

**INTEGRATED TRAINING AREA MANAGEMENT**  
**ITAM Learning Module**  
**Tactical Units & Equipment**

**Lesson #2: Combat Equipment and Vehicles**

**Objectives**

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To achieve a successful ITAM program, land managers must understand the primary tactical missions and training requirements of the units that use their installation and training/testing lands. This Lesson is the second lesson of a four-part learning module, which will help students to learn more about the Army, its organization and missions.

By completing this Lesson, students will:

1. Identify the individual equipment used by soldiers.
2. Identify the major combat vehicles used by Army units.
3. Identify the major helicopters used by Army units.
4. Identify the major support vehicles used by Army units.

**Field Gear**

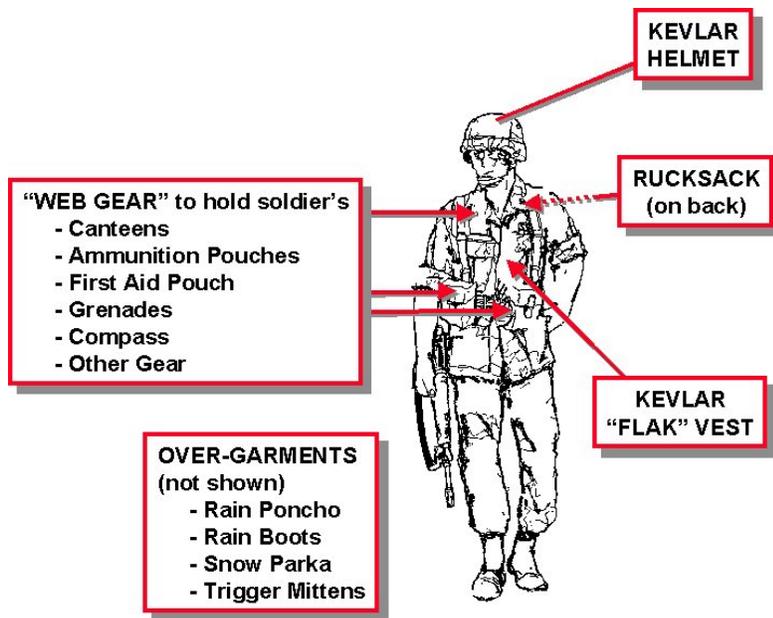
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Every soldier in the United States Army is permanently issued uniforms and clothing upon initial entry training. Additionally each soldier is issued (on a loan basis) a set of personal equipment to use during field exercises or combat.

Most of this equipment is survival or protective in nature. This equipment is nicknamed “field gear” or “TA-50.”

A complete set of TA-50 contains a helmet, armored “flak” vest, belts, suspenders, pouches, canteens, wet (and cold) weather gear, tent-making items, a sleeping bag, and other equipment.

The average cost for equipping a soldier is usually around \$2000.



## Nuclear, Biological, or Chemical (NBC)

### Gear and Specialized Equipment

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In addition to TA-50, soldiers are equipped with specialty gear.

All soldiers will have NBC gear (a protective mask with hood to cover the Kevlar helmet, protective overgarments, and rubber over-boots and gloves) designed to protect him/her from Nuclear, Biological, or Chemical weapon effects. NBC gear also includes detection tape to sense the presence of NBC agents on the battlefield, and an antidote kit to be used in the event of unprotected exposure to these agents.

Other more specialized soldiers (such as aviation or armor soldiers) are issued additional gear such as NOMEX fire-resistant coveralls, gloves, and special helmets.

Nearly all soldiers will be responsible for maintaining expensive night vision devices, global positioning units, or radio gear in addition to their personally assigned weapon.



Note: Helmet cover not shown.

## Weapons Systems

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The Army can not perform its wartime missions without weapons.

There are two very broad categories of weapon systems...individual and crew-served. Individual weapons are items that take only one person to successfully operate (such as a rifle or hand grenade). Crew-served weapons are larger and must have two or more soldiers (a "crew") to successfully operate them. A machine gun, tank, and helicopter are considered crew-served weapon systems.

## Individual Weapons

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Individual weapons have two sub-categories: firearms and grenades.

