

Chapter 2

Employing Fires

Suppressing or destroying the enemy with direct and indirect fires is essential to success in close combat. Because fire and movement are complementary components of maneuver, the Infantry platoon leader must be able to effectively mass the fires of all available resources at critical points and times. Effective and efficient employment of fires is achieved when the platoon acquires the enemy rapidly and masses the effects of direct and indirect fires. When employed effectively the effects produce decisive results in the close fight.

SECTION I — CONSIDERATIONS FOR EMPLOYING AND CONTROLLING FIRE

2-1. When planning and executing fires, Infantry leaders must know how to apply several fundamental principles. The purpose of these principles is not to restrict the actions of subordinates. They are intended to help the platoon accomplish its primary goal in any engagement (acquire first, shoot first, and hit first) while giving subordinates the freedom to act quickly upon acquisition of the enemy. The principles of fire control are—

- Command and control.
- Mass the effects of fire.
- Destroy the greatest threat first.
- Avoid target overkill.
- Employ the best weapon for the target.
- Minimize friendly exposure (protection).
- Prevent fratricide.
- Plan for limited visibility conditions.
- Develop contingencies for diminished capabilities.

COMMAND AND CONTROL

2-2. Every time a Soldier fires a weapon or requests indirect fire, he does so with the intent to kill or destroy an enemy target. He may also affect an enemy target through nonlethal means such as smoke, illumination, or nonlethal fires. Platoon and squad leaders are the first leaders in the chain of command who are legally and morally responsible for the fires and effects produced by their subordinates.

2-3. Exercising control of the direct fires is founded upon the concept of authority. When given a mission, leaders are given the authority they need to accomplish the mission. This non-negotiable responsibility includes the need to fire weapons, move units, and conduct military actions. Leaders and their subordinates are accountable for carrying out these duties in a legal, moral, and competent manner.

2-4. Tactical reasons to exercise control include, combining weapons to achieve complementary and reinforcing effects, preventing fratricide on another unit, achieving a particular tempo, achieving surprise, and preventing detection. Technical reasons to exercise control include limited ammunition quantities, deconflicting fires, and managing surface danger zones (SDZs.)

2-5. Leaders must balance the need to personally control their subordinate's fires with the need for their units to be responsive to procedural control. The surest way for a leader to control his subordinate's fires is to withhold that authority to his level. The surest way to ensure his subordinates have maximum freedom of

action is to provide them with rules and conditions to guide their personal fire decisions. These rules can be issued in the unit's TSOP, rules of engagement (ROE), and mission briefs.

MASS THE EFFECTS OF FIRE

2-6. Infantry units must mass the effects of fires to achieve decisive results. Leaders achieve fire superiority by concentrating all available fires. Massing involves focusing fires at critical points, distributing the effects, and shifting to new critical points as they appear. There are many ways to achieve fire superiority. They include:

- Using combinations of weapons and munitions.
- Applying the appropriate volume and accuracy of fire at enemy point and area targets.
- Establishing engagement criteria and engagement priorities.
- Assigning Soldiers mutually supporting positions and overlapping sectors of fire.
- Focusing fires on enemy vulnerabilities.

2-7. Concentration of fires, both preparatory and supporting, is necessary to gain and maintain fire superiority. Fires from weapons not organic to the platoon or squad are coordinated by the unit leader or his next higher headquarters. Artillery, tanks, and tactical air may be available to take part in the penetration and reduction of enemy prepared defenses. Fire superiority is particularly important while attacking when Infantry units begin breaching protective enemy obstacles and assaulting the enemy position itself. When defending, fire superiority defeats the enemy's attack, enabling the defender to transition to the offense by counterattacking.

2-8. Every tactical plan the leader develops (for both offense and defense) must have a concept of fires. (For example, how the platoon will gain and maintain fire superiority.) The plan to achieve fire superiority includes initiation, adjustments, and ceasing fire. Because the effects of fire tend to diminish as the enemy becomes accustomed to it, fires should initially be intense. Delivery of large volumes of concentrated fires into a specified area inflicts maximum damage and shock. Properly timed and delivered fires contribute to the achievement of surprise, and to the destruction of the enemy. Shifting and ceasing fires should be planned and executed with equal precision. If not, the complementary movement to positions of advantage is delayed, and the enemy could have an opportunity to recover and react.

2-9. Leaders concentrate the effects of combat power at the decisive place. First, leaders develop targets, target reference points (TRPs), and sectors of fire to integrate the effects of fires and maneuver with the terrain. Second, they select positions that maximize cover and concealment and emplace security elements to enhance protection. Third, they seek information from reconnaissance and surveillance elements to determine enemy dispositions and intentions. Finally, they exercise battlefield leadership before and after contact by making bold decisions and synchronizing other elements of combat power.

