

Chapter 3

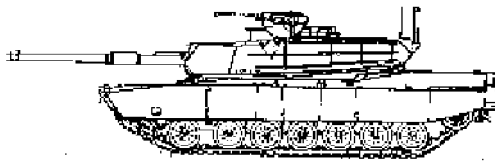
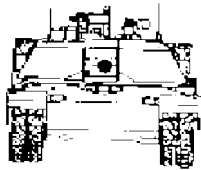
MAGTF Antiarmor Weapons and Techniques

The MAGTF possesses a vast array of weapons systems with anti armor capabilities. While later chapters will address the proper integration of these weapons systems in a combined arms role, it is imperative that the reader understand the capabilities and limitations of each weapon system against a tank or other types of armored vehicles. Since improvement of weapon capabilities and armor is ongoing and information is often classified, the reader should consult the unit S-2 for timely updates on this subject matter.

Section I. Antiarmor Weapons Systems

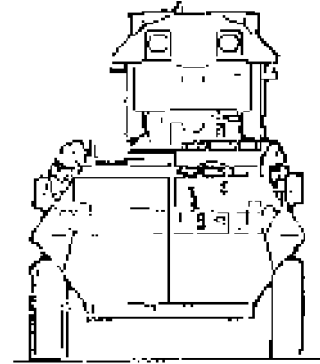
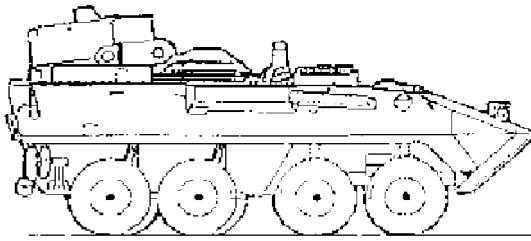
3101. Weapons Systems

The M1A1 main battle tank is powered by a gas turbine engine rated at 1,500 hp, with a 23.8 hp/ton ratio. This MBT has a maximum speed of 42 mi/h and a cruising range of 275 miles. The M1A1 has a laser range finder, optical day sight, and a thermal imaging night sight. With the fording kit, it is capable of moving in water at turret roof depth. The M1A1 fires only Sabot (kinetic energy round) and the high explosive antitank (HEAT) (high explosive [HE] shaped charge), and the Multi-purpose Anti-Tank (MPAT) which is an air/ground fused version of the HEAT round.



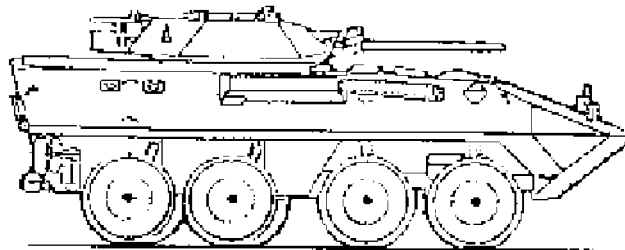
Crew	4
Weight	67.59 tons
Armament	120mm smoothbore tank gun MER for HEAT, APFSDS, and MPAT range 4000m .50 cal M2 MG tank commanders Maximum effective range 1830 m 7.62 mm Coax MG and 7.62 mm Coax MG Maximum effective range 900 m
Basic Load	44 rounds main gun

Figure 3-1. M1A1 Tank.



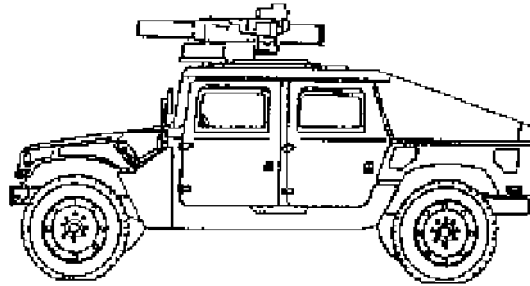
Crew	4
Weight	12.6 tons
Armament	TOW ATGM launcher, MER 3,750 m
Basic Load	12 TOW missiles
	(2 ready, 10 stowed)
Top Speed	60+ mi/h

Figure 3-2. LAV AT.



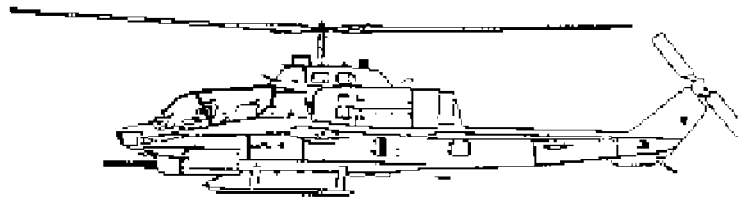
Crew	4
Weight	12.2 tons
Armament	25 mm M242 chain gun
	Maximum effective range 2,000 m (approx.)
	2-M240 7.62 mm MG coax and
pintle-mounted	Maximum effective range 900 m
Top Speed	60+ mph

Figure 3-3. LAV 25.



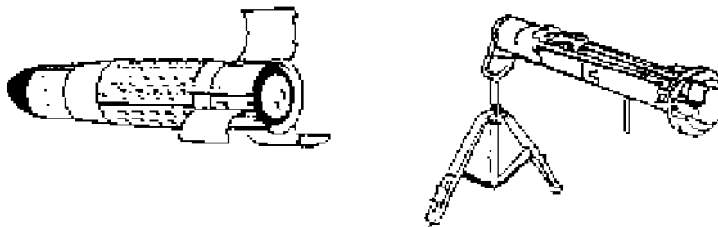
TOW Section, Antiarmor Plt, Wpns. Co, Inf Bn
8 Tms x 3 Marines + Sec Ldr = 25 Marines
Crew 3
Weight 8,194 lb. w/equipment and crew (vehicle mounted)
Max Eff Rng 203 lb. ground mounted on tripod
 3,750 m/21.5sec. time of flight
Types TOW2A (conventional direct attack profile)
 TOW2B (top-down attack profile)
Basic Load 6 TOW missiles
Note TOW gunners normally require approximately 150 to 300 m of missile flight to gain control of the missile.

