

CHAPTER 4

TACTICAL CONSIDERATIONS

This chapter discusses tactical considerations and limitations of Javelin employment during combat operations. To integrate the Javelin into tactics and techniques, the leadership from the company commander down to the squad leader must be familiar with field manuals (FM 7-5, FM 7-7, FM 7-7J, FM 7-8, or FM 7-10) appropriate to the organizations and to the organizational level. This chapter also discusses how to construct a Javelin fighting position, affording the gunner and assistant gunner/ammunition handler good cover and concealment while allowing for the best possible engagement of the enemy.

Section I. ROLE AND FUNDAMENTALS

The role of the Javelin is to destroy enemy armored vehicles out to 2,000 meters. The Javelin replaces the Dragon in selected Infantry, Armor, and Engineer units. Commanders may use the Javelin in various roles from supporting fire to conducting surveillance. Commanders must understand the Javelin's unique capabilities and limitations to enhance the units' combat power.

4-1. ROLE

The Javelin's primary role is to destroy enemy armored vehicles. When there is no armored vehicle threat, the Javelin can be employed in a secondary role of providing fire support against point targets such as bunkers and crew-served weapons positions. In addition, the Javelin CLU can be used alone as an aided vision device for reconnaissance, security operations, and surveillance. In mechanized Infantry units, when Bradley fighting vehicles (BFVs) are part of a combined-arms team with tanks, the Javelin becomes a secondary antiarmor weapons system. It supports the fires of tanks and TOWs, covers secondary armor avenues of approach, and provides observation posts with an antiarmor capability. The Javelin gunner should be able to engage up to three targets in 2 minutes making him very effective against any armor threat.

4-2. CAPABILITIES AND LIMITATIONS

The Javelin has some unique capabilities that provide the unit with an effective antiarmor weapon system. However, the commander should also understand the system's limitation in order to effectively employ this system.

a. Firepower.

(1) Capabilities.

- (a) The maximum effective range of the Javelin is 2,000 meters.
- (b) The Javelin has a fire and forget capability. The missile imaging infrared (I2R) system gives the missile the ability to guide itself to the target when launched by the gunner.
- (c) The Javelin has two missile flight paths:
 - Top attack flight path is designed to impact on the top of the target.
 - Direct attack flight path is designed to impact on the side (front, rear, flank) of the target.

- (d) The Javelin gunner is capable of firing up to three missiles within 2 minutes.
- (e) The dual-shaped charge warhead is capable of defeating any known enemy armor.
- (f) The NVS sees little degradation of the target image.
- (g) Countermeasures used by the enemy is countered by the NVS filter.

(2) **Limitations.**

- (a) The CLU sight cannot discriminate targets past 2,000 meters.
- (b) The NVS cool down time is from 2.5 to 3.5 minutes.
- (c) The seeker's cool-down time is about 10 seconds.
- (d) The BCU life, once activated, is about 4 minutes.
- (e) During limited visibility (natural or man-made), rain, snow, sleet, fog, haze, smoke, dust, and night are collectively referred to as limited visibility conditions. The day FOV can be rendered useless during these conditions.

(f) Night.

- The day FOV relies on daylight to provide the gunner a suitable target image.
- The NVS uses the infrared naturally emitted from objects. Infrared crossover is the time at dawn and dusk that the terrain and the target are close enough in temperature to cause the target to blend in with its surroundings.
- Natural clutter is when the sun heats objects to a close enough temperature that it causes the target to blend in with the surrounding terrain.
- Artificial clutter occurs when there are man-made objects that emit large amounts of infrared (for example, burning vehicles).
- Heavy fog reduces the capability of the gunner to detect and engage targets.

(g) The flight path of the missile is restricted in wooded, mountainous, and urban terrain.

(h) The gunner must have line of sight for the seeker to lock onto a target.

b. **Maneuver.**

(1) **Capabilities.**

- (a) The Javelin is man-portable.
- (b) The fire and forget capability allows the gunner to shoot and move before missile impact.

(c) The soft launch capability of the Javelin allows it to be fired from inside buildings and bunkers.

(d) The Javelin is maneuverable over short distances for the gunners.

(2) **Limitations.**

- (a) The weight of the Javelin makes maneuvering slow over long distances.
- (b) The Javelin round is bulky and restricts movement in heavily wooded or vegetative terrain.

c. **Protection.**

(1) **Capabilities.**

- (a) The passive infrared targeting system used to acquire lock-on cannot be detected.
- (b) The launch motor produces a small signature.
- (c) The fire and forget feature allows the gunner to take cover immediately after the missile is launched.

(2) **Limitations.**

- (a) The gunner must partially expose himself to engage the enemy.
- (b) The CLU requires a line-of-sight to acquire targets.

4-3. FUNDAMENTALS OF EMPLOYMENT

The Javelin is employed based on mission, enemy, terrain (and weather), troops, time available and civil considerations (METT-TC). The Javelin's increased range and lethality gives the commander a greater effect on the battlefield. By applying the following fundamentals of antiarmor employment, the gunner and his leaders increase the probability of destroying enemy targets and enhances the survivability of the Javelin gunner.

a. **Standoff.** The gunner strives to engage armored and mechanized infantry vehicles in the 1,000- to 2,000-meter range. The Javelin size and small-launch signature are not easily detected at these distances, and the maximum effective range of most machine guns is about 1,000 meters. Engagement at ranges of less than 1,000 meters exposes the gunner to enemy direct fire weapons and lessens his survivability on the battlefield. By engaging the enemy whenever possible out to 2,000 meters, the enemy armor threat is forced to break formation. Mechanized infantry vehicles are forced to take cover and dismount the infantry. The result is a change in momentum of the battle for both defensive and offensive operations.

b. **Mutual Support.** The Javelin provides mutual support for the other antiarmor assets and for each other. Mutual support is established by employing the Javelin in sections and by overlapping sectors of fire between Javelins.

(1) **Employing by Sections.** Employment of Javelins by section establishes mutual support between gunners. If one gunner has engaged and is displacing, the other gunner can continue to cover the assigned sector. To achieve this, the Javelins are positioned so that fires directed at one Javelin do not suppress the other Javelins (Figure 4-1).

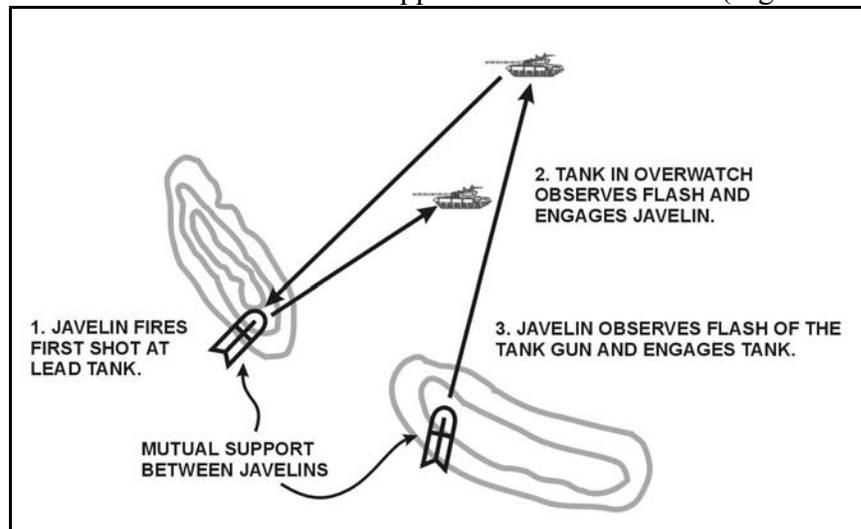


Figure 4-1. Mutual supporting fire.

(2) **Overlapping Sectors of Fire.** The gunners may overlap sectors of fire to maximize coverage (Figure 4-2). Overlapping sectors of fire are essential to mutual support.

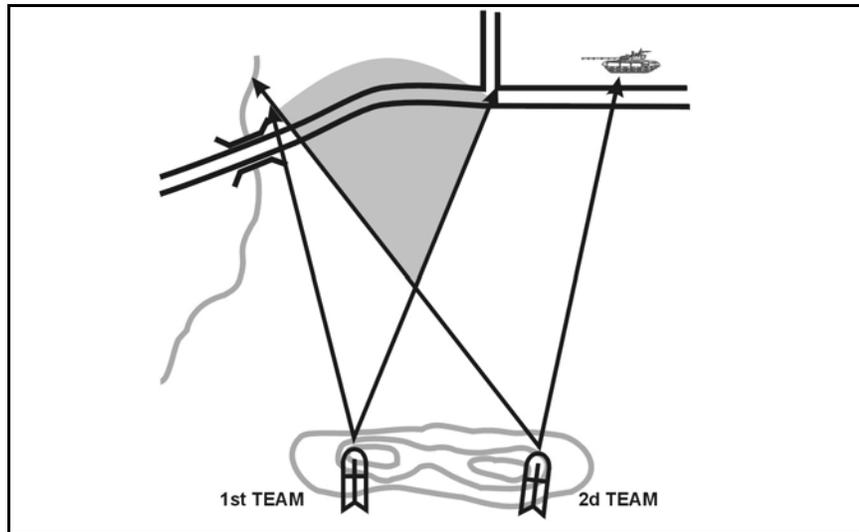


Figure 4-2. Overlapping sectors of fire.

c. **Security.** Antiarmor sections are vulnerable to attack by dismounted Infantry. To protect Javelin sections, position them near friendly Infantry units. The Infantry should be able to cover dismounted avenues of approach to the Javelin position.

d. **Flank Engagements.** The Javelin should be employed to engage enemy vehicles from the flank. Although the Javelin has the unique ability to use a top attack, the gunner should still seek to engage with flank shots.

e. **Cover and Concealment.** The Javelin gunners should use cover and concealment to increase their survivability. Cover is protection from the fire of enemy weapons and from enemy observation. It can be natural or man-made. Concealment is protection from enemy observation. Concealment includes not only camouflage but also light, noise, and movement discipline.

f. **Employ in Depth.** Javelin fire should be employed in depth. By employing the Javelins in depth in conjunction with integrated fires and obstacles, the commander prevents the enemy from easily engaging friendly antiarmor systems and slows and canalizes the enemy advance (Figure 4-3). This increases engagement times for all antiarmor systems and the probability of achieving a hit. Positions are selected to capitalize on the Javelin's 2,000-meter range.

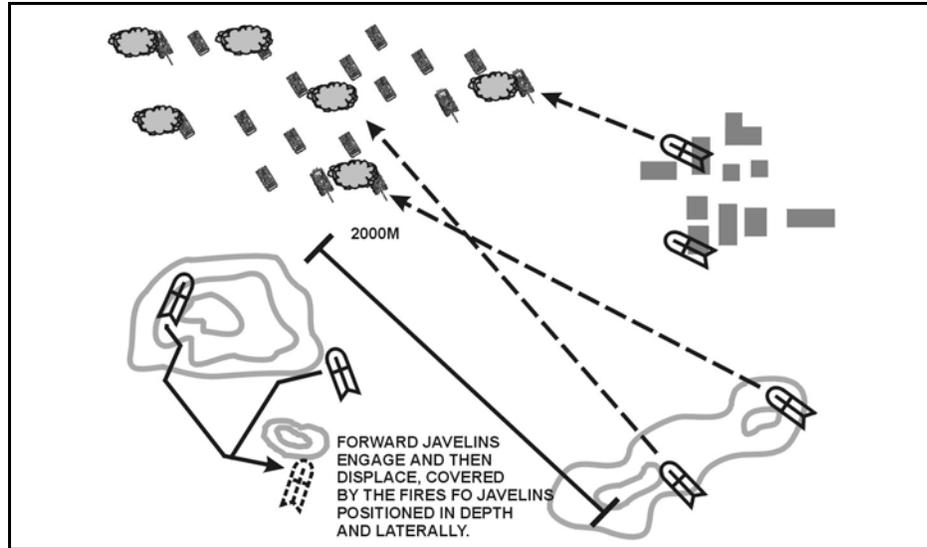


Figure 4-3. Javelins positioned in depth.

g. **Combined Arms.** Skillful integration of Infantry, Armor, Engineer, and indirect fire assets greatly improve the survivability and lethality of antiarmor units. The Javelin can be an integral antiarmor asset as part of the combined arms team.