2-10. The fire plan is developed concurrently with the leader's scheme of maneuver, in as much detail as time will allow. When developing his fire plan, the leader considers—

- The use of all available assets.
- The enemy situation, disposition, and terrain.
- The nature of targets and the effects desired.
- The availability of ammunition and Soldier's combat load.
- Time of fire (initiation of fires, duration and rate, and cease fires).
- Scheduled and on-call fires.
- Use of smoke and illumination.
- Means of communication.

DESTROY THE GREATEST THREAT FIRST

2-11. The platoon engages targets in direct relation to the danger they present. If two or more targets of equal threat present themselves, the platoon should engage the closest target first. The platoon marks the defense engagement area (EA) so it can determine when to engage various targets, then plans these ranges

on sketches and range cards. For example, the platoon should mark the EA at the Javelin maximum engagement distance (2,000 meters) to ensure gunners do not waste missiles.

AVOID TARGET OVERKILL

2-12. The Infantry platoon strives to avoid engaging a target with more than one weapon system at a time. To avoid target overkill, the platoon can divide EAs into sectors or quadrants of fire to better distribute direct fire among the platoon. The platoon can use many techniques to mark the EA. The platoon and company should develop a TSOP that divides the EA with both infrared and thermal TRPs to enable good distribution of fires within the EA. Squads and platoons should mark EAs with infrared devices for engagements during limited visibility. Thermal sights on the command launch unit (CLU) of the Javelin cannot detect infrared sources. Therefore, the EA must also be marked with thermal devices. The platoon can burn a mixture of rocks, sand, and diesel fuel inside a fuel drum, ammunition can, or bucket shortly before dusk to give off a heat source for most of the night.

2-13. The platoon leader may also designate rates of fire, by weapon system, to avoid target overkill. Predetermining the rates of fire and length of firing time allows the platoon leader to plan for sufficient ammunition needed for desired effect. The rates of fire are cyclic, rapid, and sustained.

2-14. In offensive operations, avoid overkill by—

- Establishing weapon system priorities to engage targets and distribute fires. The platoon leader may establish that a Javelin team engages a tank on the objective while the other Javelin team engages a bunker.
- Having the weapons squad leader control the support-by-fire element to prevent needless ammunition expenditure.
- Having the platoon leader use direct fire control measures as discussed in Section IV of this chapter.

EMPLOY THE BEST WEAPON FOR THE TARGET

2-15. Enemy target type, range, and exposure are key factors in determining the friendly weapon and munitions that should be employed for the desired target effects. Using the appropriate weapon against the enemy target increases the probability of its rapid destruction or suppression. The platoon leader task organizes and arrays his forces based on the terrain, enemy, and desired fires effects.

2-16. Weapons and munitions are designed with specifications that enable their effects to be forecasted with some degree of accuracy before being fired. They are also designed for a specific range versus specific targets. Platoon and squad Infantry leaders must have an intimate understanding of their organic and supporting weapons and munitions to include the following:

- Weapon characteristics, ranges, and optimal use.
- Munition characteristics, lethality, and optimal use (such as how to achieve intended effects and avoid unintended effects).
- Procedures to request, control, and adjust fires from other agencies.

2-17. Infantry platoon and squad leaders must ensure that they focus the fires of their weapons systems on targets their weapon systems are designed to engage (Figure 2-1). For example, CCMS are used against armored targets at ranges of up to 2,000 meters for stand-off protection. However, medium machine guns are used to destroy enemy unarmored vehicles and dismounted Infantry at ranges within 1,000 meters. Leaders plan and execute fires throughout the depth of the AO, engaging enemy targets early and continuously IAW weapon capabilities and standoff. The principle of depth enables Infantry units to achieve and maintain fire superiority. By engaging the enemy early, leaders disrupt the enemy's plans, forcing him to seek cover. To apply this principle, leaders are required to know weapon systems at their effective ranges as well as the movement rates of Soldiers and equipment. When moving, the friendly force echelons its fires in front of the friendly attacking force. This allows unhindered movement. When the friendly force defends, they echelon their forces against the approaching enemy force.