Figure 3-4. M220E4 TOW (HMMWV)



Armament TOW or Hellfire (laser designated)
 Maximum range TOW 3,750 m/21.5 sec. time of flight
 Hellfire excess of 5,000 m
Basic Load 8 TOW or 8 Hellfire (combination of 4 TOW/4 Hellfire)

Figure 3-5. AH-1W COBRA Attack Helicopter.

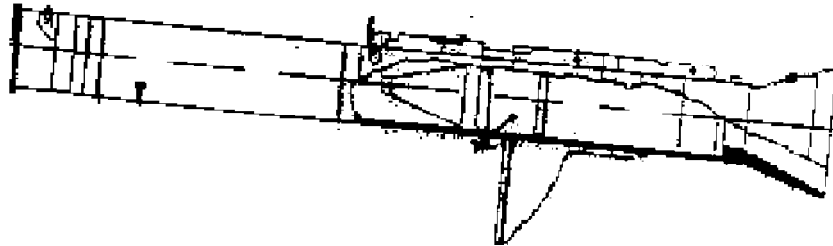


Dragon Sec, Anti-Armor Plt, Wpns Co, Inf Bn
12 tms x 2 Marines = 24 systems of day and night trackers
Team 2
Weight 33.91 lb (round with day tracker)
 48.7 lb (round with night tracker)
Max Rng 1,100 m/11sec (100 m per sec)

Note: Fire & Forget weapon system. Selectable for top-down or direct attack profile. Will defeat any main battle tank w/ reactive armor.

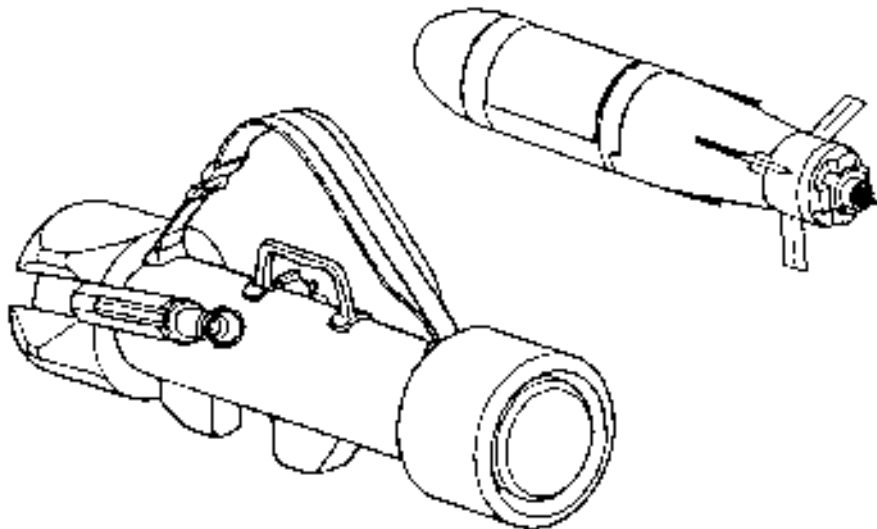
The JAVELIN is the replacement for DRAGON (M47) missile system.

Figure 3-8. FGM-148 JAVELIN Advanced Antitank Weapon System - Medium (AAWS-M).



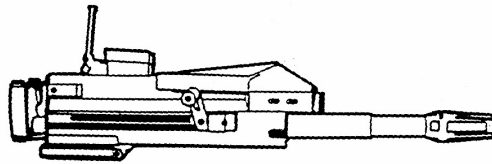
Team	Any Marine regardless of MOS
Weight	14.6 lb
Warhead	84 mm HEAT
MER	50% P _h /P _k 300 m stationary 250 m moving (approx.)

Figure 3-9. AT4.



Team	Any Marine regardless of MOS
Weight	19 lbs.
Warhead	explosively formed penetrator
MER	80%P _h 17-600m (stationary) 200m (moving)
Note:	Fire & Forget weapon system, inertial reference autopilot guidance

Figure 3-10. PREDATOR Short Range Antitank Weapon (SRAW).



Team	2
Weight	140.6 lb (tripod mounted)
MER	2,212m (area)
	1,500m (point)
Warhead	40 mm HEDP grenade

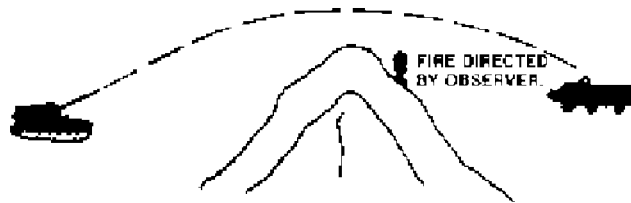
The MK-19 MG is mounted on the AAV, HMMWV, and ground-mounted on a tripod.

Figure 3-11. MK-19 Machine Gun



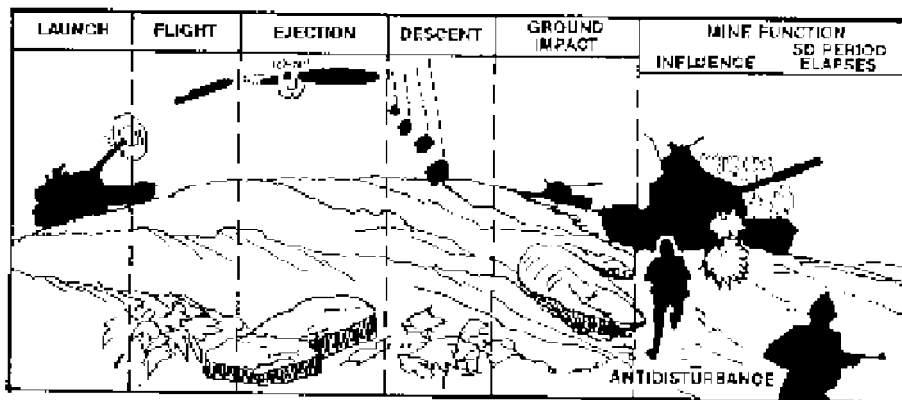
Crew/Team	1-4 (cupola, ring mount, or tripod)
Weight	129 lb (total)
	60 lb (receiver group)
	24 lb (barrel)
	44 lb (tripod)
Max Eff Rng	1,830 m
Grazing Fire	700 m
Tracer burnout	2,200 m

Figure 3-12. M-2 Browning Machine Gun (Caliber .50 HB).



