, an antenna compartment that supports a 10-me-



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M4 command and control vehicles



ter nesting mast, a 579-cubic-foot crew/mission equipment compartment, a bio-chem system (100/200 cubic foot per minute with 1.5 inches of water overpressure) and an environmental cooling unit (40,000 BTU per hour cooling).

A March 1994 engineering and manufacturing development contract was followed by three low-rate initial production awards that covered a total of 25 vehicles. The final vehicles covered under that contract were delivered in June 2001.

Although the M4 C²V program was terminated in December 1999 to provide funding for the Army's new Stryker armored vehicle acquisition, the Army pulled the systems out of storage and issued most of them for combat use during Operation Iraqi Freedom.

The **M7 Bradley Fire-Support Team (BFIST) Vehicle** provides an integrated Bradley-based fire-support platform, based on the M2A2 ODS vehicle, that enables company fire-support teams (FISTs) and company fire-support officers to plan, coordinate and execute timely, accurate indirect artillery and mortar fires.

The M7 BFIST is equipped with an inertial navigation system, targeting station and lightweight computer units with the forward observer system (FOS), all integrated on a 1,553 data bus. These features provide the crew with a highly accurate point-and-click targeting capability, stationary or while on the move, day or night, under all weather conditions.

The M7 BFIST is also armed with a 25 mm automatic cannon and a 7.62 mm coaxial machine gun common to the Bradley fighting vehicle family. Force XXI Battle Command Brigade and Below (FBCB²) was fielded to M7 BFIST in FY 2003.

The **M88A2 Heavy Equipment Recovery Combat Utility Lift and Evacuation**

System (Hercules) is a full-tracked, heavy armored vehicle developed to accomplish safe, effective and independent battlefield recovery operations. It implements swift and effective combat evacuations through the battlefield recovery operations of towing, winching and lifting.

The Hercules uses the M88A1 chassis modified to significantly improve towing, winching, lifting and braking characteristics. It is the primary recovery support for the 70-ton M1 Abrams tank, the Wolverine and other heavy combat vehicles.

The M88A2 includes a 1,050-horsepower engine; a 35-ton boom; overlay armor; a 140,000-pound, single-line, constant-pull main winch; and a 3-ton auxiliary winch for deploying the main winch cable. When compared to the M88A1, these upgrades improve towing power by 25 percent, lifting capability by 40 percent and winching ability by 55 percent.

The system is in full-rate production and deployment. Fielding began in July 1997, and it achieved first unit equipped in July 1997. The first Army vehicle was delivered in January 1996.

The **M113 Family of Vehicles (FOV)** provides a highly mobile, survivable and reliable tracked-vehicle platform that, with upgrades, is able to keep pace with Abrams- and Bradley-equipped units and is adaptable to a wide range of current and future battlefield tasks through the integration of specialized mission modules. Although not presently in new production, the 14,795 M113 FOV systems now in Army vehicle inventories constitute a significant percentage of present and future heavy division assets.

Recent activities within the M113 FOV focused on upgrading several models of the vehicles to meet or exceed the mobility characteristics of the supported maneuver force. The most recent upgrade to see wide fielding is the A3 reliability improvement for selected equipment (RISE). RISE provides various derivatives within the FOV with major performance improvements in mobility, reliability and survivability through installation of a 275-horsepower 6V53T engine with an X-200-4A transmission.

Coupled with reconfiguration of the driver's station and several other vehicle subsystems, these improvements provide battlefield mobility commensurate with the supported Abrams/Bradley maneuver force. Moreover, the increased performance provided by this and other upgrade packages permits a range of enhanced survivability options.

The Army's **Opposing Forces Surrogate Vehicle (OSV)** is designed to visually and tactically simulate the BMP-2 infantry fighting vehicle at the National Training Center (NTC) and in similar training environments. The simulation has been accomplished by adding a modified Bradley tur-

*M113 armored personnel carrier
with slat armor*

ret with other visual modifications to an upgraded M113A3 chassis (modifying former M901 improved TOW vehicles).

The OSV replaces the shrinking supply of aging and difficult to maintain M551s currently in surrogate use.

In addition to the OSV, a separate program is under way to convert excess M901A1 (M113 FOV) improved TOW vehicles (ITVs) to serve as opposing forces surrogate training system (OSTS)-main battle tank (MBT) vehicles. The OSTS-MBT is a tracked surrogate vehicle designed to operationally and visually simulate threat tanks during force-on-force training at the U.S. Army Combat Maneuver Training Centers at Fort Polk, La.; Fort Irwin, Calif.; and Hohenfels, Germany. The vehicle is an M113A3 chassis with an operational two-man turret equipped with simulated weapon systems and visual modifications.

The **Small-Unit Support Vehicle (SUSV)** is the U.S. Army designation for the Swedish Bv206 all-terrain personnel carrier. The SUSV is a full-tracked, diesel-powered, articulated vehicle in the 1- to 2-ton payload category. The vehicle's unique steering mechanism involves articulation of the front and rear cars in relation to each other.

It is fielded in multiple configurations (M973A1 cargo carrier, M1065 command post, M1066 ambulance and M1067 flat-bed) primarily to units serving in or deployed to regions with heavy snowfall. The SUSV, however, is amphibious, and is equally mobile in marshy or swampy terrain.

WHEELED VEHICLES

The versatile **High-Mobility, Multipurpose Wheeled Vehicle (Humvee)** provides a common, light tactical vehicle capability. The Humvee is the Army's primary light wheeled vehicle for combat support and combat service support missions. The Humvee replaced the quarter-ton jeep, M718A1 ambulance, half-ton Mule, 1.25-ton Gamma Goat and M792 ambulance when it began fielding in 1985. Humvees of all variants (including most



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up-armored Humvees) are currently deployed in support of operations in Iraq and Afghanistan.

The Humvee family of vehicles consists of multiple configurations built on a common chassis to support weapon systems, command and control systems and field ambulances and to provide ammunition, troop and general cargo transport. It is equipped with a high-performance diesel engine, automatic transmission and four-wheel drive. It is air transportable and low-velocity air drop (LVAD) certified (except for the maxi ambulance variants). The Humvee can be equipped with a self-recovery hydraulic winch capable of up to 10,500-pound 1:1 ratio line pull capacity, and it can support payloads from 2,500 to 5,100 pounds (including crew and pintle loads), depending on the model.

The A1 model, which entered production in 1992, introduced upgraded driveline

components, heavy-duty rear springs, an improved brake system, a high-ratio transfer and 2.73:1 front and rear differentials.

The subsequent introduction of the A2 configuration brought with it a new 6.5-liter, naturally aspirated diesel engine; an electronically controlled, four-speed automatic transmission; and a redesigned emissions system that met 1995 U.S. Environmental Protection Agency (EPA) standards. Other features focused on user comfort, vehicle maintainability and performance.

Further expansion of Humvee payload capacity has led to the development and introduction of the expanded capacity vehicle (ECV), M1113 and the M1114 up-armor Humvee (UAH). The ECV was produced in 1995 as a shelter carrier providing up to 5,100 pounds of payload. The M1114 UAH configuration provides protection for the driver and three crew mem-



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Humvee