Section II. DEFENSE

This section describes the Javelin in defensive operations, mechanized company defensive employment, defense in depth, and retrograde operations. The principle factors to consider when positioning the Javelin is gunner protection and optimizing the capabilities of the weapons system.

4-4. DEFENSIVE OPERATIONS

The Javelin is normally the antiarmor weapon system that supports a rifle squad or platoon. In some units these weapons are organic to the platoon. At times, the platoon may be supported by the TOW weapon system. During planning, the leader considers the enemy vehicle threat, then positions antiarmor weapons accordingly to cover armor avenues of approach. He also considers the fields of fire, tracking time, and minimum engagement distance of each weapon. The platoon leader selects a primary position and sector of fire for each antiarmor weapon. He also picks alternate and supplementary positions for them. Each position should allow flank fire and have cover and concealment. The leader should integrate the CLU into his limited visibility security and observation plan. If time permits, the gunner prepares range cards for his primary, alternate, and supplementary positions (Appendix B).

a. **Personnel Duties.** The tasks listed below must be performed to employ the Javelin in the defense successfully (Table 4-1).

TASKS TO BE PERFORMED	AA SECTION ----- SECTION SERGEANT	AA SECTION ----- TEAM LEADER	GUNNER/ ASSISTANT GUNNER (if assigned)
Integrate Javelin into the Platoon Tactical Plan: • Select general weapons positions. • Assign sectors of fires. • Coordinate mutual support. • Coordinate with adjacent units.	X X X X X		
Reconnoiter For, and Select, Tentative Javelin Firing Positions (Primary, Alternate, and Supplementary) and Routes Between Positions.	X		
Supervise Continual Preparation and Improvement of Positions.	X	X	
Coordinate Security for the Javelin Teams.	X		
Inspect the Selection of Tentative Firing Positions, Confirm or Make Adjustments.	X	X	
Supervise Preparation of Javelin Range Card.	X	X	
Control Movement of Gunners Between Positions.	X	X	
Issue Fire Commands to Gunners.	X	X	
Coordinate Resupply and Collection of Extra Rounds Carried in Platoon.	X		
Identify Enemy Avenues of Approach.	X		
Prepare Fighting Position (Primary, Alternate, Supplementary)		X	
Prepare Javelin Range Card.		X	X
Designate Target Reference Points.	X		
Prestock Javelin Rounds.		X	X
Prepare Round for Firing.			X
React to Fire Commands.			X
Engage Targets.			X

Table 4-1. Personnel duties.

b. **Gunner Placement.** The platoon leader selects the fighting position and assigns the sector of fire. Taking into consideration these simple rules will greatly improve the gunner's survivability.

(1) **Natural Cover and Concealment.** The gunner uses the terrain to his advantage for cover and concealment from enemy ground and aerial observation.

(2) **Flank or Rear Shots.** It is much more difficult for the enemy to retrace the flight path of a round to its launch site and orient their weapons on the Javelin firing position when the round moves obliquely across the enemy's front.

(3) **Mutually Supporting Positions.** Javelins should be placed in mutually supporting positions to ensure continuous coverage of the engagement area (Figure 4-1).

(4) **Integrate with Adjacent Units.** Javelin teams need to coordinate with adjacent units to ensure security.

(5) **Engage at Maximum Range.** The Javelin's 2,000-meter maximum range makes it difficult for the enemy to engage the Javelin with direct fire. This forces the enemy to deploy earlier than intended. Because of the Javelin's range, it may need to be placed at the flank or rear of the platoon positions.

c. **Positions.** The three types of Javelin positions include primary, alternate and supplementary (Figure 4-4).

(1) **Primary.** The primary position is one from which a gunner or team can cover the assigned sector of fire. It should have good observation, cover and concealment, and good fields of fire.

(2) **Alternate.** The alternate position is one from which a gunner or team can either move to the flank or slightly to the rear of the primary position. The gunner or team must be able to cover the same sector of fire as from the primary position. The gunner moves to the alternate position when the primary position can no longer be occupied. The decision to change positions is made by the leader.

(3) **Supplementary.** The supplementary position is one from which a gunner or team covers avenues of approach and any TRPs not covered by the primary and alternate positions. This position is usually close enough to the primary position to share mutual support with other positions. This position should also have good observation, cover and concealment, and good fields of fire.

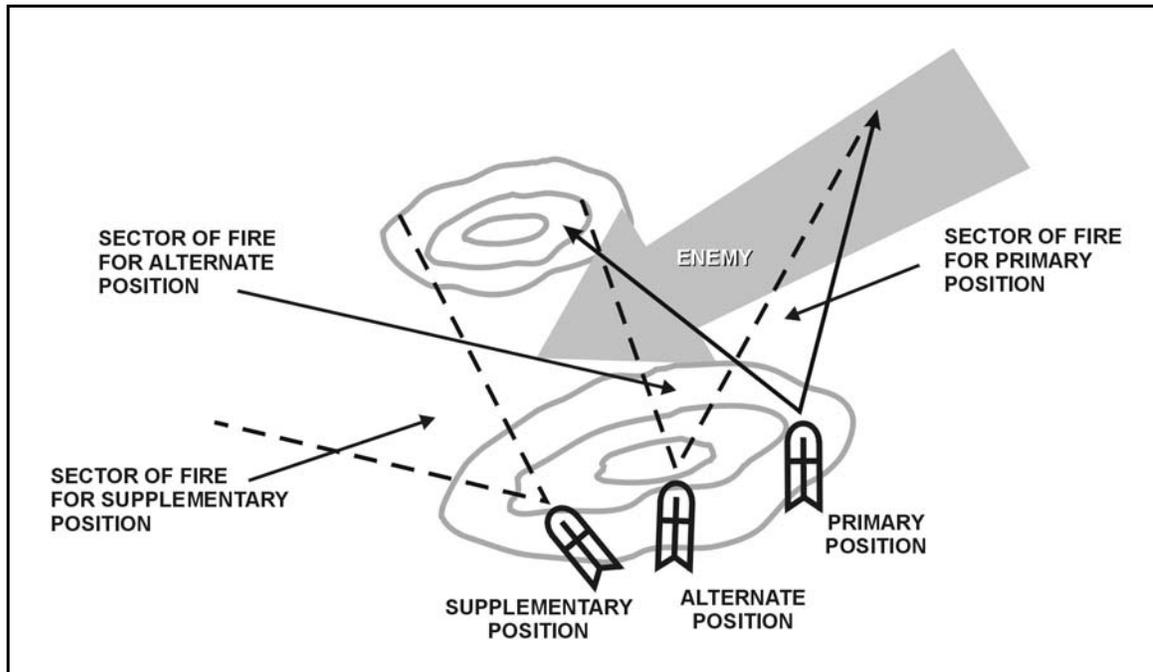


Figure 4-4. Primary, alternate, and supplementary positions.

4-5. MECHANIZED COMPANY DEFENSIVE EMPLOYMENT

Mechanized infantry companies (Heavy or Light) use the Javelin's range and lethality to complement the firepower of the BFV and Interim Brigade Combat Team (IBCT). This technique creates a much more effective engagement, especially when the company is fighting without tanks. Without the Javelin, BFV-IBCT equipped infantry units have difficulty defending when the enemy attacks with both tanks and Infantry fighting vehicles (IFV). If the commander focuses his BFV fires on the tanks, the IFVs are free to maneuver close enough to engage with their weapons, dismount their infantry, and begin the assault. If the commander focuses all his fires on the IFVs, he risks letting the enemy tanks get close enough to engage his BFVs. The Javelin gives the mechanized company commander the ability to focus effective fires on both tanks and IFVs throughout his engagement area and to destroy enemy IFVs before they can close to assault range (Figure 4-5).

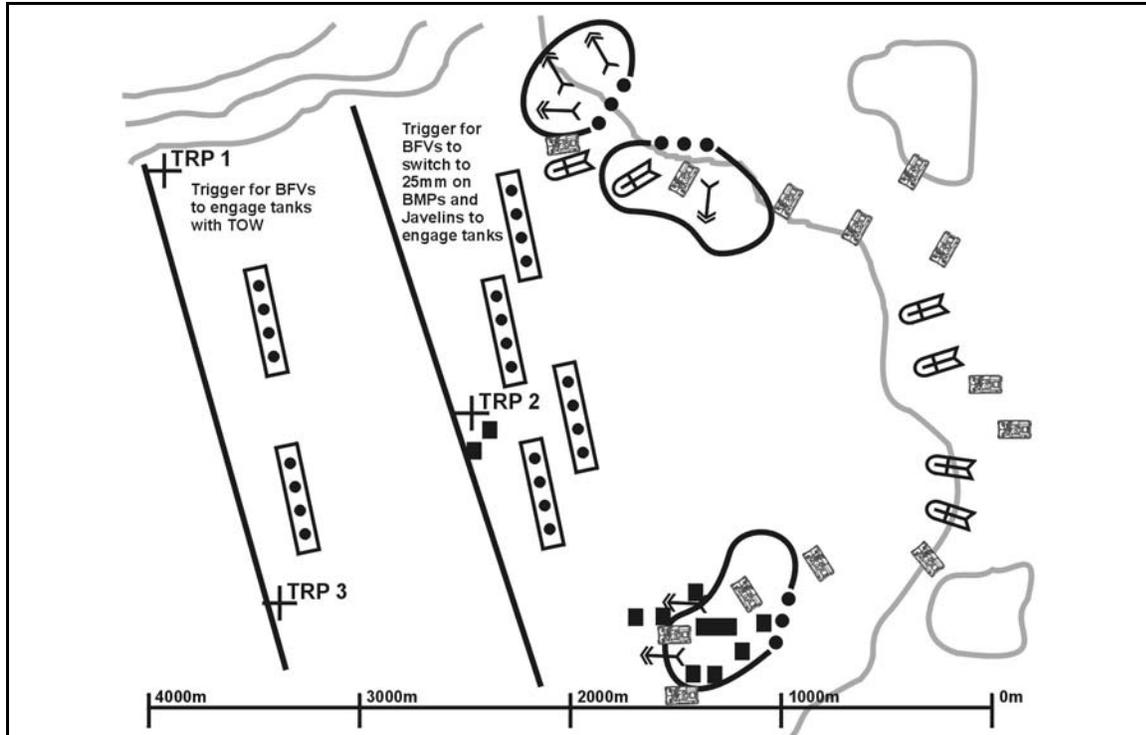


Figure 4-5. Javelin-equipped mechanized company defense.

4-6. DEFENSE IN DEPTH

In the defense, the Javelin team may participate as part of a screen. The Javelin team supports screen operations by assisting in:

- Maintaining continuous surveillance of avenues of approach using the CLU's night vision capability.
- Detecting enemy units and reporting their direction of movement.
- Destroying the pursuing enemy armored vehicles when forced to withdraw.
- Providing antiarmor fires to allow screening units to break contact and withdraw.

4-7. DELAYS AND WITHDRAWALS

Delays and withdrawals involve movement away from the enemy. Against an armored enemy, Javelins and other antiarmor weapons are often positioned so they can cover the movement of the entire force.

a. **Delay.** In a delay, the unit trades space for time without becoming decisively engaged, Javelin teams can be directed to set up antiarmor ambushes, to block avenues of approach, and to slow advancing armored vehicles.

b. **Withdrawal.** In a withdrawal, Javelin teams often overwatch and protect the force as it withdraws.

(1) **Withdrawal Under Enemy Pressure.** Enemy pressure makes withdrawing more difficult than it would be otherwise (Figure 4-6). The platoon must employ fire and maneuver to fight its way away from the enemy. To ensure continuous antiarmor coverage, both covering and maneuvering elements must have Javelins.