Firearms are conventional bullet-firing rifles or pistols. The primary firearm in the inventory is the 5.56mm/.223 caliber M-16 rifle, which is issued to most soldiers with all types of units. Other weapons are the 9mm M-9 "Baretta" pistol, the M-4 Carbine (5.56mm/.223 caliber) a light weight version of the M-16 (not shown), and a lightweight automatic rifle called the M-249 Squad Automatic Weapon (or SAW, also 5.56mm).



**M-9**

The M-9 is a 9mm double-action semiautomatic pistol, with a 15-shot magazine.



**M-16**

The M-16A2 is a lightweight 5.56mm (approx. .22 caliber) rifle with a 30-shot magazine. The weapon was designed for either automatic (three-round bursts) or semiautomatic (single shot) fire. The bottom of the trigger guard opens to provide access to the trigger when the shooter is wearing gloves or mittens. A compensator helps keep the muzzle down during firing.



**M-249 Squad Automatic Weapon (SAW)**

The M-249 Squad Automatic Weapon (SAW) is a lightweight 5.56mm machine gun carried by infantry squads. The SAW is a magazine or belted automatic rifle. It can be carried and operated by an individual soldier. It provides infantry squads and fire teams with the ability to fire at targets at greater distances than with a rifle and for longer periods of time without stopping. Gunners have the option of using a 30-round magazine or a 200-round magazine

Hand grenades are either explosive or non-explosive. Explosive grenades are designed to kill enemy personnel through blast or fragmentation. Non-explosive grenades can incapacitate, obscure, or signal with smoke, flash-bang, or CS (“teargas”). All are thrown baseball-style by an individual.

One hybrid weapon used is the 40mm M-203 grenade launcher. It fits under an M-16 rifle and shoots an oversized, shotgun-like grenade. M-203 grenades have the same effects as regular hand grenades.



**M-203 (40 mm) Grenade Launcher**

The M-203 40mm Grenade Launcher is used while attached to a M-16A2 5.56mm rifle. It is a lightweight, compact, breech-loading, pump action, single shot launcher. The launcher consists of a hand guard and sight assembly with an adjustable metallic folding, short-range blade sight assembly, and an aluminum receiver assembly which houses the barrel latch, barrel stop and firing mechanism. The launcher is capable of firing a variety of low-velocity 40mm ammunition. The launcher also has a quadrant sight that may be attached to the M-16A2 carrying handle and is used for maximum effective range.

## **Crew-Served Weapons**

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Crew-served weapons fall into five main sub-categories:

1. Machine Guns
2. Armored Combat Vehicles
3. Indirect Fire Weapons
4. Air Defense Weapons
5. Rotary Wing Aircraft (Helicopters)

### **Machine Guns**

Machine guns comprise the first series of crew-served weapons. They are usually much larger, fire bullets faster, and have larger bullets than rifles (some capable of penetrating steel and concrete).

A machine gun will have a crew of two or three (a gunner, an assistant gunner, and possibly an ammunition bearer). Machine guns are carried and rested on the ground for firing, or they are mounted on vehicles designed to carry them.

The main machine guns in use are the 7.62mm M-60 machine gun (being replaced by the 7.62mm M-240 machine gun) and the .50 caliber heavy machine gun, the M2.



**M-60**

The M-60E3 7.62mm machine gun is an air-cooled, portable or tripod-mounted machine gun designed for ground operations. It has a fixed head space and timing that permits rapid changing of barrels. Slightly different from its parent, the M-60, the M-60E3 has a receiver-attached bipod that easily deploys for stability. It has an ambidextrous safety, universal sling attachments, a carrying handle on the barrel, and a simplified gas system that does not require safety wire to prevent loosening. However, the lightweight barrel is not safe for overhead fire and is not capable of sustaining a rapid rate of fire of 200 rounds per minute without severe damage failure of the barrel.



**M-2**

The M-2 .50 caliber machine gun provides sustained, concentrated fire in combat. The M-2 can be operated in a semi-automatic or automatic mode. An anti-personnel and anti-aircraft weapon, it can be fired from a fixed position or from most vehicles.