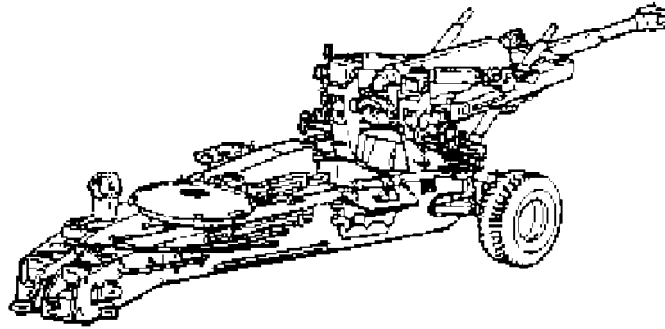
The Copperhead is a 155 mm cannon launched, antitank, laser-guided projectile. It has a maximum range of 16,800 m and a minimum range of 3,000 m. It must be terminally guided by the modular universal laser equipment (MULE) laser designator.

Figure 3-13. Copperhead.



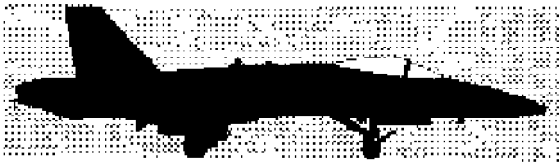
Family of scatterable mines (FASCAM) is an artillery delivered munition. RAAMS projectiles are 155 mm and contain nine anti armor mines with self-destruct times of less than and greater than 24 hours. The GATOR (CBU 78/B) is an air-delivered mine. The GATOR consists of 60 submunitions -- 15 anti armor and 45 antipersonnel.

Figure 3-14. Family of Scatterable Mines.



The M483A1 dual-purpose improved conventional munitions (DPICM) round is fired from the M-198, with a range of 17,500 m. This round contains antipersonnel, antimaterial, dual-purpose grenades. A shaped charge jet is expelled downward through the body of the grenade, while the rest of the grenade bursts into a large number of small fragments, expelled outward with high velocity. The jet is capable of penetrating approximately 2.75 inches of homogenous armor plate. Each projectile contains 88 shaped-charge grenades. When DPICM is not available, the artillery has the capability to degrade armored force capabilities. Fired in high concentrations, HE (PD) and (VT) fired in close proximity to armored vehicles can achieve mobility kills by damaging road wheels, suspensions, and tread. Additionally, these rounds can damage externally mounted target acquisition devices and optics, strip off radio antennae, and puncture fording kits and external fuel tanks.

Figure 3-15. Dual-Purpose Improved Conventional Munitions 155 M-198



The F/A-18 is an all-weather, strike fighter capable of both intercept/destruction of enemy aircraft and close air support (CAS). Armament includes a 20 mm gun, bombs, and an array of air-to-air and ground attack missiles and rockets.

Figure 3-16. F/A-18C/D Hornet.



The AV-8B is a vertical/short takeoff and landing (V/STOL) fighter that provides CAS. Armament includes a 25 mm gun, and various missiles, bombs, and rockets.

Figure 3-17. AV-8B Harrier, Harrier II, and Super Harrier II Plus.



The EA-6B's mission is to assist the operation of friendly aircraft by suppressing and degrading enemy defense systems through the jamming of enemy electronic signals or destruction of air defense systems through the use of High-Speed Anti-Radiation Missile (HARM). It's role is to assist in the suppression of enemy air defense (SEAD) in, among other missions, the execution of anti-armor operations.

Figure 3-18. EA-6B Prowler.

For a detailed discussion of weapon capabilities and employment of artillery, naval surface fire support (NSFS), and air-delivered ordnance, refer to MCWP 3-16, *Tactics, Techniques, and Procedures for Fire Support Coordination*, MCWP 3-16.1, *Marine Artillery Support*, and MCWP 3-23.1 *Close Air Support*.

3102. Strength and Weaknesses of Antiarmor Weapons Systems

There is no single *best* weapons system for every situation. In order to maximize combat power, the MAGTF uses all available resources to best advantage. To do so, the MAGTF seeks to achieve the effects of combined arms. Combined arms is the full integration of combat arms in such a way that to counteract one, the enemy must become vulnerable to another. The choice of a single system or a mix of systems is mission, enemy, terrain, and weather, troops and support available, and time available (METT-T) dependent. For a detailed study of specific weapons system, the reader should refer to the appropriate MCWP or TM. The following general comments address different families of weapons systems from a technical perspective.

a. Tank. The tank is the best weapon within its maximum effective range to engage another tank from the front. The M1A1 tank's 120 mm gun is capable of penetrating the front slope of MBTs. The tank cannon is capable of a rapid rate of fire. A crew can acquire a target and fire 2 main gun rounds in 12 seconds. The tank is the most difficult antiarmor weapon to suppress with artillery fire. Its mobility and armor protection allows a more active defensive posture. The tank's M-2 MG can engage light armor.

The tanks structural weaknesses were previously discussed. Clearly, close terrain such as urban or woodland terrain, and the size of the tank contribute to its vulnerability. The tank--individually or concentrated--presents a lucrative target for air. The tank's heat signature makes it susceptible to thermal imagery sights. The tanks weight and width restrict tank positioning options and route planning more than any other ground anti armor weapon system.

b. ATGM. The TOW and Dragon possess high hit probability from the moment the gunner acquires control out to their maximum effective ranges. Both systems are man portable. The TOW is found equipped on the light armored vehicle (LAV), high mobility multipurpose wheeled vehicle (HMMWV), and the AH-IW helicopter. The TOW can be ground mounted on a tripod.