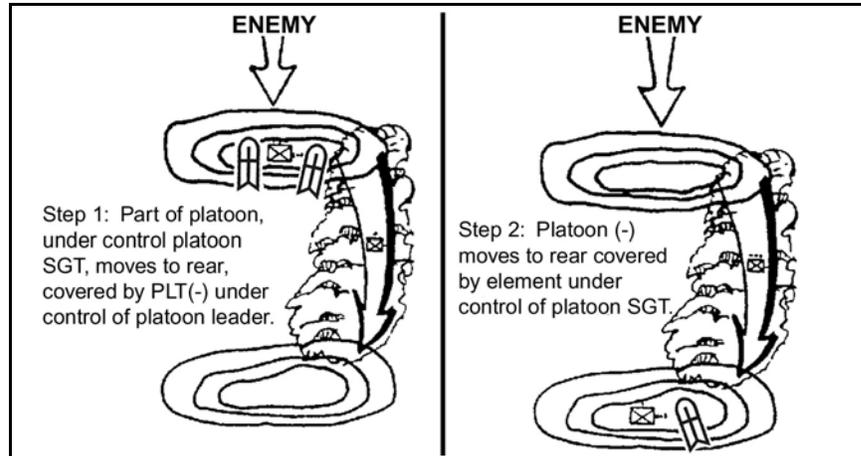


Figure 4-6. Withdrawal under enemy pressure.

(2) **Withdrawal Not Under Enemy Pressure.** The company can withdraw with speed, secrecy and deception (Figure 4-7). Withdrawal is most effective during the hours of darkness or under limited visibility conditions. Withdrawal is usually conducted in mass. When required, the company leaves a security force to cover a withdrawal by deception and maneuver. The antiarmor section can be split with a portion of the Javelin gunners assigned to the security force and the remainder with the main body.

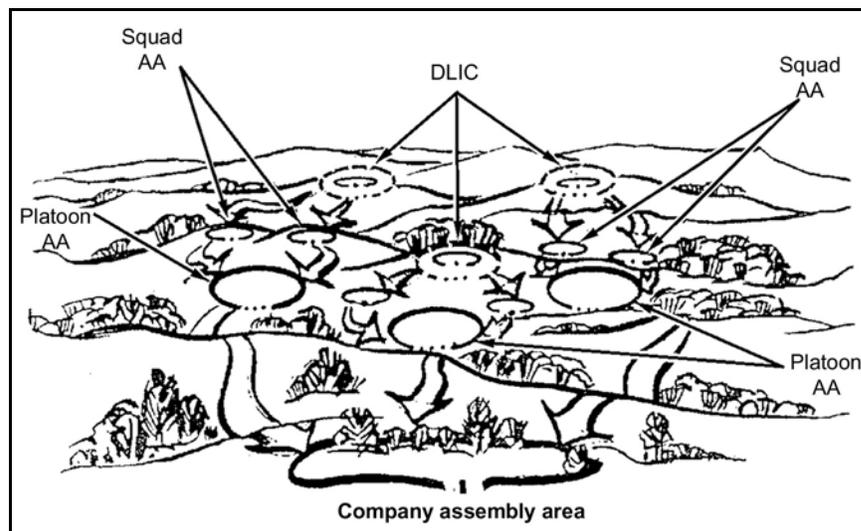


Figure 4-7. Withdrawal not under pressure.

Section III. FIGHTING POSITIONS

This section describes the different fighting positions the gunner uses. The gunner may use a hasty fighting position or a deliberate fighting position.

4-8. HASTY FIGHTING POSITION

A hasty position (Figure 4-8) is prepared when there is little or no time to prepare fighting positions. The gunner positions himself behind whatever cover is available. He digs out the position to use for quick emplacement of the weapons system. The gunner selects a position that allows him to observe and fire around the side of an object and not over the top while covering a sector of fire. The gunner looks for a location that affords him (and his assistant gunner, if assigned): cover, concealment, clear field of view, clear overhead path for the missile, and a clear backblast area.

a. The gunner digs out an area about 1 to 1-1/2 M16A2s wide by 1-1/2 M16A2s long and 1 Kevlar helmet deep. In most areas, it is not necessary to dig a backblast area because the two-stage motor provides a soft launch capability with a small backblast. The gunner looks behind his position for debris and clears it. The dirt removed during digging is placed to the front of the position to provide cover for the gunner.

NOTE: If assigned an M4-series weapon, add 7 inches to the dimensions on the position.

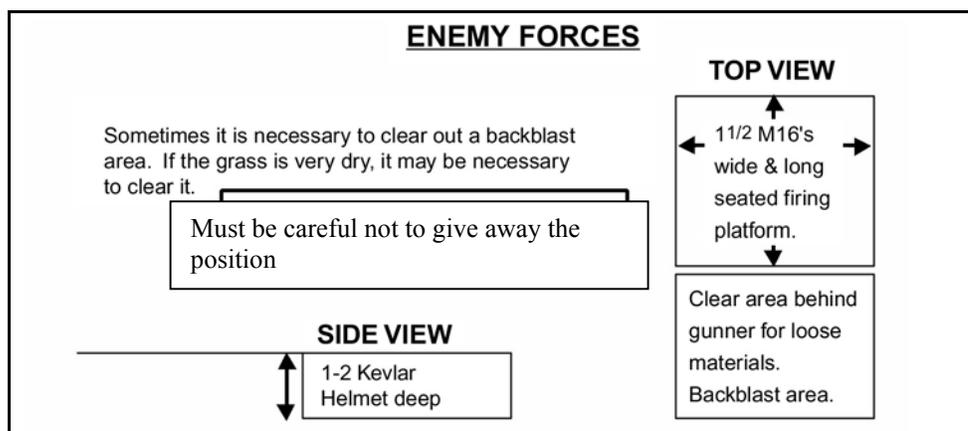


Figure 4-8. A hasty fighting position.

b. The hasty fighting position is constructed for expansion to afford the gunner and the assistant gunner/ammunition handler, if assigned, cover and concealment. This fighting position is based on the gunner firing from the sitting position, which is the preferred firing position. This position affords the gunner a low silhouette, and a steady and comfortable position while maintaining the ability to engage targets in his sector (Figure 4-9).

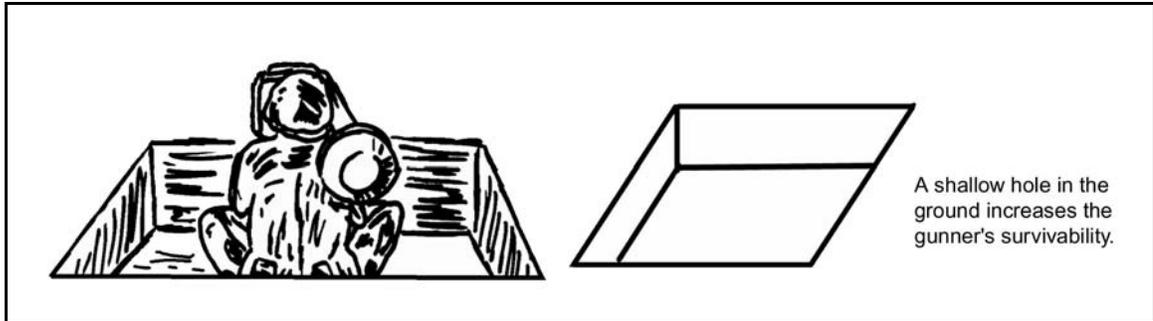


Figure 4-9. Hasty fighting position.

d. The gunner continues to improve the fighting position. The position expands to include cover and concealment for the assistant gunner/ammunition handler, if assigned. Once the fighting position begins to expand, then it becomes a *firing platform for the deliberate fighting position* (Figures 4-10 and 4-11).

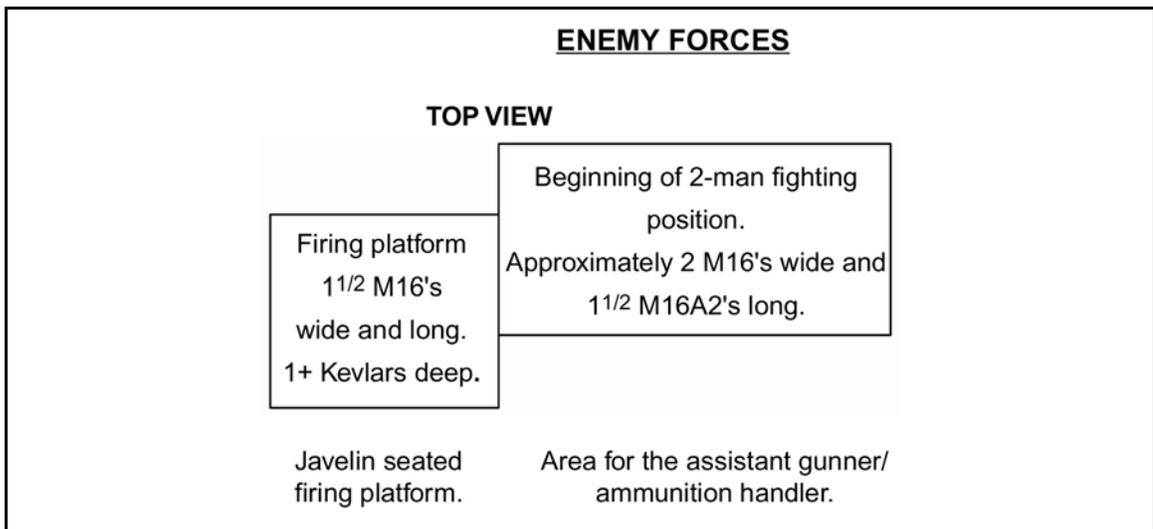


Figure 4-10. Improved hasty fighting position.

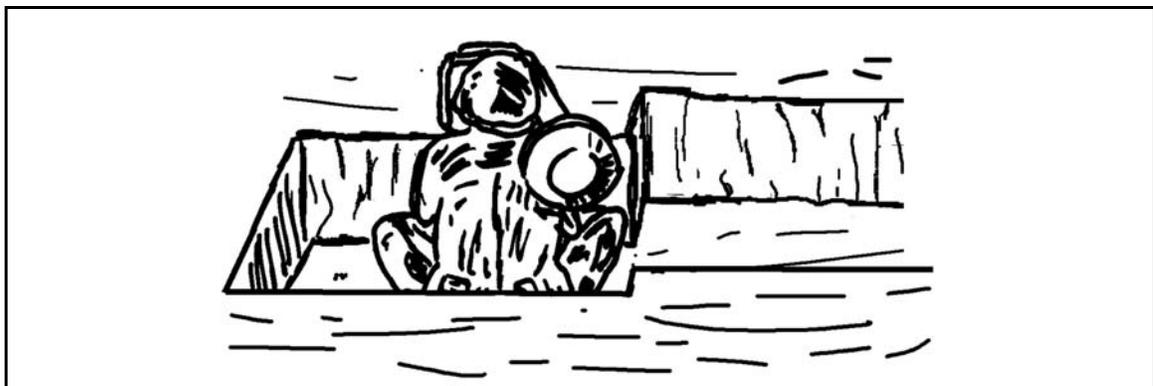


Figure 4-11. Expanded hasty fighting position (gunner sitting on the Javelin firing platform).

e. The gunner now has an expanded hasty fighting position that offers the minimum amount of cover and concealment to the gunner and the assistant gunner/ammunition handler, if assigned. This position is considered the basic fighting position for the Javelin.

4-9. DELIBERATE FIGHTING POSITION

The construction of a deliberate fighting position takes more time. The gunner constructs a two-man fighting position with the Javelin firing platform added to one or both sides, depending on the expected battle situation.

a. **Constructing the Fighting Position.** The gunner constructs the deliberate fighting position in the following sequence:

- (1) Trace the outline of the fighting position on the ground.
- (2) Check fields of fire. Get down on hands and knees and observe the sector. Make sure the sector is seen well enough to engage the enemy. If not, check for alternate positions and inform the squad leader.
- (3) Place the Javelin in operation.
- (4) Clear the field of fire, both overhead and ground, while ensuring the sector is under observation.
- (5) Mark the outline for a complete fighting position on the ground.
- (6) Dig the primary (left side) Javelin seated firing platform. Dig down about one Kevlar helmet deep by one and a half M16A2s wide and one M16A2 long. Use the dirt for the parapets.
- (7) Move into the primary firing platform and cover the sector when METT-TC dictates.
 - (a) Build a parapet to the front and flanks of the position.
 - (b) Camouflage the front of the position. If possible, move out in front of the fighting position about 35 meters. Observe how well the camouflage is working. Camouflage maintenance is a continuous process. Ensure the position continues to blend into the background.
 - (c) Dig the standing area of the deliberate fighting position wider than the standard two-man fighting position making room for the Javelin round and the gunner's equipment.
 - (d) Decide if the secondary sitting firing platform is needed, then dig it. Use the dirt to build the right side parapet.
 - (e) Improve the position by adding overhead cover. The overhead cover should not restrict the gunner from firing the Javelin. The overhead should not cover the firing platform. This allows the missile to exit the LTA without obstruction.
 - (f) Improve the position by adding a storage/protective area. The size of this area depends on the space needed for equipment.
 - (g) Continue improvements as long as the position is occupied.
 - (h) Check the camouflage and replace them as necessary.
 - (i) Position camouflage nets, if used, so they do not hang in the backblast area. If any portion of the net is in the backblast area, it will damage the net and could collapse on the position when the missile is launched.
- (8) The overall area needed for constructing a Javelin fighting position is about 3 feet (front to rear) by 5 feet (side by side) M16A2s. This includes the space required to

construct the front, sides, and back parapets. The depth of the fighting position depends on the height of the shortest soldier occupying the position.