A third type of machine gun is the 40mm Mark-19 automatic grenade launcher (AGL). It is a machine gun hybrid of the M-203 grenade launcher.



**Mk-19 Grenade Launcher**

The MK-19 Grenade Launcher is a fully automatic weapon that fires 40mm grenades. The MK19-3 can be mounted on a tripod or a vehicle swivel point. The weapon delivers accurate, intense, decisive firepower against personnel and lightly armored vehicles by shooting a variety of 40mm grenades. Because of its weight, it is crew transportable only over short distances with limited amounts of ammunition. The MK19-3 shoots a 40mm grenade, which can kill in a 32-foot (5-meter) circle and wound in a 100-foot (30-meter) circle (48 feet). The grenade can penetrate two inches of armor.

### ***Armored Combat Vehicles***

Armored combat vehicles are the second set of crew-served weapons systems. This category has a series of different tracked vehicles with two purposes.

The current M1-series “Abrams” is the front-line Army tank. Tanks are designed to be the spearhead of any thrust against a well-armed enemy. They carry a main gun (120mm) designed to destroy other tanks and are mounted on a heavily armored track system for all-terrain mobility. Tanks will often mount two or more machine guns to increase their firepower. The tank has a crew of four (a tank commander (E-6), a gunner, a loader, and a driver).



**M1A1**

The M-1 main battle tank is called the Abrams, after Gen. Creighton Abrams, former Army Chief of Staff. It is a fully tracked, low-profile tank with shoot-on-the-move capability and a high degree of maneuverability. Special armor, fuel and ammunition compartmentalization and an automatic fire detection and suppression system provide the crew with a high level of protection. The principal version, the M1A1, features a 120mm cannon with a thermal sight, allowing it to track on a target by the heat it produces, and a fire control stabilization system that tracks such variables as tank speed, target speed, wind speed, tilt and ammunition temperature. The Abrams operates in all climate and lighting conditions. The M1A2 and M1A3 are improved versions of the M1A1, containing upgraded navigational equipment, communications equipment, and other features.

Armored fighting vehicles also include the M2/3 Bradley Infantry Fighting Vehicles (BFV) or M113-series Armored Personnel Carriers. Both types of vehicles are designed to carry soldiers (mechanized infantrymen) in the back of the vehicle (BFVs, however, can shoot at the enemy with a turret weapon and fire anti-tank missiles). The BFV has a crew of three (a track commander, a gunner for the TOW anti-tank missile system and a .25 mm chain machine gun, and a driver). The BFV can also carry up to 6 infantrymen. The M113 Armored Personnel Carrier (APC) has been replaced in most Mechanized Infantry units by the BFV. However, the APC is still used to transport Engineer squads in Combat Engineer Battalions in the Armored and Mechanized Infantry Divisions.



**M2/M3 Bradley**

The Bradley Fighting Vehicle (BFV) is a lightly armored, fully tracked fighting vehicle that provides cross-country mobility, mounted firepower and protection from artillery and small-arms fire. It is used in mechanized infantry and armored cavalry combat. Infantry can fight from inside the vehicle by using modified M-16 rifles mounted in firing ports or may dismount from the M-2 version to fight on foot. Armored cavalry units also use the M-3 version. The vehicle is armed with a 25mm cannon, effective against most armored targets, and with the TOW missile, effective against lightly armored targets out to its maximum range of 3,750 meters (2.3 miles).



**M113**

The M113A2 personnel carrier is a lightly armored, full-tracked combat vehicle that provides protected transportation for troops or cargo in combat. The A2 model features improvements in the cooling, suspension and personnel heating systems. The vehicle can carry up to 12 combat-equipped troops or a payload of two tons.

### ***Indirect Fire Weapons***

Indirect fire weapons usually shoot at the enemy in an indirect-fire role (an observer sees the enemy and tells the gunner where to shoot) from distances of 4 to 40 km away.

Indirect fire systems are either carried or towed by truck or can move under their own power (“self-propelled”). These systems are broken-down into three families: mortars, cannons and howitzers, or rockets.