The gunner and the weapon are vulnerable to enemy fire, both direct and indirect, during target acquisition and tracking. Firing is marked by a distinctive signature. ATGMs have a slow rate of fire relative to tank cannons and relative to the speed of enemy armor in the assault. ATGM travel time to target is much slower than tank cannons, though the ability of tank crews to dodge

ATGMs is probably overrated. Vegetation, firing over water, and lack of armor protection severely restrict ATGMs that are ground or vehicle mounted. While the TOW is capable of defeating most tanks from the front, the Dragon is restricted to flank shots on heavier armored vehicles. ATGMs should be employed in a combined arms role to protect the gunners. Another words, gunners should not normally engage armored targets until direct and/or indirect suppressive fires are delivered on the enemy.

Javelin. The Javelin possesses an extremely high hit probability from launch out to its maximum range. The system is manportable and found in the Javelin Section of the Anti-Armor Platoon, Weapons Company, Infantry Battalion. The Javelin incorporates fire-and-forget technology in it's design which increases the survivability of crews by eliminating the tracking time required of the TOW and Dragon gunner. Many of the other limitations of wire-command linked ATGMs are no longer considerations with this system. The Javelin allows the gunner to select either a convention direct attack mode (if a target in beneath overhead cover) or a top-down attack mode which allows the gunner to engage the least armored portion of threat vehicles. This dramatic increase over the capabilities of the Dragon, significantly enhances the MAGTF's medium range defense against an armored or mechanized threat.

c. LAV 25/ LAV AT. The LAV vehicle is exceedingly fast but is lightly armored. Its security role in the defense requires speed and a *limited capability* to engage enemy armor. The TOW capabilities have already been discussed. The 25 mm gum is capable of destroying light armor, particularly from the flank. Both variants are helicopter transportable, however range that the vehicle can be lifted depends on variables such as combat loaded weight of the vehicle, ambient weather conditions, and LZ elevations. Both systems are fired with the gunner inside the vehicle, allowing for marginal protection from air burst artillery and small arms.

d. Light Antiarmor Weapons. The AT-4 is a shoulder-launched light anti armor weapon designed to defeat modern threat MBTs from the flank and rear in close-in fighting at ranges less than 300 meters. As a munition, the AT-4 is lightweight and easy to carry. The rocket with shaped charge warhead may not be effective against all explosive reactive armor.

PREDATOR is a lightweight, manportable system with a fly-over, top-down down attack profile similar to the TOW-IIB and Javelin. The top-down attack profile takes advantage of the vulnerable upper surfaces of armored vehicles and tanks. The warhead of this munition uses an explosively formed penetrator that is lethal against all current MBTs including those with explosive reactive armor. This fire-and-forget system exposes the firer for the briefest possible time between ranges of 17 and 600 meters.

The MK-153 Shoulder Launched Multipurpose Weapon (SMAW) is an 83mm portable antiarmor rocket launcher. It's primary role is to destroy bunkers and other fortifications. The Hight Explosive Dual Purpose (HEDP) round is effective against bunkers, masonry, concrete walls, and light armor. The High Explosive Anti-Armor (HEAA) rocket is effective against lightly armored vehicles and tanks without additional armor.

Range limitations and tracking of a moving target present difficulties to all LAW systems, resulting in the firer being well within the range of enemy weapons systems when using all three of these systems.

e. Machine Guns. The MK-19 and the M-2 .50 cal MG are not primary armor defeating weapons. However, these weapons can engage light armored vehicles from the flanks and may be used in concert with other primary armor defeating weapons to provide synergy to the ambush.

f. AH-1W Helicopter. This helicopter fires either the TOW or Hellfire (laser designated) missiles. AH-1Ws are most effective against tanks when using standoff weapons such as Hellfire (laser designated), using massed surprise fires, and when used in conjunction with ground forces to hinder enemy air defense capabilities. The TOW missile requires exposure to track the

missile to the target, potentially making the AH-1W vulnerable to ground fire. However, the AH-1W can effectively use terrain to provide cover and concealment within its battle position to reduce likelihood of detection. The missile angle of impact against tank armor make it a formidable tank killing system. Time on station is a limiting factor.

g. Fixed Wing Aircraft. Marine fixed-wing aircraft possess a variety of weapons systems and munitions capable of defeating enemy armor. However, vulnerability to ground weapons systems may require extensive SEAD fires, such as that delivered by the EA-6B's HARM system. While clearly capable of destroying individual armored vehicles once detected, the best use of fixed-wing aircraft is against unsuspecting armored columns or second echelon units not fully deployed for combat. Time on station is a limitation.

h. Artillery. The 155 mm M-198 fires Copperhead and DPICM projectiles. The Copperhead projectile is clearly capable of defeating enemy tanks, but requires laser designation. Additionally, the availability of the rounds may be limited. The DPICM rounds are most effective against light armor, not MBTs. DPICM's high dud rate should be considered if commanders plan on maneuvering through areas where it was employed. As with fixed-wing aircraft, a larger number of armor kills are likely against armored columns or second echelon units. Enemy counterbattery fire is a consideration when employing friendly artillery. Artillery in a direct fire role should only be used for self-protection.