(9) The standing area is about two M16A2s wide (from side-to-side) and about one and a half M16A2 rifles long (from front-to-rear) (Figure 4-12).

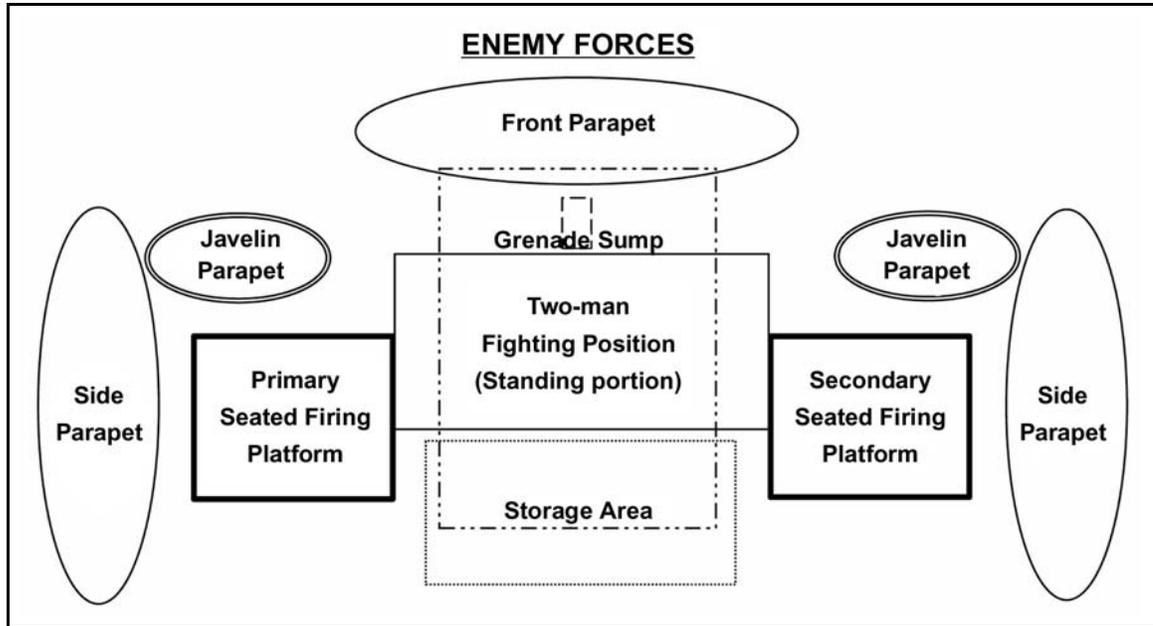


Figure 4-12. Deliberate fighting position.

LEGEND

- Javelin seated firing platform (1-1/2 M16A2s wide by 1 M16A2s long).
- Two-man fighting position (2 M16A2s wide by 1-1/2 M16A2s long).
- Parapet (minimum of 18 inches between you and the enemy and as high as necessary).
- ⋯ Overhead cover (1-1/2 M16A2s wide by 1-1/2 to 2 M16A2s long) capable of supporting at least 18 inches of dirt.
- ⋯ Storage area (depends on amount of equipment to be stored, to include extra Javelin rounds).
- ⋯ Grenade sump (1 entrenching tool in diameter and the length of the entrenching tool deep).
- Backblast berm is about 1 Kevlar helmet thick and 18 inches high. The berm deflects the hot gases and debris up and out. This reduces the amount of clearing required.
- ▤ Javelin parapet, sand bags if available, should be used.

NOTE: If assigned an M4-series weapon, add 7 inches to the dimensions on the position.

b. **Views.** The three views of Javelin fighting positions are illustrated in Figure 4-13 but refer to legend above.

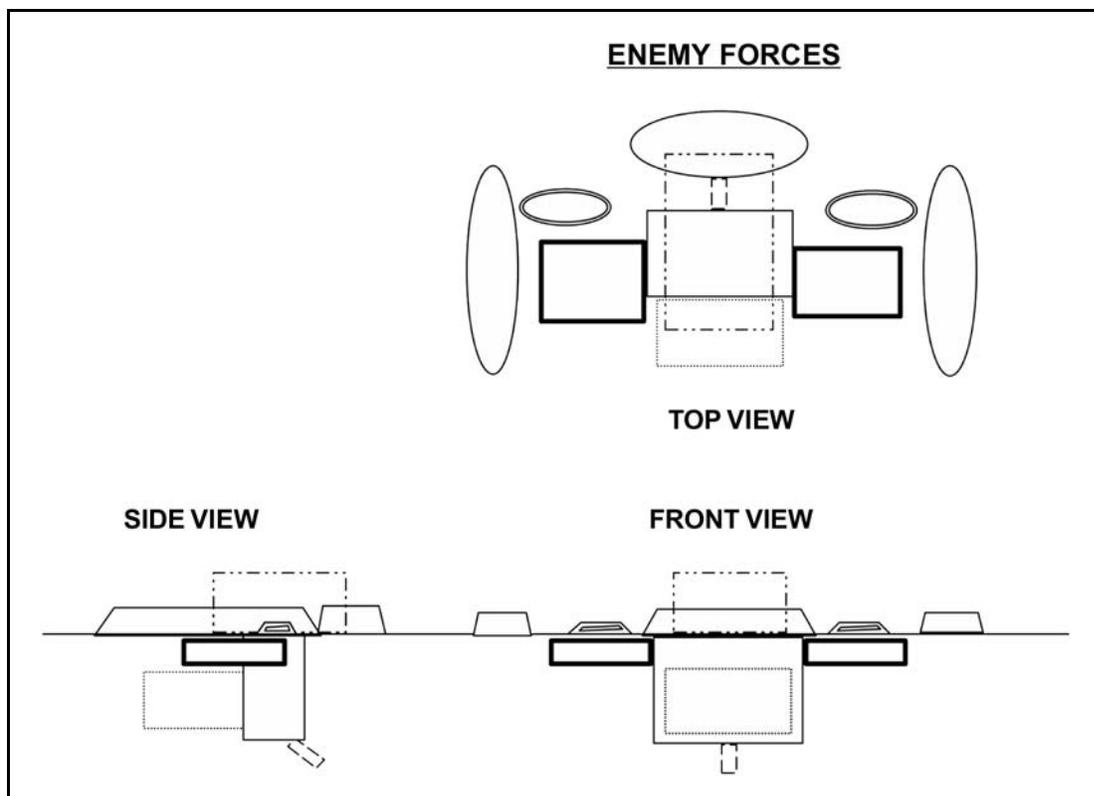


Figure 4-13. Completed deliberate fighting position.

c. **Built-up Javelin Fighting Position.** In a defensive position, with the help of the engineers and an abundant supply of Class IV materials, it is possible to construct a bunker-style fighting position. This position requires a lot of time and material.

(1) **Front View** (Figures 4-14 and 4-15). The front of the Javelin defensive fighting position provides considerable protection from small arms and indirect fire. However, the gunner is limited in his ability to engage targets.

(a) When this type position is constructed, it is imperative to examine the front of the position and consider how well the position blends into the background.

(b) When using vegetation, replace it when it begins to die. How long the vegetation remains green depends on the temperature. After the gunner has scanned the sector for any signs of the enemy, the assistant gunner/ammunition handler, if assigned, approaches the front of the position to check its concealment and makes the required improvements, then returns. The gunner continues surveillance until the assistant gunner/ammunition handler, if assigned, has returned to his position.



Figure 4-14. Sketch of the front view of a Javelin defensive fighting position.

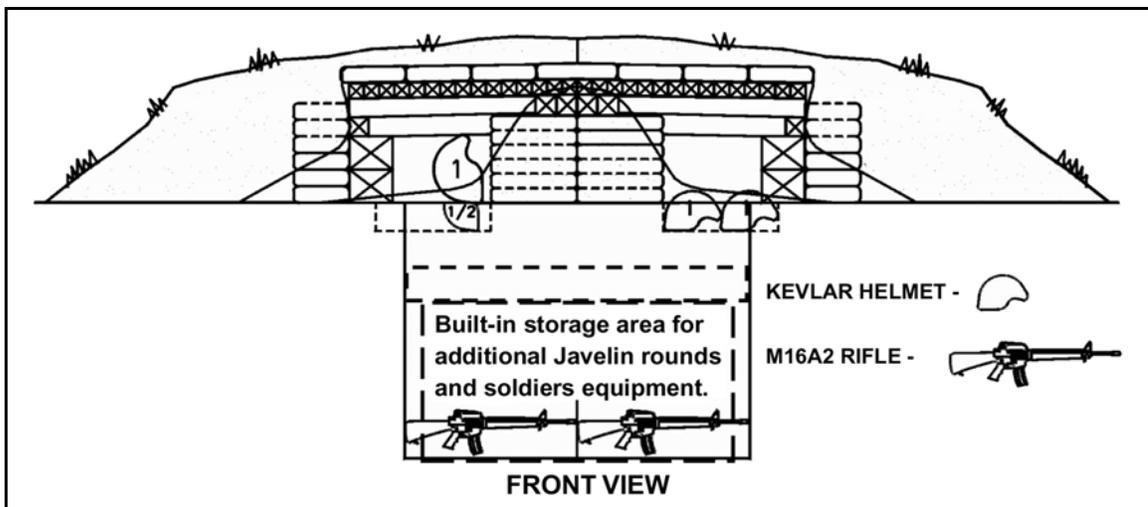


Figure 4-15. Front view of a Javelin defensive fighting position.

(2) *Side View*. Figure 4-16, page 4-16, shows the side view of the Javelin defensive fighting position.

NOTE: If assigned an M4-series weapon, add 7 inches to the dimensions on the position.

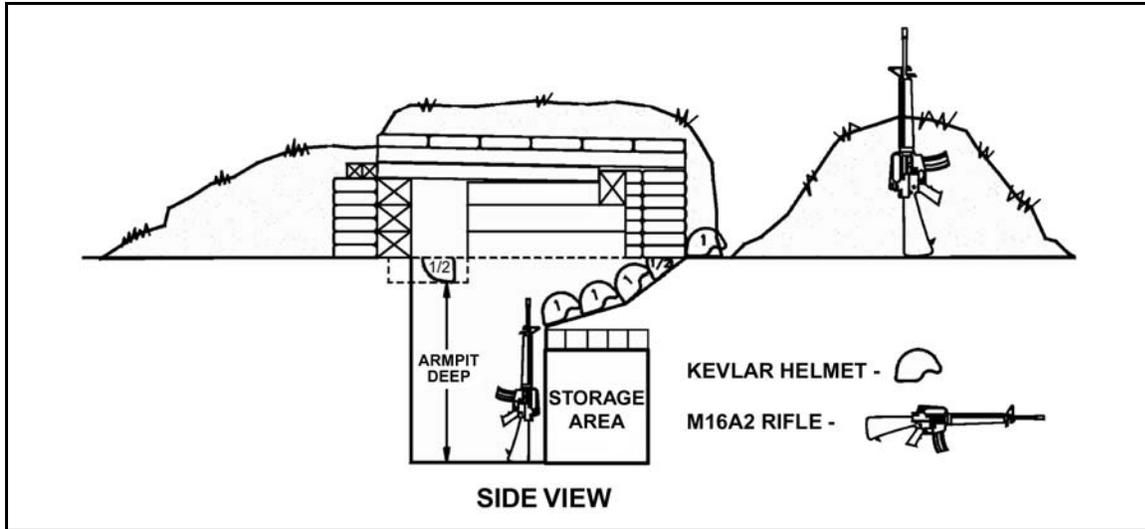


Figure 4-16. Side view of a Javelin defensive fighting position.