**M-198 (155 mm)**

The M-198 is a helicopter transportable 155mm towed howitzer used in a general support role for Army light infantry divisions or Marine Corps Air Ground task forces. The M-198 has a conventional split trail carriage and utilizes a hydropneumatic recoil mechanism. In firing position, the split trails are spread and locked, the wheels are raised off the ground, and the weapon rests on a firing base.



**M119 (105 mm)**

The M-119A1 is a lightweight 105mm artillery piece that can be positioned quickly by ground vehicle or helicopter. The M-119A1, usually towed by a HMMVW battle vehicle, is air mobile (can be sling loaded) by helicopter, and air transportable by C-130 and larger transport aircraft. It fires all U.S. and NATO standard 105mm projectiles.



**M-102 (105 mm) Towed Howitzer**

The M-102 105mm howitzer is used in air mobile (helicopter) and light infantry operations. The weapon carriage is lightweight welded aluminum, mounted on a variable recoil mechanism. The weapon is manually loaded and positioned, and can be towed by a 2 ton truck or High Mobility Multipurpose Wheeled Vehicle (HMMWV), can be transported by UH-60 Black Hawk helicopters, or can be dropped by parachute with airborne units. The howitzer's high volume of fire compensates in large measure for the lower explosive weight of the projectile compared to the Army's 155mm and 8-inch howitzers.



**M-109 (155 mm)**

The M-109A3 is an armored self-propelled medium howitzer firing a 155mm (about 6.2 inch diameter) shell. It is used to provide indirect fire support. C-5 aircraft can transport the 155mm M-109A3. It has an amphibious capability when equipped with a flotation kit. Components of the weapon include a periscope, cannon, firing mechanism, howitzer cannon, elbow telescope and panoramic telescope.



**Paladin**

The M109A6 Paladin is the latest advancement in 155mm self-propelled artillery. The system enhances previous versions of the M109 by implementing onboard navigational and automatic fire control systems. Paladin has both a Kevlar-lined chassis and a pressurized crew compartment to guard against ballistic, nuclear, biological, and chemical threats. The M109A6 is the most technologically advanced cannon in the Army inventory. This weapon has a 4 man crew, and weights approximately 62,000 lbs/32 tons, and has a cruising range of 186 miles, Max speed is 35 MPH, It has a fuel capacity of 133 gals. The Paladin can operate independently, from on the move, it can receive a fire mission, compute firing data, select and take up its firing position, automatically unlock and point its cannon, fire and move out - all with no external technical assistance. Paladin is capable of firing up to four rounds per minute to ranges of 30 kilometers. The Paladin features increased survivability characteristics such as day/night operability, NBC protection with climate control and secure voice and digital communications. The crew remains in the vehicle throughout the mission.

Mortars are simple tubes that launch a small “bomb” at a high angle for a very short range. Cannons and howitzers are breach-loaded and fire large explosive projectiles (“shells”) at the enemy up to 30 km away.



**M-224 (60 mm) Mortar**

The M-224 60mm Lightweight Mortar is a smooth bore, muzzle-loading weapon. It is fired by dropping a projectile into the firing tube. The high explosive round used in the M-224 has snap-off propellant segments, allowing the gunner to adjust the range by changing the amount of propellant, and a variable fuse, adjusted by rotating the fuse head. The fuse setting allows the projectile to burst before impact, on impact or after impact.



**M-29 (81 mm) Mortar**

The M-29 81mm mortar is a smooth-bore, muzzle-loaded, high-angle, indirect fire weapon. It consists of a barrel, sight, bipod, and base plate (its circular base plate allows for firing in any direction).



**M-252 (81 mm) Mortar**

The M-252 81mm Medium Extended Range Mortar is a medium weight mortar that is highly accurate and has a greater range (4,500 meters to 5,650 meters) and lethality than the previous 81mm mortar. The muzzle end has a short tapered lead-in that acts as a blast-reducing device. The breech end is finned for better cooling. This mortar uses the standard M-64 mortar sight of the 60mm mortar, M-224.



**M-30 (4.2 inch) Mortar**

The 4.2 inch M-30 mortar is a rifled muzzle-loading weapon designed for high-angle fire.