Chapter 3

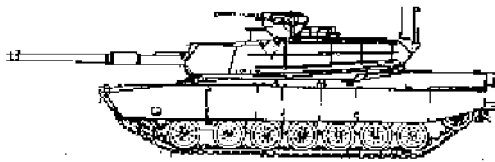
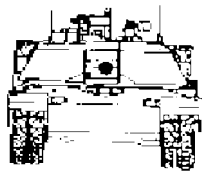
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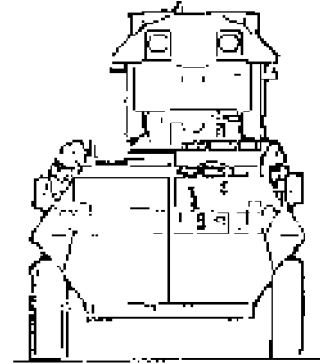
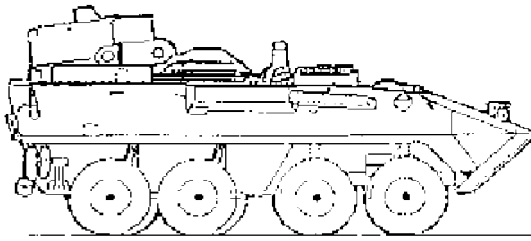
3101. Weapons Systems

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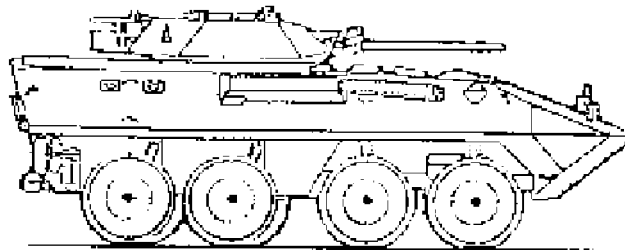
Crew	4
Weight	67.59 tons
Armament	120mm smoothbore tank gun MER for HEAT, APFSDS, and MPAT range 4000m .50 cal M2 MG tank commanders Maximum effective range 1830 m 7.62 mm Coax MG and 7.62 mm Coax MG Maximum effective range 900 m
Basic Load	44 rounds main gun

Figure 3-1. M1A1 Tank.



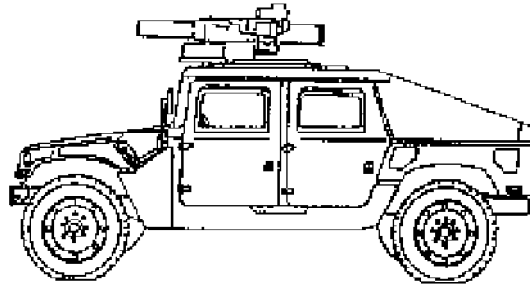
Crew	4
Weight	12.6 tons
Armament	TOW ATGM launcher, MER 3,750 m
Basic Load	12 TOW missiles
	(2 ready, 10 stowed)
Top Speed	60+ mi/h

Figure 3-2. LAV AT.



Crew	4
Weight	12.2 tons
Armament	25 mm M242 chain gun
	Maximum effective range 2,000 m (approx.)
	2-M240 7.62 mm MG coax and
pintle-mounted	Maximum effective range 900 m
Top Speed	60+ mph

Figure 3-3. LAV 25.



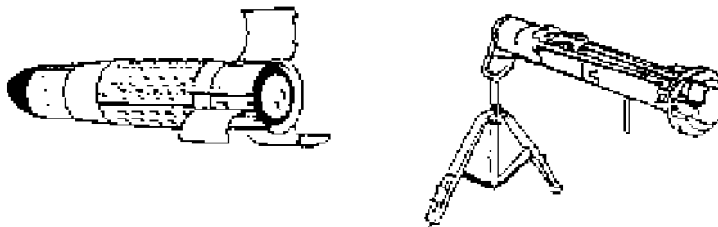
TOW Section, Antiarmor Plt, Wpns. Co, Inf Bn
8 Tms x 3 Marines + Sec Ldr = 25 Marines
Crew 3
Weight 8,194 lb. w/equipment and crew (vehicle mounted)
Max Eff Rng 203 lb. ground mounted on tripod
Types 3,750 m/21.5sec. time of flight
Basic Load TOW2A (conventional direct attack profile)
Note TOW2B (top-down attack profile)
to gain control of the missile. 6 TOW missiles
 TOW gunners normally require approximately 150 to 300 m of missile flight

Figure 3-4. M220E4 TOW (HMMWV)



Armament TOW or Hellfire (laser designated)
of flight Maximum range TOW 3,750 m/21.5 sec. time
 Hellfire excess of 5,000 m
Basic Load 8 TOW or 8 Hellfire (combination of 4
 TOW/4 Hellfire)

Figure 3-5. AH-1W COBRA Attack Helicopter.

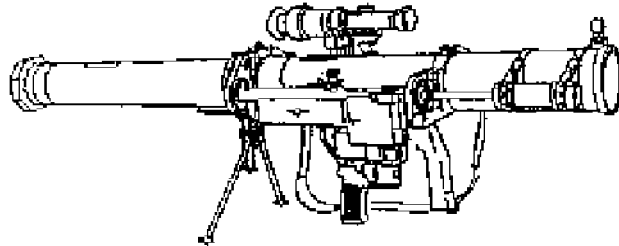


Dragon Sec, Anti-Armor Plt, Wpns Co, Inf Bn
12 tms x 2 Marines = 24 systems of day and night trackers
Team 2
Weight 33.91 lb (round with day tracker)
 48.7 lb (round with night tracker)
Max Rng 1,100 m/11sec (100 m per sec)

Note **Basic Load 2 missiles per tm**
 Dragon gunners will normally require approximately 200 m of missile flight to gain control of the missile.