(3) *Top View.* Figure 4-17 shows the top view of a Javelin defensive fighting position.

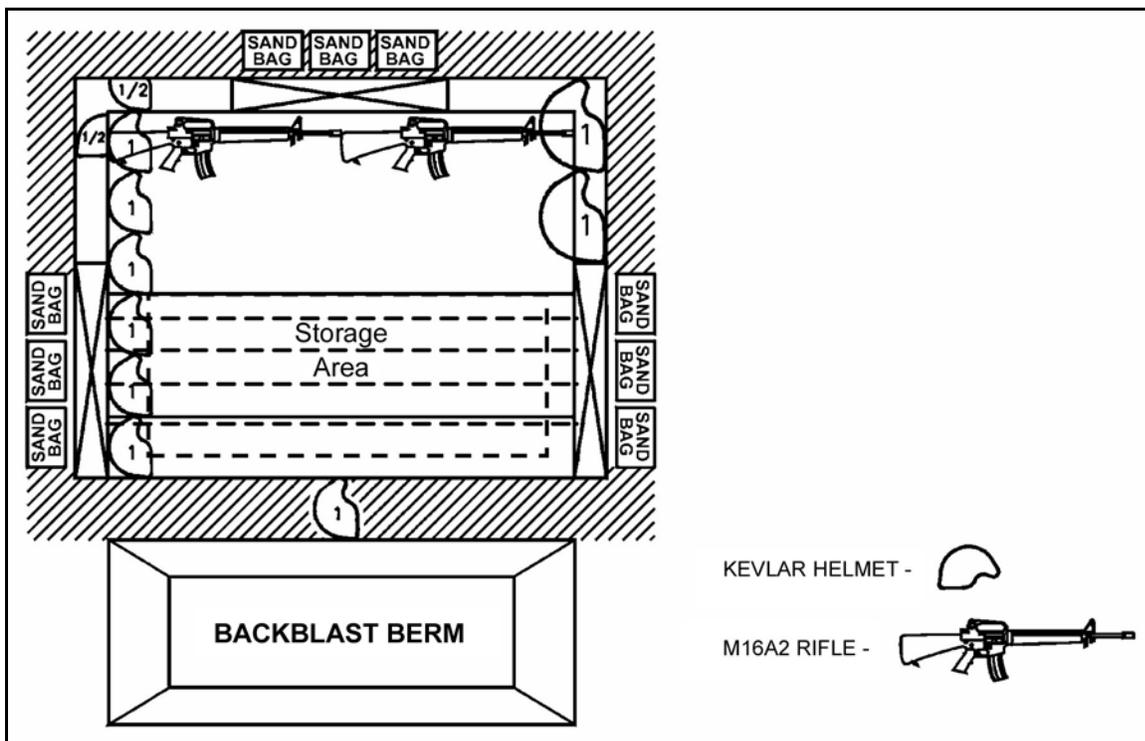


Figure 4-17. Top view of a Javelin defensive fighting position.

NOTE: If assigned an M4-series weapon, add 7 inches to the dimensions on the position.

Section IV. OTHER TACTICAL OPERATIONS

This section describes how the Javelin contributes to offensive operations and the antiarmor ambush role. During stability and support operations, Javelins are not used in their typical roles.

4-10. OFFENSIVE OPERATIONS

The Javelin contributes to offensive operations by providing long-range fires that destroy enemy armor and protect the force from armored counterattacks. In the absence of armored targets, the Javelin can engage enemy fortifications and hovering helicopters. The Javelin is normally used in a support-by-fire role during offensive operations. The primary consideration for such employment is the availability of fields of fire and the armored threat. Javelin teams can, however, effectively protect flanks and the shoulder of penetrations against armored threats and can also provide overwatch for unit movement (Figure 4-18).

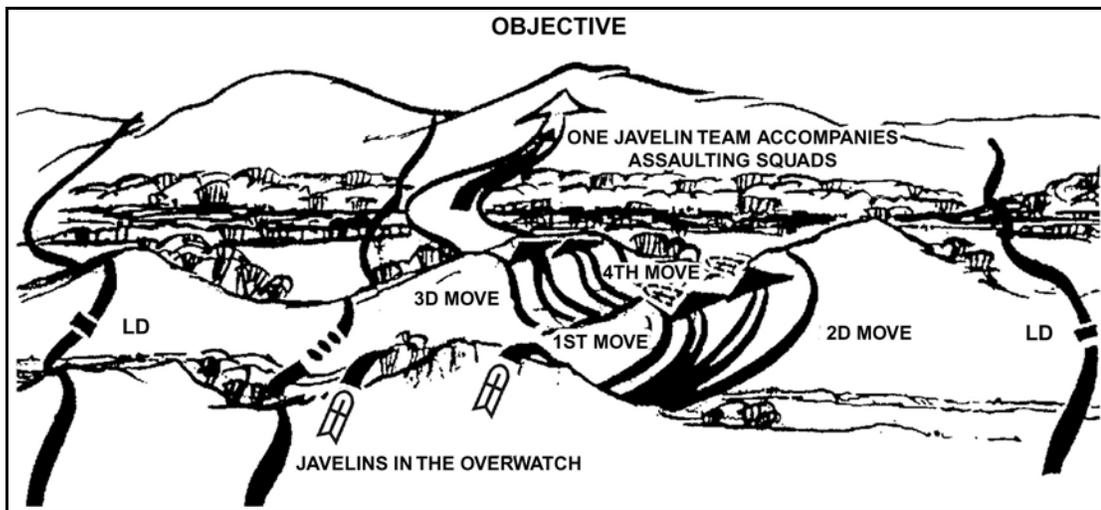


Figure 4-18. Javelin supporting offensive operations.

4-11. ANTIARMOR AMBUSH ROLE

Antiarmor ambushes are usually conducted to destroy small groups of armored vehicles, force the enemy to move more slowly and cautiously, or force the enemy into a choke point. Any unit conducting an antiarmor ambush can use Javelins for this purpose. The Javelin has a slow rate of fire, so other weapons systems must be prepared to engage the vehicles while the Javelin gunners attach the CLU to new rounds. The Javelin's 2,000-meter range allows flexibility in choosing ambush positions. In addition to fires into the kill zones, the Javelin can be employed in a security role to guard high-speed avenues of approach, to slow or stop enemy reinforcements, or to destroy vehicles attempting to flee the kill zone (Figure 4-19, page 4-18).

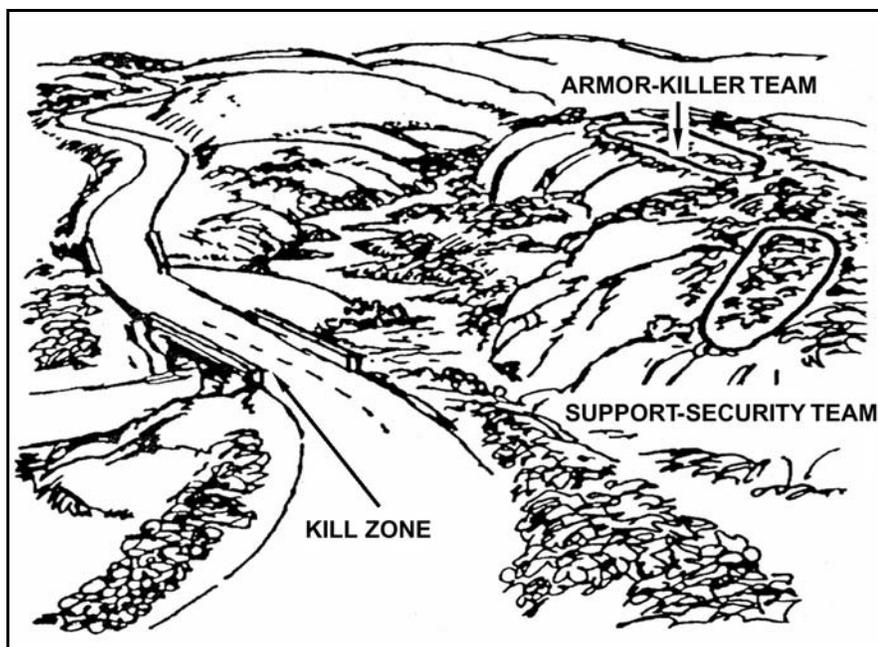


Figure 4-19. Antiarmor ambush.

4-12. STABILITY AND SUPPORT OPERATIONS

During stability operations, Javelin gunners may be used against an armored threat if one exists. If there is no armored threat, the Javelin gunner can expect to provide a surveillance capability. The IR sight is especially useful. In the case of roadblocks, Javelin gunners provide protection against vehicles that attempt to *run* the roadblock. To be effective in this task, the gunner needs to be able to position himself where he has an unimpeded view of the approaches to the roadblock. The gunner must clearly understand the rules of engagement (ROE) to know when he is authorized to engage targets, which may be at minimum range. The observation capability of the Javelin's sight may be useful during support operations, but it is not likely that a missile will ever be fired.

4-13. URBAN COMBAT

The Javelin is primarily used to defeat main battle tanks and other armored combat vehicles. It has a moderate capability against bunkers, buildings, and other fortified targets commonly found during combat in built-up areas. Javelin teams provide overwatching antitank fires during the attack of a built-up area. Within built-up areas, they are best employed along major thoroughfares and from the upper floors of buildings or roofs to attain long-range fields of fire. The minimum engagement distance limits firing opportunities in the confines of densely built-up areas, and the Javelin may not be the weapon of choice in the urban environment (FM 3-06.11 [FM 90-10-1]) where there are additional considerations including: fires (caused by both friendly and enemy) may cause target acquisition and lock-on problems; clutter on the battlefield may cause lock-on problems; and, line-of-sight communications may be limited by the structures.

a. **Obstacles.** The Javelin's unique flight path forces the gunner to think in three dimensions. The urban environment has overhead obstacles such as street signs, light poles, and wires, which could impede the missile's flight path.

b. **Engagement Considerations.** The Javelin's three distinct engagement considerations are: engagement distance, crossover, and time.

(1) **Engagement Distance.** The Javelin missile has a minimum engagement distance (150 meters in the attack mode and 65 meters in the direct attack mode), which limits its use in built-up areas. Few areas in the inner city permit the gunner to fire much beyond the minimum arming distance. The gunner is usually limited to firing down streets, rail lines, parks, or plazas. The Javelin can effectively fire from upper level stories or roofs of buildings into other buildings.

(2) **Crossover.** Sometimes the seeker will not be able to distinguish between the background and the target because the two have the same temperature (crossover).

(3) **Time.** When a gunner comes across a target of opportunity, he may not be able to take advantage of it. The cool down time of the NVS is 2.5 to 3.5 minutes. Seeker cool down takes about 10 seconds. Once the BCU is activated, the gunner has a maximum of 4 minutes to engage the target before the BCU is spent. Vehicles crossing the street or moving between buildings (flank shot) are exposed for about 10 to 15 seconds, meaning the gunner may not have enough time to lock-on to the target and fire.

c. **Backblast.** The soft launch capability enables the gunner to fire from inside buildings because there is little overpressure or flying debris. Anyone in the enclosure should wear a helmet, protective vest, ballistic eye protection, and hearing protection.

d. **Weapon Penetration.** The dual charge warhead penetrates typical urban targets. The direct attack mode is selected when engaging targets in a building. Enemy positions or bunkers in the open closer than 150 meters are engaged using the direct attack mode. Positions in the open farther than 150 meters are engaged using either the top or direct attack mode depending on the situation.

e. **Breaching Structural Walls.** The Javelin is not effective when breaching structural walls. The antitank guided missiles (ATGMs) are not designed to breach structural walls effectively. All ATGMs, to include the Javelin, are designed to produce a small hole, penetrate armor, and deliver the explosive charge. Breaching calls for the creation of a large hole. ATGMs are better used against armored vehicles or for the destruction of enemy-fortified fighting positions.