Rockets can shoot farther and use even larger warheads than cannons. The Army's main rocket weapon, the Multiple Launch Rocket System (MLRS) proved its effectiveness most recently in the Persian Gulf War.



**Multiple Launch Rocket System (MLRS)**

The Multiple Launch Rocket System (MLRS) is a free-flight artillery rocket system that delivers large volumes of firepower in a short time. The system is used to attack enemy artillery, materiel and personnel targets and suppress enemy air defenses. It consists of a launcher, two disposable pods, each containing six rockets or one missile, a fire control system, and an aiming device. The carrier is a derivative of the Bradley Fighting Vehicle.



**Tactical Missile System (TACMS)**

The Army TACMS missile system consists of a surface-to-surface guided missile with an anti-personnel/anti-materiel warhead. TACMS missiles are fired from a modified Multiple Launch Rocket System (MLRS) launcher.

### ***Air Defense Weapons***

Air Defense weapon systems, like their indirect fire counterparts, can be considered to be manpack/carried or self-propelled. The main classification, however, is determined by range.

A SHORAD (Short Range Air Defense) system is designed to provide air defense coverage in a small-but-critical area. The main weapon is the STINGER missile. It is fired from a shoulder-held launcher or a vehicle-mounted system called the AVENGER. STINGER crews in Armored and Mechanized Infantry units are equipped with an M2 Bradley, resulting in a Bradley Stinger Fighting Vehicle (BSFV).



**Stinger**

The Stinger is a shoulder-fired, "fire and forget" surface-to-air guided missile that enables the soldier or Marine to find, track and intercept low-altitude jets, propeller-driven fixed-wing aircraft or helicopters. This passive infrared missile system homes in on the heat emitted by those aircraft. Stinger features an ability to find and track its target rapidly, and to destroy aircraft attacking from any direction. A dual detector seeker allows the missile to override certain infrared countermeasures to evade detection. The missile is packaged within its disposable launch tube. It is delivered from the manufacturer ready to operate and requires no field testing or direct support maintenance.



**Avenger**

The Avenger is an air defense missile system consisting of a pedestal mounted "Stinger" missile battery that operates from a High Mobility Multi-purpose Wheeled Vehicle (HMMWV) chassis. The system consists of eight heat-seeking Stinger missiles in two quickly reloadable pods and a .50-caliber machine gun for self-defense. Avenger provides protection to rear echelon units and command posts against low-altitude and high-speed airplanes and helicopters.

HIMAD (High-to-Medium Air Defense) is the second classification. Another Gulf War familiar system (the PATRIOT) is the mainstay weapon in this category. A PATRIOT system has a series of tracking radar, command shelters, and missile launchers and can shoot-down enemy aircraft or missiles from great distances. Due to their large size and bulk, there are no manpack HIMAD systems.



**Patriot**

The Patriot is an air defense guided missile system designed to cope with an air threat which includes saturation, maneuver and electronic countermeasures by both aircraft and tactical ballistic missiles. The system uses a single multi-function phased array radar, Command and Track-Via-Missile guidance, and automated operations with capability for human override. A Patriot battery includes the engagement control station, radar, electric power plant, eight launchers and 64 missiles.

## **Rotary Wing Aircraft**

Rotary wing aircraft (helicopters) have three families:

1. Attack Helicopters
2. Observation and Reconnaissance
3. Utility and Cargo

Attack helicopters, like the AH-64 Apache and AH-1 Cobra, carry weapons like grenade launchers, automatic cannons, rockets, or anti-tank missiles. They escort troop carrying helicopters to battle, or directly attack the enemy.



**AH-1 Cobra**

The Cobra is a two-bladed, tandem-seat (front & back), attack helicopter powered by a single turbine engine. This weapon system performs anti-armor, air cavalry and armed reconnaissance roles and can attack point (individual) targets with its anti-armor and anti-helicopter capabilities. It also provides fire support and security missions. The mix of weaponry depends on the model. Cobras can be armed with TOW and Hellfire anti-armor missiles, Sidewinder anti-aircraft missiles, Sidearm anti-radar missiles, Hydra 70 rockets, 20mm (.80 caliber) cannon and a 7.62mm (.30 caliber) machine gun.