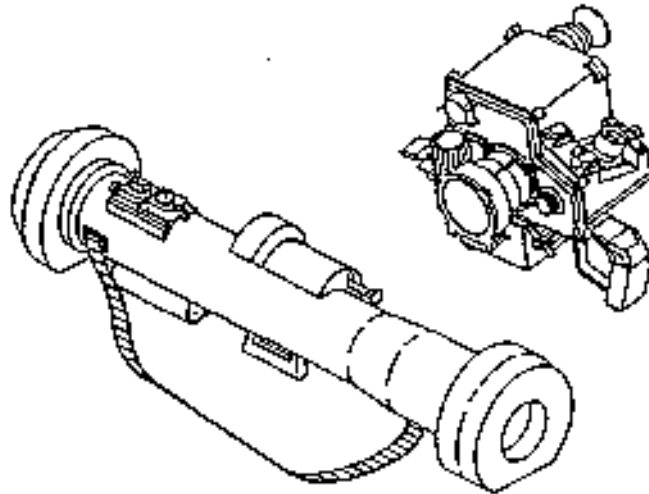
The Dragon is due for complete phase-out in favor of the JAVELIN (AAWS-M).

Figure 3-6. M47 Dragon.



Assault Sec, Wpns Plt, Rifle Co, Inf Bn
6 tms x 2 Marines + Sec Ldr = 13 Marines
Combat Eng Bn
2 tms x 2 Marines = 4 Marines
Team 2
Weight 29.20 lb
Warhead 83 mm High Explosive Dual Purpose (HEDP)
83 mm High Explosive Anti Armor (HEAA)
MER 250 m stationary (HEDP)
500m stationary (HEAA)
Basic Load 3 rockets per tm

Figure 3-7. Mk-153 Shoulder-Launched Multipurpose Assault Weapon (SMAW).

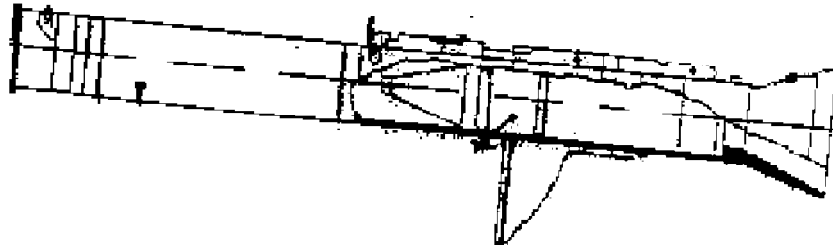


Javelin Sec, Anti-Armor Plt, Wpns Co, Inf Bn
8 tms x 2 Marines + Sec Ldr = 17 Marines
Team 2
Weight 49.5 lbs. (full system)
14.5 lb (command launch unit)
35 lb (Javelin round)
Warhead tandem shaped charge
Maximum Eff Rng 92% P_h, 90% P_k 2,000m. Can range 2,000m (+)
1,000m/4.6 sec TOF, 2,000m/14.5 sec TOF
Basic Load 2 missiles per tm

Note: Fire & Forget weapon system. Selectable for top-down or direct attack profile. Will defeat any main battle tank w/ reactive armor.

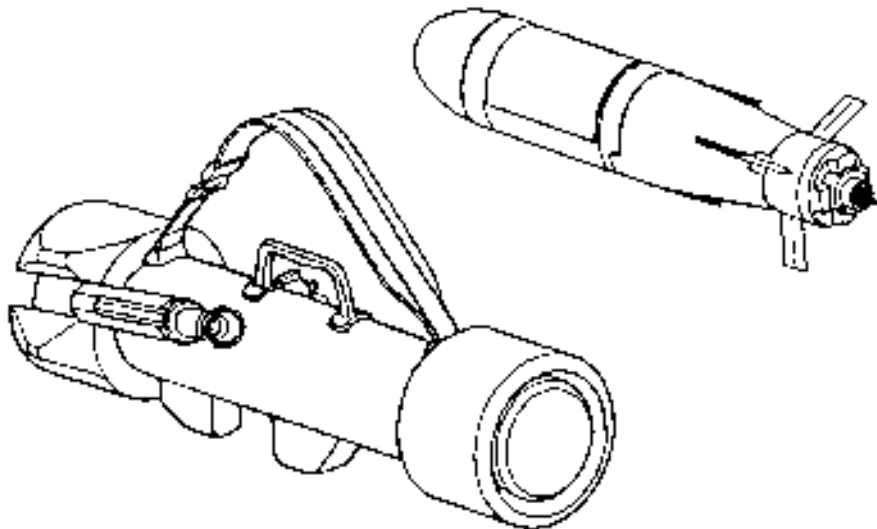
The JAVELIN is the replacement for DRAGON (M47) missile system.

Figure 3-8. FGM-148 JAVELIN Advanced Antitank Weapon System - Medium (AAWS-M).



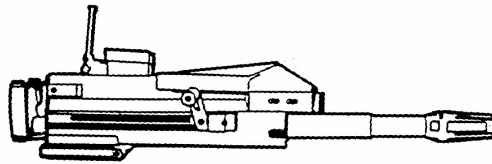
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Figure 3-9. AT4.



Team	Any Marine regardless of MOS
Weight	19 lbs.
Warhead	explosively formed penetrator
MER	80%P _h 17-600m (stationary) 200m (moving)
Note:	Fire & Forget weapon system, inertial reference autopilot guidance

Figure 3-10. PREDATOR Short Range Antitank Weapon (SRAW).



Team	2
Weight	140.6 lb (tripod mounted)
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	1,500m (point)
Warhead	40 mm HEDP grenade

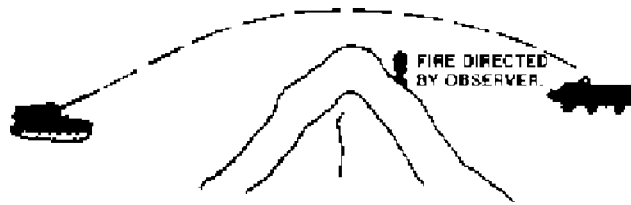
The MK-19 MG is mounted on the AAV, HMMWV, and ground-mounted on a tripod.