Section V. TARGET ENGAGEMENT TECHNIQUES

Target acquisition is essential for a gunner to be effective on the battlefield. Target acquisition is a four-step process: target detection, target classification, target recognition, and target identification. Target acquisition begins with detection; the gunner uses his senses in conjunction with the CLU to detect targets. Using the CLU to aid in the detection, classification, recognition and identification of the enemy target only enhances the gunner's usage as a valuable tool for the unit. The gunner learns to use different fields of view in scanning for targets.

4-14. TARGET DETECTION

The gunner should listen for the sounds that will alert him to the enemy's presence, it may not pinpoint the exact location but it will alert him. The gunner can see vehicles

moving by dust trails. The gunner's best method of detection is with his eyes. He can also use binoculars, his scope, his night vision sight, and even the command launch unit to aid him in detecting targets. When scanning his sector of fire, the gunner should look for the most likely areas a vehicle may be positioned or approaching from. Look for dust or vehicle exhaust. Look for enemy vehicle movements along high-speed avenues of approach. As a vehicle moves over a terrain feature it may cause what is known as a "flash" this is the thermal signature may be visible for a fraction of a second after the vehicle has moved out of sight. Look for unnatural shapes and shadows. During the daytime, light often reflects off equipment and in the dark, the enemy may not practice good light discipline making them observable by the naked eye allowing the gunner to detect targets quickly and begin the target engagement process. The gunner determines target engageability by changing the fields of view.

a. **Target Images.** There are some differences in the way a target appears in each field of view. (Figure 4-20)

- (1) **Day FOV:** full-color visible light image, 4x magnification of target.
- (2) **WFOV:** black-and-green infrared image, 4x magnification of target.
- (3) **NFOV:** black-and-green infrared image, 9x magnification of target.
- (4) **Seeker FOV:** black-and-green infrared image, 9x magnification of target.



Figure 4-20. Fields of view.

b. **Fields of View.** The day field of view is used during daylight hours to conduct surveillance and target detection. The night vision sight has two fields of view, the wide field of view (WFOV) and the narrow field of view (NFOV) that present a black-and-green image of the terrain and targets. The missile has a field of view (seeker FOV) and is used for target engagement and is available to the gunner once the seeker has been activated. Cold areas appear dark green or black, and hot areas light green. The gunner adjusts the contrast and brightness controls and the focus to better locate enemy targets.

(1) **WFOV:** Is used as the primary scanning field of view for surveillance and target detection.

(2) **NFOV:** Is used for target classification, recognition and identification. This field of view has a limited use for target detection and is not used for scanning because of its small area.

(3) **Seeker FOV**: Is the view that the missile has of the target. Is used to lock the track gates onto the target.

c. **Scan for Targets**. The gunner must scan his sector of fire or area of surveillance at all times for the enemy. The scanning techniques that help to detect targets quickly are rapid scan, slow scan, and detailed search. The gunner observes the following procedures in all three techniques to scan for targets effectively (Figure 4-21). The gunner:

- Scans the entire sector of fire or area of surveillance using WFOV of the CLU.
- Scans in a consistent pattern, slowly and evenly.
- Pays special attention to those positions in which a target would most likely appear, for example, avenues of approach
- Identifies the location of objects, such as trees, roads, buildings, and any man-made infrared signatures.

(1) **Rapid Scan**. The rapid scan method is used to detect obvious signs of enemy activity. This type of scan is used when first occupying a fighting position. (Figure 4-23). The gunner:

(a) Divides the target area into sections. Uses TRPs or easily recognizable terrain features to divide the area.

(b) Adjusts the brightness of the CLU display so that *the hot spots* (bright green when viewed through the CLU display) stand out in the CLU display.

(c) Starts from the gunner's position, scans out to either the left or the right to the farthest point of the gunner's sector and back across the sector to the other side.

(d) Stops and uses the detailed search technique, if the gunner suspects he has spotted a target during the rapid scan.

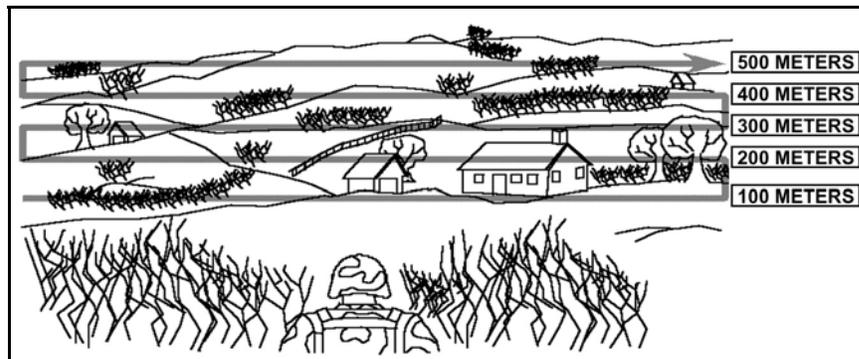


Figure 4-21. Slow/rapid scan.

(2) **Slow Scan**. If there are no targets detected during the rapid scan, the gunner conducts a slow scan of the sector (Figure 4-21).

(a) Starts from the gunner's position and begins a slow scan of the sector from left to right in short intervals 50 to 100 meters deep, until a scan of the sector is completely covered.

(b) Conducts a more detailed search if a target is detected.

(3) **Detailed Search**. The detailed search is used when targets are either detected, or other techniques have been used and it has resulted in no enemy activity found. The gunner uses the NFOV to search specific areas of the sector. If a target is detected, the

gunner uses the NFOV to further recognize, classify and identify the target. (Figure 4-22)
The gunner:

(a) Concentrates on specific areas that are more likely for targets to be hiding or likely avenues of approach.

(b) Looks for signs that the enemy may have been in the area by looking for tracks and any other signs of enemy activity.

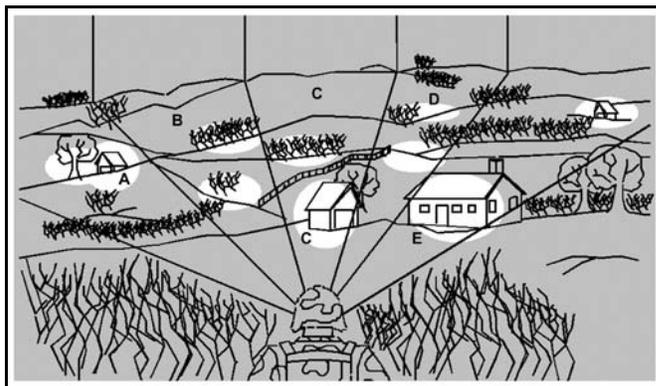


Figure 4-22. Detailed search.

(2) **Moving Targets.** Moving targets are easier to spot when scanning a sector because movement catches the eye's attention. Moving vehicles also leaves signatures that are easily detected by the NVS of the CLU. The following considerations will help gunners detect moving targets.

- Track vehicles leave a distinct pattern on the ground caused by the friction from the tracks in contact with the ground.
- Exhaust plumes are easily seen when the vehicles are moving through low lying areas.
- An IR flash can be seen immediately following a vehicle that moves behind cover.

(5) **Stationary Targets.** These targets are more difficult to detect than moving targets due to camouflage or its cold status. Targets that have been sitting for long periods of time may appear to blend in with the remainder of the surroundings. However, tanks and other vehicles are started periodically to ensure they remain combat ready. This procedure heats up the vehicle, exhaust, and engine areas.

(a) **Hot, stationary targets.** Tanks, armored personnel carriers and other vehicles either remain running for long periods of time or are started to keep their batteries from running low and to keep their electronics operational. These targets have a hot signature when compared to its surroundings. The gunner easily detects these targets when using the CLU (Figure 4-23).

- **Suspension system.** Tracks, wheels and road wheels heat up during movement. It provides a hotter signature than the hull and makes detection easier.
- **Engine compartment.** Once stopped, the vehicle continues to give off a hot signature for several hours. The engine takes longer to cool off than the remainder of the vehicle.

- *Exhaust.* Vehicles are started periodically to charge its engines. The vehicle's exhaust takes time to cool down after being operated.
- *Gun tube.* If the vehicle has been involved in firing, its gun tube gives off a heat signature that will aid in classification.

(b) *Cold, stationary targets.* After a vehicle has been sitting for a long period of time, without the engine or electronics being operated, it appears as darker green or black against the surrounding area. When using the CLU in the night vision mode (WFOV or NFOV), the target is detected based on its appearance in relation to the surrounding objects or Delta-T.

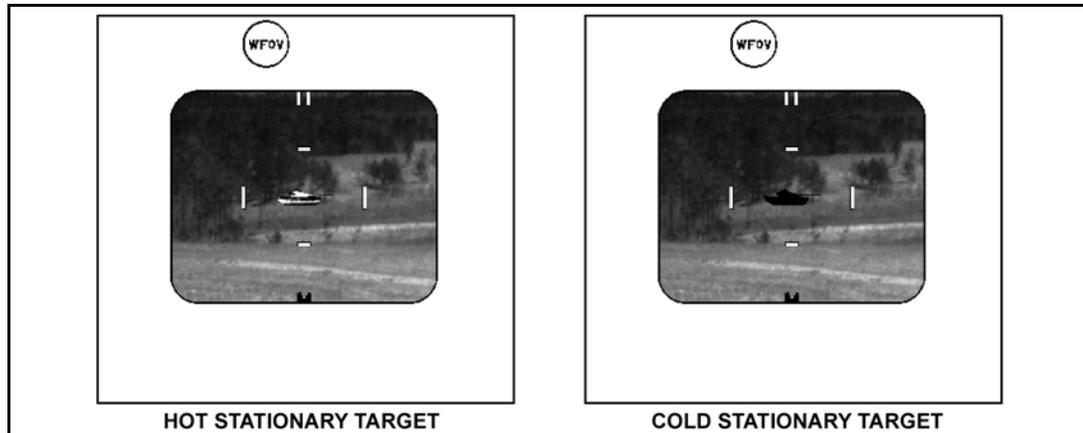


Figure 4-23. Stationary targets.

4-15. TARGET CLASSIFICATION

Once a target is detected, the gunner must classify the target as either a wheeled or tracked vehicle (Figure 4-24, page 4-24). Different parts of the vehicle give off heat signatures making the classification of a vehicle easier. When viewed through the NVS (WFOV or NFOV), a vehicle's wheels or suspension system quickly heats up.

a. **Wheeled Vehicles.** The hubs of wheeled vehicles heat up along with the tires, giving it a distinct heat signature. Based on the vehicles configuration of axles, there may be two or more distinctive round heat signatures just below the hull or body. The engine compartments are normally located at the front of the vehicle. Some wheeled vehicles do not have a gun tube; if it does, the gun tubes are usually small and harder to spot.

b. **Tracked Vehicles.** The suspension system has road wheels that heat up during movement, usually five to seven road wheels based on the type of vehicle. The engine compartment is usually located in the rear on tanks and the front on armored personnel carriers. These signatures are usually hotter for a longer period of time than the remainder of the vehicle. The gun tube when fired heats up and makes classification of the vehicle easier.

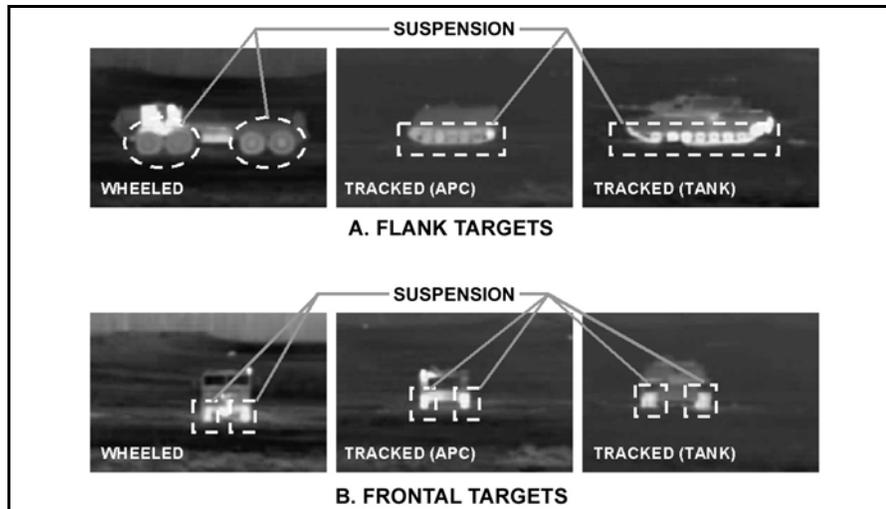


Figure 4-24. Target classification features.