**AH-64 Apache**

The Apache is a state-of-the-art attack helicopter capable of defeating a wide range of targets, including all armored vehicles. This helicopter, which is capable of performing its mission at night and under adverse weather conditions, provides direct aerial fire as an integral element of ground units. Armed with laser-designated Hellfire missiles, 30mm cannon and Hydra 70 rockets, the Apache can direct highly mobile and effective firepower against the enemy. Its Target Acquisition Designation Sight (TADS) and Pilot Night Vision Sensor (PNVS) provide day and night laser designation of targets and infrared night vision for both the pilot and the copilot/gunner.

Observation and reconnaissance helicopters are designed to find enemy forces, track them, and direct artillery fire on them or guide attacks to the enemy location. These helicopters are armed with anti-air missiles and can engage enemy attack helicopters or jets in combat situations. They also carry two Hellfire anti-tank missiles which can be used to defeat enemy armor.



**OH-58D Kiowa Warrior**

The Kiowa is a two-seat, single engine, four-bladed main rotor, scout helicopter with a low-light television, a thermal imaging system and a laser range finder/designator incorporated into a mast-mounted sight. The helicopter, when armed, is used in aerial reconnaissance, aerial security, target acquisition, command and control, defensive air combat and multipurpose light helicopter contingency operations.

Utility and Cargo helicopters are basically flying trucks designed to rapidly transport (“lift”) troops, equipment, and supplies. They can be modified for special missions.



**UH-1 Huey**

The UH-1 (Huey) is the oldest member of the helicopter fleet (the first one was delivered in 1958) in the Department of Defense inventory. The Huey transports troops and equipment into combat and flies combat resupply, aeromedical evacuation and command and control missions. It has a crew of three, two pilots and a crew chief, and can transport a 3,000 pound (1,350 kg) payload, eight combat troops or a 4,000 pound (1,800 kg) sling load. In the Marine Corps, the Huey provides utility combat helicopter support to the landing force commander during ship-to-shore movement.



**UH-60 Blackhawk**

The Army's UH-60L Black Hawk (and the versions of the other services) is a twin-engine, medium lift helicopter. It is used for troop transport, cargo lift, anti-submarine warfare, search and rescue, drug interdiction, anti-ship warfare and special operations. Each variation is equipped for the specific needs of its service. For example, the Navy's SH-60B Seahawk is an airborne platform for a weapon system that deploys sonobuoys (sonic detectors) and torpedoes in an antisubmarine role. Some versions, such as the Air Force's MH-60G Pave Hawk and the Coast Guard's HH-60J Jayhawk, are equipped with a rescue hoist with a 250 foot (75 meter) cable that has a 600 pound (270 kg) lift capability, and a retractable in-flight refueling probe. The Army's UH-60L Black Hawk can carry 11 soldiers or 2,600 pounds (1,170 kg) of cargo or sling load 9,000 pounds (4,050 kg) of cargo.



**CH-47 Chinook**

The CH-47 Chinook is a twin-engine, tandem rotor, cargo helicopter. This helicopter's primary missions are movement of ammunition, repair parts, petroleum and tactical movement of artillery, troops, and special weapons on the battlefield.

## Support Vehicles

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All units will have support vehicles designed to help move bulk food, fuel, ammunition, special equipment, or entire troop units. Tracked support vehicles will normally be found in mechanized units, while wheeled vehicles will be found in all units.



**Heavy Expanded Mobility Tactical Truck (HEMTT)**



**M-977 Cargo**



**M-978 Fueler**



**M983 Tractor**



**M984 Wrecker**

The Heavy Expanded Mobility Tactical Truck (HEMTT) provides transport capabilities for re-supply of combat vehicles and weapons systems. There are five basic configurations of the HEMTT series trucks: M977 cargo truck with Material Handling Crane (MHC), M978 2500 gallon fuel tanker, M984 wrecker, M983 tractor and M985 cargo truck with MHC. A self-recovery winch is also available on certain models. This vehicle family is rapidly deployable and is designed to operate in any climatic condition where military operations are expected to occur.