Figure 3-11. MK-19 Machine Gun



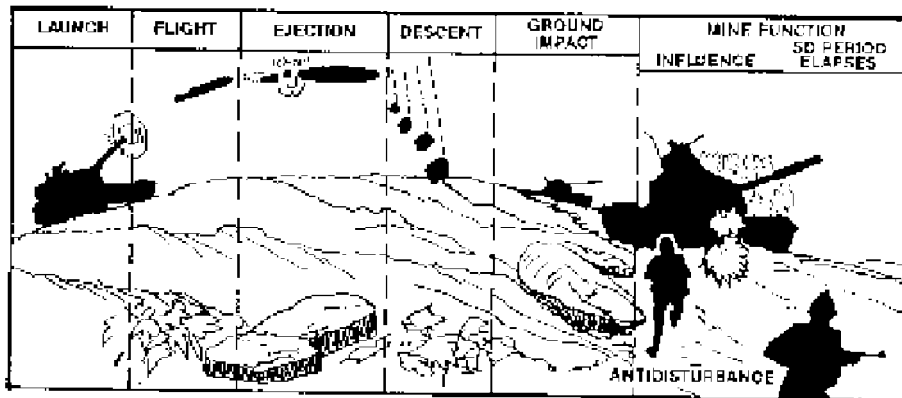
Crew/Team	1-4 (cupola, ring mount, or tripod)
Weight	129 lb (total) 60 lb (receiver group) 24 lb (barrel) 44 lb (tripod)
Max Eff Rng	1,830 m
Grazing Fire	700 m
Tracer burnout	2,200 m

Figure 3-12. M-2 Browning Machine Gun (Caliber .50 HB).



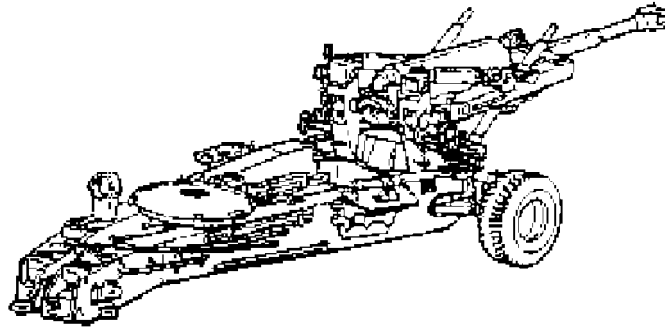
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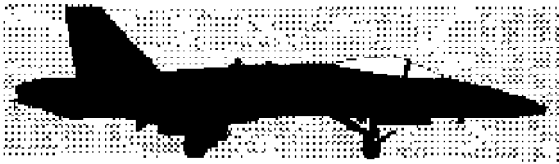
Family of scatterable mines (FASCAM) is an artillery delivered munition. RAAMS projectiles are 155 mm and contain nine anti armor mines with self-destruct times of less than and greater than 24 hours. The GATOR (CBU 78/B) is an air-delivered mine. The GATOR consists of 60 submunitions -- 15 anti armor and 45 antipersonnel.

Figure 3-14. Family of Scatterable Mines.



The M483A1 dual-purpose improved conventional munitions (DPICM) round is fired from the M-198, with a range of 17,500 m. This round contains antipersonnel, antimaterial, dual-purpose grenades. A shaped charge jet is expelled downward through the body of the grenade, while the rest of the grenade bursts into a large number of small fragments, expelled outward with high velocity. The jet is capable of penetrating approximately 2.75 inches of homogenous armor plate. Each projectile contains 88 shaped-charge grenades. When DPICM is not available, the artillery has the capability to degrade armored force capabilities. Fired in high concentrations, HE (PD) and (VT) fired in close proximity to armored vehicles can achieve mobility kills by damaging road wheels, suspensions, and tread. Additionally, these rounds can damage externally mounted target acquisition devices and optics, strip off radio antennae, and puncture fording kits and external fuel tanks.

Figure 3-15. Dual-Purpose Improved Conventional Munitions 155 M-198



The F/A-18 is an all-weather, strike fighter capable of both intercept/destruction of enemy aircraft and close air support (CAS). Armament includes a 20 mm gun, bombs, and an array of air-to-air and ground attack missiles and rockets.

Figure 3-16. F/A-18C/D Hornet.



The AV-8B is a vertical/short takeoff and landing (V/STOL) fighter that provides CAS. Armament includes a 25 mm gun, and various missiles, bombs, and rockets.

Figure 3-17. AV-8B Harrier, Harrier II, and Super Harrier II Plus.



The EA-6B's mission is to assist the operation of friendly aircraft by suppressing and degrading enemy defense systems through the jamming of enemy electronic signals or destruction of air defense systems through the use of High-Speed Anti-Radiation Missile (HARM). It's role is to assist in the suppression of enemy air defense (SEAD) in, among other missions, the execution of anti-armor operations.

Figure 3-18. EA-6B Prowler.

For a detailed discussion of weapon capabilities and employment of artillery, naval surface fire support (NSFS), and air-delivered ordnance, refer to MCWP 3-16, *Tactics, Techniques, and Procedures for Fire Support Coordination*, MCWP 3-16.1, *Marine Artillery Support*, and MCWP 3-23.1 *Close Air Support*.

3102. Strength and Weaknesses of Antiarmor Weapons Systems

There is no single *best* weapons system for every situation. In order to maximize combat power, the MAGTF uses all available resources to best advantage. To do so, the MAGTF seeks to achieve the effects of combined arms. Combined arms is the full integration of combat arms in such a way that to counteract one, the enemy must become vulnerable to another. The choice of a single system or a mix of systems is mission, enemy, terrain, and weather, troops and support available, and time available (METT-T) dependent. For a detailed study of specific weapons system, the reader should refer to the appropriate MCWP or TM. The following general comments address different families of weapons systems from a technical perspective.

a. Tank. The tank is the best weapon within its maximum effective range to engage another tank from the front. The M1A1 tank's 120 mm gun is capable of penetrating the front slope of MBTs. The tank cannon is capable of a rapid rate of fire. A crew can acquire a target and fire 2 main gun rounds in 12 seconds. The tank is the most difficult antiarmor weapon to suppress with artillery fire. Its mobility and armor protection allows a more active defensive posture. The tank's M-2 MG can engage light armor.