4-16. TARGET RECOGNITION

After a gunner classifies a target as a wheeled or track vehicle, the gunner then determines whether a target is a tank or armored personnel carrier (APC). Some of the same techniques used to classify a vehicle are used to recognize the vehicle.

a. **Tanks.** The characteristics of a tank make this vehicle stand out from others. The large gun tube, the five to seven road wheels, and the engine compartment being in the rear of the vehicle, all make this easily recognizable as a tank. (Figure 4-25)

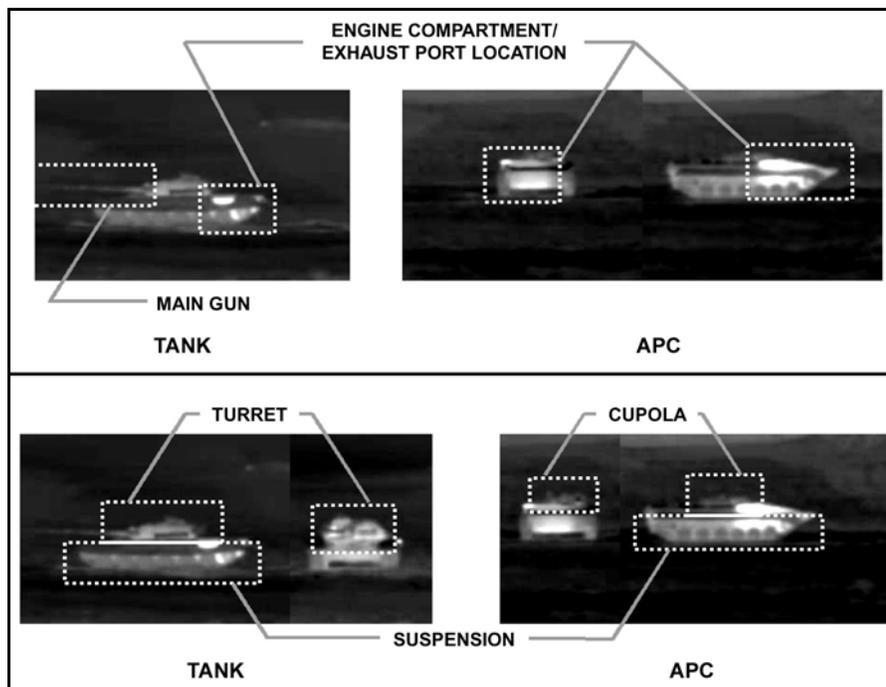


Figure 4-25 Target classification (tank/APC).

b. **Armored Personnel Carriers.** Based on the configuration of an APC, it may be wheeled or tracked. The enemy configures the APC differently based on its use however; there are some common characteristics for them. The engine compartment is located in the front of the vehicle; they may or may not have a turret, and may or may not have a gun tube.

c. **Tank or APC.** Target classification features (Table 4-2).

SIGNATURE	TANK	APC
Engine Compartment	In rear	In front
Exhaust Ports	In rear	In front or side
Main Gun	Long and thick	Short and thin
Turret	Yes and large	Some and usually small
Cupola	New Tanks	No
	Old Tanks	Yes
Size/Shape		Large and sloping

Table 4-2. Target classification features.

4-17. TARGET IDENTIFICATION

Once the gunner has detected, classified and recognized, he may have enough information to engage the target, but the final step in target acquisition is identification. The enemy may have common armored vehicles as our allies and the gunner must be sure of his target. The use of the CLU provides the gunner with a thermal image of a target; therefore the gunner must have a clear understanding of thermal vehicle signatures as well as daylight images. Training aids available to the units come in different forms, from CD-ROM and GTAs to actual photographs. These tools when used prepare the gunner to correctly identify enemy vehicles versus friendly ones.

a. The Night Vision and Electronic Sensors Directorate, PM-FLIR, at ROV-V@nvl.army.mil can be contacted for assistance in vehicle identification. The Recognition of Combat-Vehicles (ROC-V) CD-ROM is available from this directorate.

b. GTA 17-2-11 and GTA 17-2-13 provides the gunner with line drawings and pictures of friendly and enemy vehicles. These are available through the local TASC.

c. For pictures and descriptions of different Soviet made vehicles, see FM 100-2-3.

d. Jane's Defense Combat Armored Vehicle Identification book contains pictures and descriptions of the vehicles currently in service throughout the world.

4-18. TARGET ENGAGEMENT

This paragraph describes the engagement techniques that the gunner might want to use to engage a target.

a. **Time Space Factors.** The gunner must take into consideration the factors that decrease the probability of hitting the target. He considers the following:

- The time it takes for NVS cooldown (2.5 to 3.5 seconds).
- The time it takes for seeker activation (10 to 14 seconds).
- The time it takes to adjust track gates, lock-on, and fire.
- The time it takes for the missile to fly the distance to the target (2,000 meters in 14 seconds).

- The speed of the vehicle.
- The location of possible cover that the vehicle may be headed towards.
- Any obstructions in the flight path of the missile.

NOTE: Keep in mind that there is a time delay of about 10 seconds between the time of seeker activation and when the seeker FOV comes on the CLU display.

b. **Track Gate Solution (Seeker Lock-on).** To achieve a seeker lock-on target, the gunner must ensure he has a good image of the target by adjusting the focus, contrast, and brightness while in the WFOV or NFOV. Once the seeker FOV is available, the gunner keeps the target in the center of the FOV and begins his track gate adjustments.

(1) **Tanks and Turretless Targets.** To ensure a good seeker lock-on, keep the target's center of mass (the tank's hull but not the gun barrel) centered in the track gates and adjust the track gates as close to the tank's edges as possible (Figure 4-26). To increase the probability of a hit, place the track gates around the hull only. Do not include the turret on flank targets.

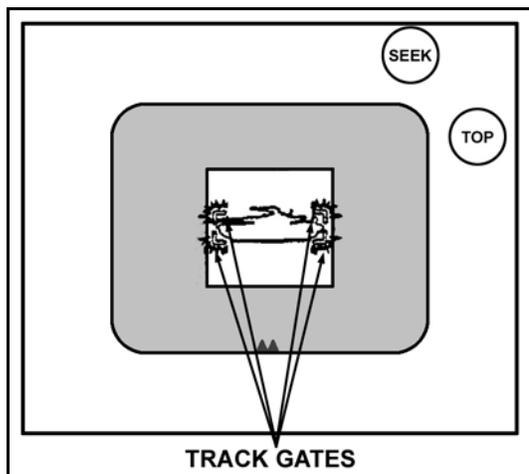


Figure 4-26. Position track gates on target.

(2) **Stationary Targets.** The lock quality for stationary targets is good when the track gates surround the edges of the target. If they are too large or too small, the gunner breaks lock, readjusts the track gates around the target, and relocks on the target. The gunner continues this procedure until lock-on is achieved.

(3) **Hull-down Targets.** When engaging hull-down vehicles at the maximum distance (2,000 meters), the CLU is limited by track gate adjustments based on the size of the target. The gunner adjusts the track gates to acquire only the visible portions of the target.

(4) **Hovering Helicopter.** To ensure an effective engagement, select the direct attack mode only.

(a) **Frontal target.** Adjust the track gates so that they surround only the nose of the fuselage (Figure 4-27). Any appendages (such as armaments, wings, rotor, and so forth) should be ignored.

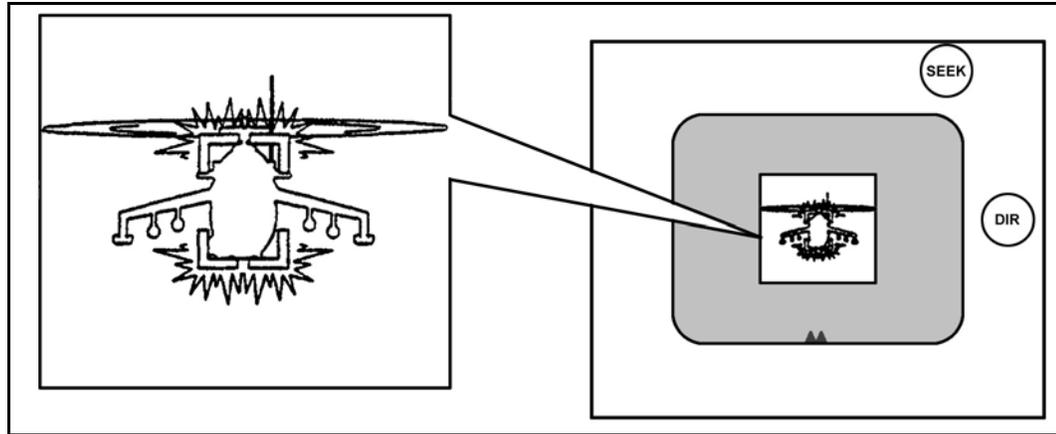


Figure 4-27. Track gate adjustment for helicopters—front.

(b) *Flank target.* Adjust the track gates to surround the passenger/engine compartment or main body (for those helicopters without a passenger compartment) (Figure 4-28). Any appendages, such as the cockpit, tail boom, rotor, and so forth—are ignored.

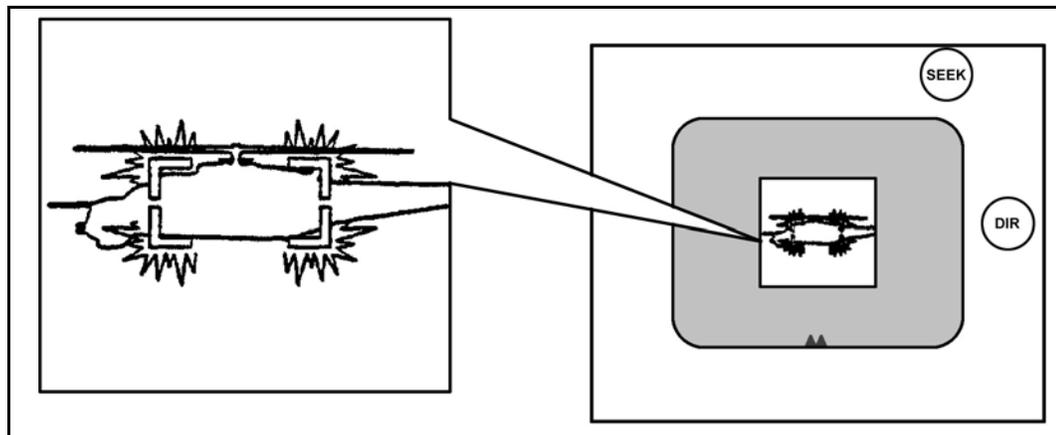


Figure 4-28. Track gate adjustment for helicopters—flank.

(5) *Bunker.* Track gate adjustment for a bunker involves the perceived size of the bunker's firing port. This adjustment depends on the range to the bunker.

(a) Place the track gates around the internal opening of the firing port (Figure 4-29, page 4-28). The gunner selects the direct-attack mode when engaging this type of target.

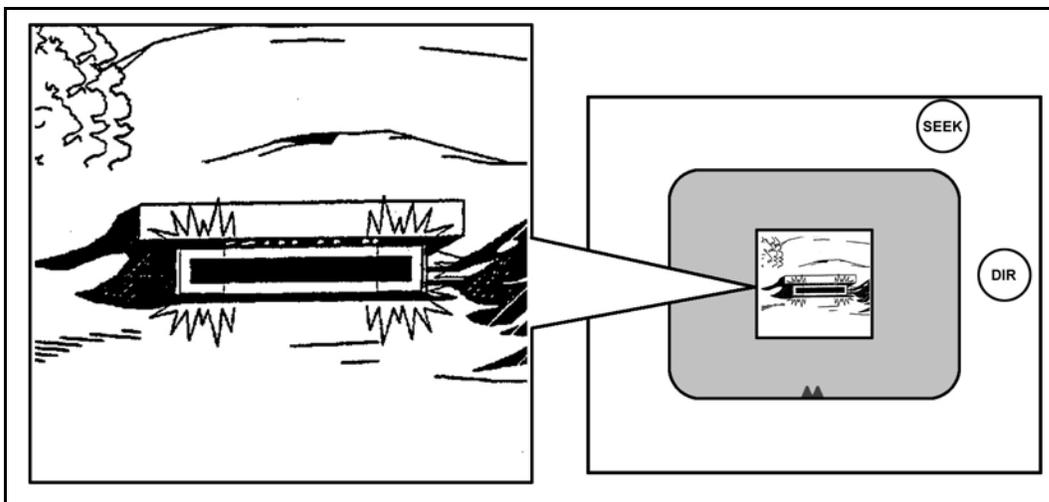


Figure 4-29. Track gate adjustment for bunker.