### **Family of Medium Tactical Vehicles (FMTV)**

The MTV consists of two weight classes of vehicles and trailers, Light Medium Tactical Vehicles (LMTV) 2.5 Ton, Medium Tactical Vehicles (MTV) 5 Ton, Light Medium Tactical Vehicle Trailers (LMTVT) and Medium Tactical Vehicle Trailer (MTVT). There are 4 model configurations of the LMTV and 11 model configurations of the MTV. Several models in both weight classes are designed for Low Velocity Air Droppable (LVAD) operations for rapid deployability into remote areas.



### **M-939A2 5-Ton Truck**

The M-939A2 tactical truck is a five-ton capacity, six-wheel drive cargo truck used for transportation of all types of supplies. The M-939 series comes in six body styles: cargo, dump, wrecker, van and long wheel base cargo. Its central tire inflation system enables the crew to increase or decrease the air pressure in the tires to improve mobility on or off roads. It can tow 21,000 pounds.

Additionally, many vehicle types are modified to fill many different roles. The HMMWV and M113 both of which have command, medical, and armed variants.



### **High Mobility Multi-Purpose Wheeled Vehicle (HMMWV)**

In the 1980s, the HMMWV replaced the famed Jeep as the Army's basic utility vehicle. Generally, it is the workhorse of the wheeled vehicle fleet. It is used as a weapons carrier to tow light howitzers or carry mortars. Variants of the "Humvee" are also used as ambulances, military police tactical vehicles and for battlefield reconnaissance. The HMMWV has a cargo capacity of 1 to 2 tons, depending on the configuration. It is a highly mobile tactical vehicle with a common chassis for various configurations, including: Cargo/troop carrier, armament carrier, TOW missile carrier, ambulance, and shelter carrier.

Support vehicles fill many roles. Often a tracked vehicle will have a wheeled counterpart. Tracked command posts (M577) carry radios and maps like wheeled HMMWVs. Earth-moving equipment is tracked (M9 Armored Combat Earthmover--ACE) or wheeled (like a roadgrader).



**M577A3 Command Post Carrier**

The M577A3 Tracked Command Post Carriers are full-tracked lightweight vehicles used as an operational staff office and command post. The vehicle is C130 air transportable, however it is not air droppable. Additional materiel changes, outside of the A3 RISE Block Modifications, could also be applied to the M577. PM-M113's intention is to block the materiel changes as funding becomes available.



**M-9 ACE**

The M-9 Armored Combat Earthmover is an amphibious, fully tracked vehicle used to prepare firing positions for artillery, tanks and other weapon systems. It is equipped with an aluminum structure, which protects against small arms fire and artillery fragments. It has two smoke grenade launchers for its own protection and also provides chemical-biological protection for the operator. It features an 8.7 cubic yard scraper bowl and bulldozer blade. The hydro-pneumatic suspension allows the front of the vehicle to be raised, lowered or tilted to permit dozing, excavating, rough grading and ditching. It has a two-speed winch with a 25,000 pound pull.



**M-88 Recovery Vehicle**

The M-88A1 is an armor-protected recovery vehicle used to tow, winch, and lift disabled armored combat vehicles. The system is most effective in recovering vehicles of 60 tons (54 metric tons) or less. In addition to towing, the M-88A1 mounts a winch that can pull up to 45 tons (40.5 metric tons), and a boom capable of lifting up to 25 tons (22.5 metric tons). It is also used to support critical maintenance operations such as engine replacement of vehicles undergoing battlefield maintenance.

Recovery and repair tow trucks have a tracked cousin, the M88 Armored Recovery Vehicle, in tank units. Ambulances are also dual-natured, with a HMMWV or M113 both hauling and treating combat patients.

## **Support Equipment**

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In addition to support vehicles, units will have a multitude of support equipment.

Radios, trailers (for cargo and water), bridge-building sets, tool kits, repair equipment, computers, forklifts, barges, and life-saving medical equipment are only a start to the massive list.

In short, the Army is designed to deploy to and operate from a place that has no established infrastructure (roads, rails, ports, telephones, etc.) and conduct combat operations while sustaining itself indefinitely.