The tanks structural weaknesses were previously discussed. Clearly, close terrain such as urban or woodland terrain, and the size of the tank contribute to its vulnerability. The tank--individually or concentrated--presents a lucrative target for air. The tank's heat signature makes it susceptible to thermal imagery sights. The tanks weight and width restrict tank positioning options and route planning more than any other ground anti armor weapon system.

b. ATGM. The TOW and Dragon possess high hit probability from the moment the gunner acquires control out to their maximum effective ranges. Both systems are man portable. The TOW is found equipped on the light armored vehicle (LAV), high mobility multipurpose wheeled vehicle (HMMWV), and the AH-IW helicopter. The TOW can be ground mounted on a tripod.

The gunner and the weapon are vulnerable to enemy fire, both direct and indirect, during target acquisition and tracking. Firing is marked by a distinctive signature. ATGMs have a slow rate of fire relative to tank cannons and relative to the speed of enemy armor in the assault. ATGM travel time to target is much slower than tank cannons, though the ability of tank crews to dodge

ATGMs is probably overrated. Vegetation, firing over water, and lack of armor protection severely restrict ATGMs that are ground or vehicle mounted. While the TOW is capable of defeating most tanks from the front, the Dragon is restricted to flank shots on heavier armored vehicles. ATGMs should be employed in a combined arms role to protect the gunners. Another words, gunners should not normally engage armored targets until direct and/or indirect suppressive fires are delivered on the enemy.

Javelin. The Javelin possesses an extremely high hit probability from launch out to its maximum range. The system is manportable and found in the Javelin Section of the Anti-Armor Platoon, Weapons Company, Infantry Battalion. The Javelin incorporates fire-and-forget technology in it's design which increases the survivability of crews by eliminating the tracking time required of the TOW and Dragon gunner. Many of the other limitations of wire-command linked ATGMs are no longer considerations with this system. The Javelin allows the gunner to select either a convention direct attack mode (if a target in beneath overhead cover) or a top-down attack mode which allows the gunner to engage the least armored portion of threat vehicles. This dramatic increase over the capabilities of the Dragon, significantly enhances the MAGTF's medium range defense against an armored or mechanized threat.

c. LAV 25/ LAV AT. The LAV vehicle is exceedingly fast but is lightly armored. Its security role in the defense requires speed and a *limited capability* to engage enemy armor. The TOW capabilities have already been discussed. The 25 mm gum is capable of destroying light armor, particularly from the flank. Both variants are helicopter transportable, however range that the vehicle can be lifted depends on variables such as combat loaded weight of the vehicle, ambient weather conditions, and LZ elevations. Both systems are fired with the gunner inside the vehicle, allowing for marginal protection from air burst artillery and small arms.

d. Light Antiarmor Weapons. The AT-4 is a shoulder-launched light anti armor weapon designed to defeat modern threat MBTs from the flank and rear in close-in fighting at ranges less than 300 meters. As a munition, the AT-4 is lightweight and easy to carry. The rocket with shaped charge warhead may not be effective against all explosive reactive armor.

PREDATOR is a lightweight, manportable system with a fly-over, top-down down attack profile similar to the TOW-IIB and Javelin. The top-down attack profile takes advantage of the vulnerable upper surfaces of armored vehicles and tanks. The warhead of this munition uses an explosively formed penetrator that is lethal against all current MBTs including those with explosive reactive armor. This fire-and-forget system exposes the firer for the briefest possible time between ranges of 17 and 600 meters.

The MK-153 Shoulder Launched Multipurpose Weapon (SMAW) is an 83mm portable antiarmor rocket launcher. It's primary role is to destroy bunkers and other fortifications. The Hight Explosive Dual Purpose (HEDP) round is effective against bunkers, masonry, concrete walls, and light armor. The High Explosive Anti-Armor (HEAA) rocket is effective against lightly armored vehicles and tanks without additional armor.

Range limitations and tracking of a moving target present difficulties to all LAW systems, resulting in the firer being well within the range of enemy weapons systems when using all three of these systems.

e. Machine Guns. The MK-19 and the M-2 .50 cal MG are not primary armor defeating weapons. However, these weapons can engage light armored vehicles from the flanks and may be used in concert with other primary armor defeating weapons to provide synergy to the ambush.

f. AH-1W Helicopter. This helicopter fires either the TOW or Hellfire (laser designated) missiles. AH-1Ws are most effective against tanks when using standoff weapons such as Hellfire (laser designated), using massed surprise fires, and when used in conjunction with ground forces to hinder enemy air defense capabilities. The TOW missile requires exposure to track the

missile to the target, potentially making the AH-1W vulnerable to ground fire. However, the AH-1W can effectively use terrain to provide cover and concealment within its battle position to reduce likelihood of detection. The missile angle of impact against tank armor make it a formidable tank killing system. Time on station is a limiting factor.

g. Fixed Wing Aircraft. Marine fixed-wing aircraft possess a variety of weapons systems and munitions capable of defeating enemy armor. However, vulnerability to ground weapons systems may require extensive SEAD fires, such as that delivered by the EA-6B's HARM system. While clearly capable of destroying individual armored vehicles once detected, the best use of fixed-wing aircraft is against unsuspecting armored columns or second echelon units not fully deployed for combat. Time on station is a limitation.

h. Artillery. The 155 mm M-198 fires Copperhead and DPICM projectiles. The Copperhead projectile is clearly capable of defeating enemy tanks, but requires laser designation. Additionally, the availability of the rounds may be limited. The DPICM rounds are most effective against light armor, not MBTs. DPICM's high dud rate should be considered if commanders plan on maneuvering through areas where it was employed. As with fixed-wing aircraft, a larger number of armor kills are likely against armored columns or second echelon units. Enemy counterbattery fire is a consideration when employing friendly artillery. Artillery in a direct fire role should only be used for self-protection.