(b) If the bunker is at a range far enough away that the firing ports cannot be seen, adjust the gates so that they surround the port frame. The gunner selects the direct-attack mode when engaging this type target.

(6) **Obscured Targets.** The gunner attempts to acquire the entire target when he is engaging targets obscured by dust, smoke, or IR clutter.

c. **Multiple Targets.** The biggest difference between a single-target engagement and a multiple-target engagement is that the gunner removes the CLU from the empty LTA, connects the CLU to a new round, and engages the remaining targets. The sequence of events is:

- Prepare the Javelin for firing.
- Assume a good firing position.
- Determine target engageability.
- Activate the seeker. (Squeeze and hold the seeker until the BCU pop is heard.)
- Change attack mode, if necessary.
- Adjust track gates.
- Lock-on target.
- Check crosshairs and track gates.
- Launch the missile.
- After missile launch, release the fire and seeker triggers.
- Remove the CLU from the empty LTA. Place the empty LTA outside the backblast area.
- Connect the CLU to a new round.
- Repeat until all the targets are engaged and destroyed.

d. **Rapid Engagement Techniques (Day Mode Only).** This technique is used to engage a target rapidly when time is critical and the gunner does not have the time available for the NVS to cool down. Standard engagement procedures are used except the gunner powers up the CLU in the DAY mode and activates the seeker before he assumes a firing position. This action starts the 10-second seeker cooldown. By the time the

gunner gets into a good firing position, he should have seeker FOV. The sequence of events for a rapid engagement are:

- (1) Prepare the Javelin for firing.
 - Connect the CLU to a round.
 - Power up the CLU in the DAY position.
 - Activate the seeker. (Hold the seeker trigger and listen for the BCU *pop* before releasing the trigger.)
 - Remove the forward end cap.
- (2) Assume a firing position. Observe the CLU display and ensure the following:
 - Green DAY, SEEK, and TOP indicators are lit (usually 10 to 15 seconds).
 - Seeker FOV and flashing track gates are present.
 - Change the attack mode, if necessary.

NOTE: The seeker FOV has a very limited area of coverage. The gunner looks over the CLU to locate the target. He aims the CLU in the direction of the target and attempts to acquire the target. If the gunner cannot locate the target, he uses the SEL switch to use the Day FOV to locate the target, then he goes back to the seeker FOV.

- (3) Adjust the track gates.
- (4) Lock-on the target.
- (5) Check crosshairs and track gates.
- (6) Launch the missile.
- (7) Perform battle damage assessment or displace.

4-19. FIRE PLAN

The Javelin is part of the direct fire plan and is used in conjunction with other weapon systems to cover an engagement area. The platoon leader uses the fire plan to ensure constant coverage by key weapons systems. The fire plan also includes units to the flanks and how their fires interlock to provide mutual support.

4-20. FIRE CONTROL

Well planned and executed fire control measures are critical to the effectiveness of Javelin fires. Javelin positions should not be jeopardized by premature fires in which either the range is excessive or the target is not in position to ensure a high probability of kill. Proper fire control ensures that Javelins engage targets at optimum times and with only the best placed Javelin in relation to the target. Uncontrolled firing decreases the effectiveness of the unit's overall antiarmor capabilities.

a. **Methods.** The primary control methods used to control fire of one or more Javelins include sectors of fire, TRPs, engagement priorities, fire patterns, and fire commands.

(1) **Sector of Fire.** A sector of fire refers to an area limited by boundaries and assigned to a unit or weapon to cover by fire (Figure 4-30, page 4-30). The gunner or unit assigned a sector of fire may fire only within that sector. Leaders make sure sectors

overlap to cover all areas and so that the Javelin gunners do not hesitate when enemy vehicles come into range. The gunner records the left and right limit on his range card.

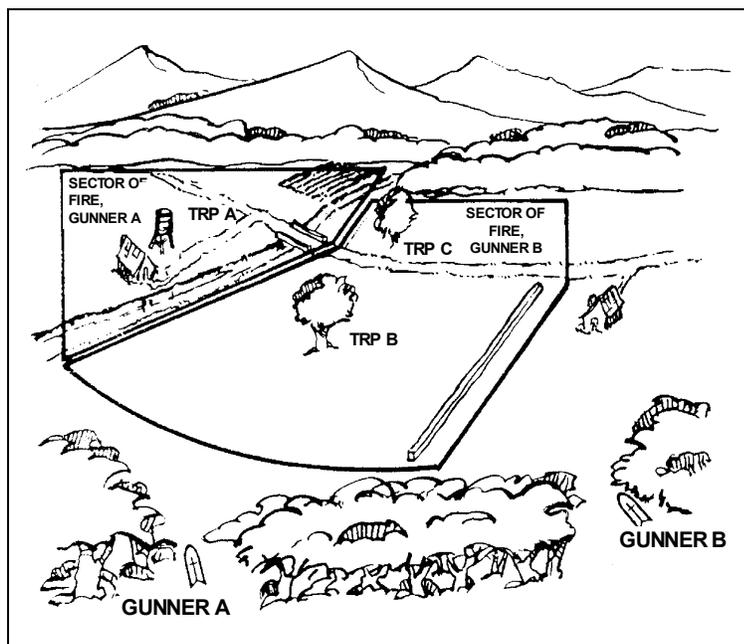


Figure 4-30. Sector of fire.

(2) **Target Reference Point.** A TRP identifies an easily recognizable, natural or man-made point on the ground. The TRP is used as a reference point for locating and controlling fires. They are referenced by two letters, followed by four numbers (assigned by a higher headquarters). TRPs are also used for shifting fires. The gunner records the location of TRPs on his range card.

(3) **Engagement Priorities.** Engagement priority means the order in which Javelins engage the various types of vehicles in an enemy formation. The commander designates the engagement priority for each of his units. Table 4-3 is an example list of engagement priority.

- | |
|---|
| <ol style="list-style-type: none"> 1. Command and control vehicles. 2. Tanks/Armored personnel carriers. 3. Antiaircraft vehicles |
|---|

Table 4-3. Engagement priority.

(4) **Fire Patterns.** Fire patterns describe the relationship between Javelins and their targets. Firing patterns help leaders control the gunners. These patterns also give gunners specific targets to focus on. Two basic patterns include cross fire and depth fire. Leaders should not fixate on one, but should remain flexible and change the pattern as needed. Within the unit's sector, the leader could use both patterns at the same time.

(a) *Cross fire*. Leaders use cross fire with targets dispersed laterally or when obstructions prevent the Javelin from firing to the front. Gunners must stagger their cross fire. That is, when the first missile hits, only then may the next gunner fire.

- *Flanking targets*. With flanking targets, leaders have each gunner engage the target at a diagonal to his position.
- *Frontal targets*. With a frontal target, that is, a target moving straight at the Javelin, cross fire helps prevent detection.
- *Follow-up*. As they destroy their targets, Javelin gunners shift their fire to the center of the enemy formation (A, Figure 4-31A).

(b) *Depth fire*. Leaders use depth fire when targets are exposed in depth. Javelins on one side engage the nearest targets, while Javelins on the other side engage the farthest targets. The gunners then shift fire toward the center of the formation. This procedure can be specified by unit SOP or in the section leader's order (B, Figure 4-31B).

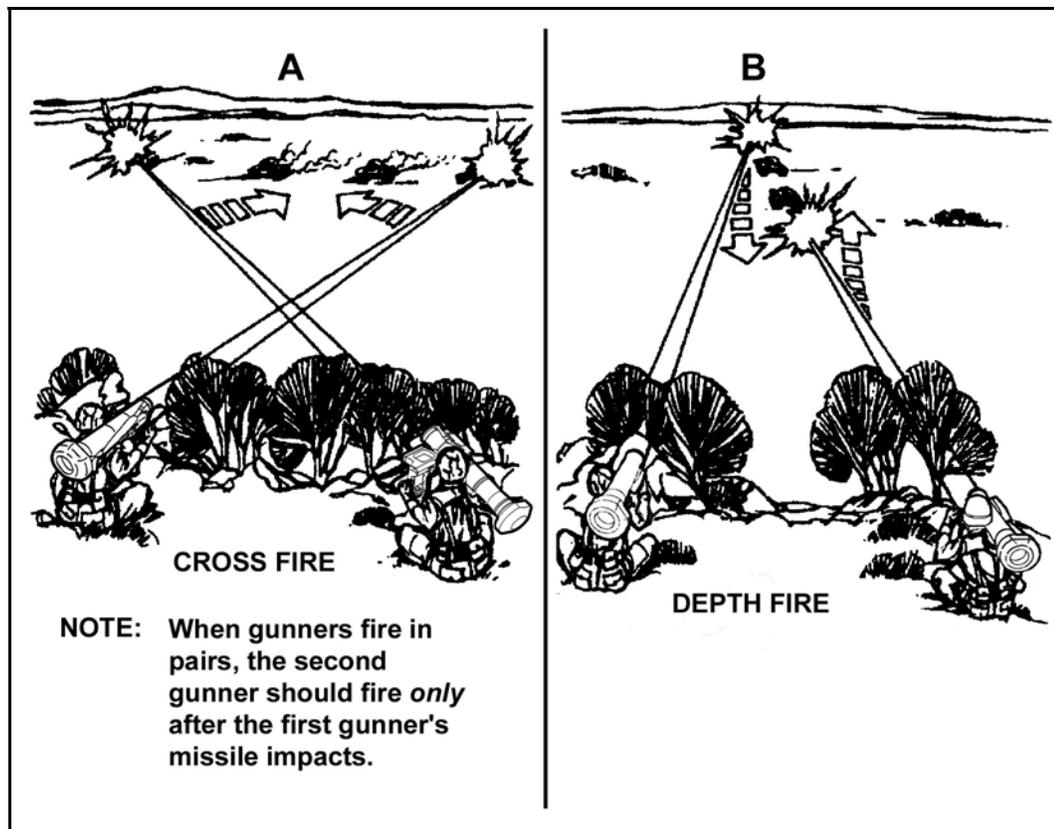


Figure 4-31. Fire patterns.

(5) *Fire Commands*. The leader uses the fire commands to control the gunner's rate of fire, time of fire, and point of fire. When distance dictates radio delivery of fire commands, the gunner divides his concentration between listening to the radio and firing the Javelin. His assistant, if he has one, listens to the radio and relays the radio commands (Table 4-4).

ELEMENT	DEFINITION	EXAMPLE
ALERT	Warns the gunners of a fire mission.	"Enemy in sector, prepare to fire."
TARGET DESCRIPTION/ LOCATION	Briefly describes the target location relative to a TRP or the gunner.	"BMP, 200 meters right of TRP 1."
METHOD OF ENGAGEMENT	Provides instructions for engaging a formation—fire cross or depth fire, fire front to rear, fire left to right or right to left, and so forth.	Fire from rear to center." Fire from front to center."
EXECUTION	Gives the command to fire.	"Team Alpha, fire." "Team Bravo, stand by."
CEASE FIRE	Gunner gives battle damage assessment (BDA) and continues the engagement.	One tank (APC) destroyed and continues engagement.

Table 4-4. Fire commands and examples.

b. **Emergency Fire Signals.** Radio communications may be lost. In such cases, control of fire will be difficult at best. Use of sectors of fire and alternate signals with pyrotechnics will often be the best and most rapid method available to control the fire of Javelin gunners. Units must establish SOPs and practice what communications procedures.

c. **Range Cards.** In some situations, such as when moving from position to position to cover the movement of an advancing force or during retrograde operations, preparing and using range cards may not work. In that case, TRPs offer the best way to control the distribution of fire. If time and circumstances permit, gunners prepare range cards for primary, alternate, and supplementary positions. These cards help the gunner engage targets successfully.