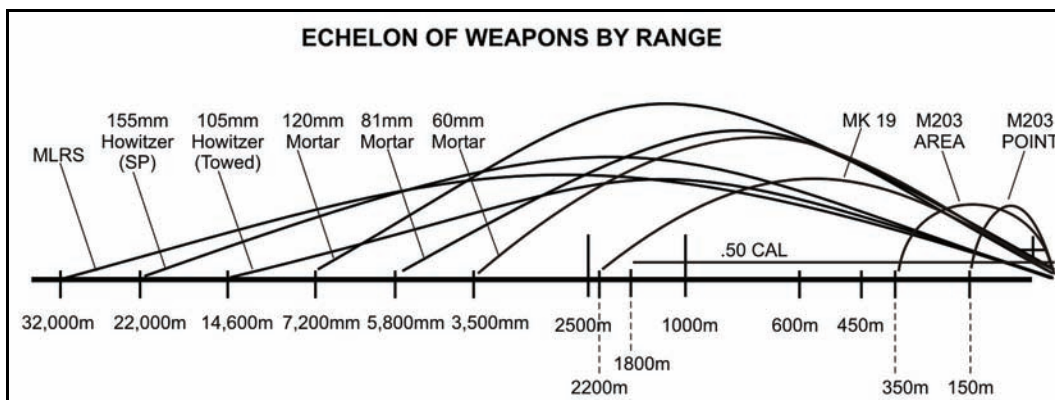


Figure 2-1. Weapon ranges.

MINIMIZE FRIENDLY EXPOSURE (PROTECTION)

2-18. Units increase their survivability by exposing themselves to the enemy only when necessary to engage him with effective fires. Natural or man-made defilade provides the best cover. Infantry units minimize their exposure by constantly seeking available cover, attempting to engage the enemy from the flank, remaining dispersed, firing from multiple positions, and limiting engagement exposure times.

PREVENT FRATRICIDE

2-19. Leaders must be proactive in reducing the risk of fratricide, especially when it concerns their Infantry platoon or squad on the multi-dimensional battlefield. There are numerous tools to assist them in fratricide avoidance. By monitoring unit locations, leaders at all levels can ensure that they know the precise locations of their own and other elements and can control their fires accordingly. Infantry leaders must know the location of each of the squads.

2-20. The platoon can use infrared and thermal marking techniques to ensure that adjacent units do not mistakenly fire at friendly forces during limited visibility. The assault element can use the infrared chemical lights, blacklight tube lights tied to poles, and many other methods to mark the assault element's progress. Leaders must ensure that the enemy does not have night vision capability before marking their Soldiers' progress with infrared marking devices. For a detailed discussion of fratricide avoidance, refer to Section III of this chapter.

PLAN FOR LIMITED VISIBILITY CONDITIONS

2-21. Dense fog, rain, heavy smoke, blowing sand, and the enemy's use of smoke may significantly reduce the leader's ability to control direct fires of the platoon. Therefore, Infantry units are equipped with thermal sights and night vision systems that allow squads to engage the enemy during limited visibility at nearly the same ranges normally engaged during the day.

DEVELOP CONTINGENCIES FOR DIMINISHED CAPABILITIES

2-22. A platoon leader usually develops a plan based on having all of his assets available and makes alternate plans to account for the loss of equipment or Soldiers. The platoon leader should develop a plan that maximizes his unit's capabilities while addressing the most probable occurrence. He should then factor in redundancy within the platoon. For example, he may designate alternate sectors of fire for the squads that provide him the means of shifting fires if one squad has been rendered ineffective. These contingencies may become items within a unit SOP.

SECTION II — WEAPON AND MUNITION CHARACTERISTICS

2-23. To better understand the science of employing fires, leaders should know the basic characteristics of weapons and munitions. This knowledge leads to an increased understanding of capabilities and the ability to achieve complementary, reinforcing effects.

COMMON WEAPONS AND MUNITION CHARACTERISTICS

2-24. There are five types of weapons used at the Infantry platoon level: small arms; machine guns; grenade launchers; shoulder-launched munitions (SLM)/Close Combat Missile System (CCMS); and mortars. These weapons are developed with emphasis on certain characteristics (Table 2-1).

Table 2-1. Common weapon characteristics.

	Small Arms	Machine Gun	Grenade Launcher	SLM/CCMS	Mortars
Lay	Direct fire	Direct fire	Direct fire	Direct fire	Indirect fire
Ammunition	Penetration	Penetration	HE	Penetration/ HE	HE WP ILLUM
Trajectory	Low trajectory	Low trajectory	High trajectory	Low trajectory	High trajectory
Point or Area Enemy Target	Point target	Point and area target	Point and area target	Point target	Area target
Organic Infantry Unit Weapons	M4	M249 MG M240 MG	M203	AT4 SMAW-D M72 Javelin	Organic to company/ battalion

LAY

2-25. The lay of a weapon is the characteristic that determines how a Soldier engages a target. A weapon's lay is either direct or indirect fire. Every weapon organic to the Infantry platoon or squad is direct fire, with the exception of company and battalion mortars. Infantry Soldiers armed with organic weapons engage the enemy with the weapon's own sight. The strength of a direct fire weapon is its responsiveness. The weapon does not need to be requested from higher, nor does higher have to "clear fires" before a round may be fired. Soldiers manning indirect fire weapons such as mortars engage the enemy by using a separate observer (Figure 2-2). Soldiers manning mortar weapon systems have the tactical advantage of avoiding direct contact with the enemy in the fight.

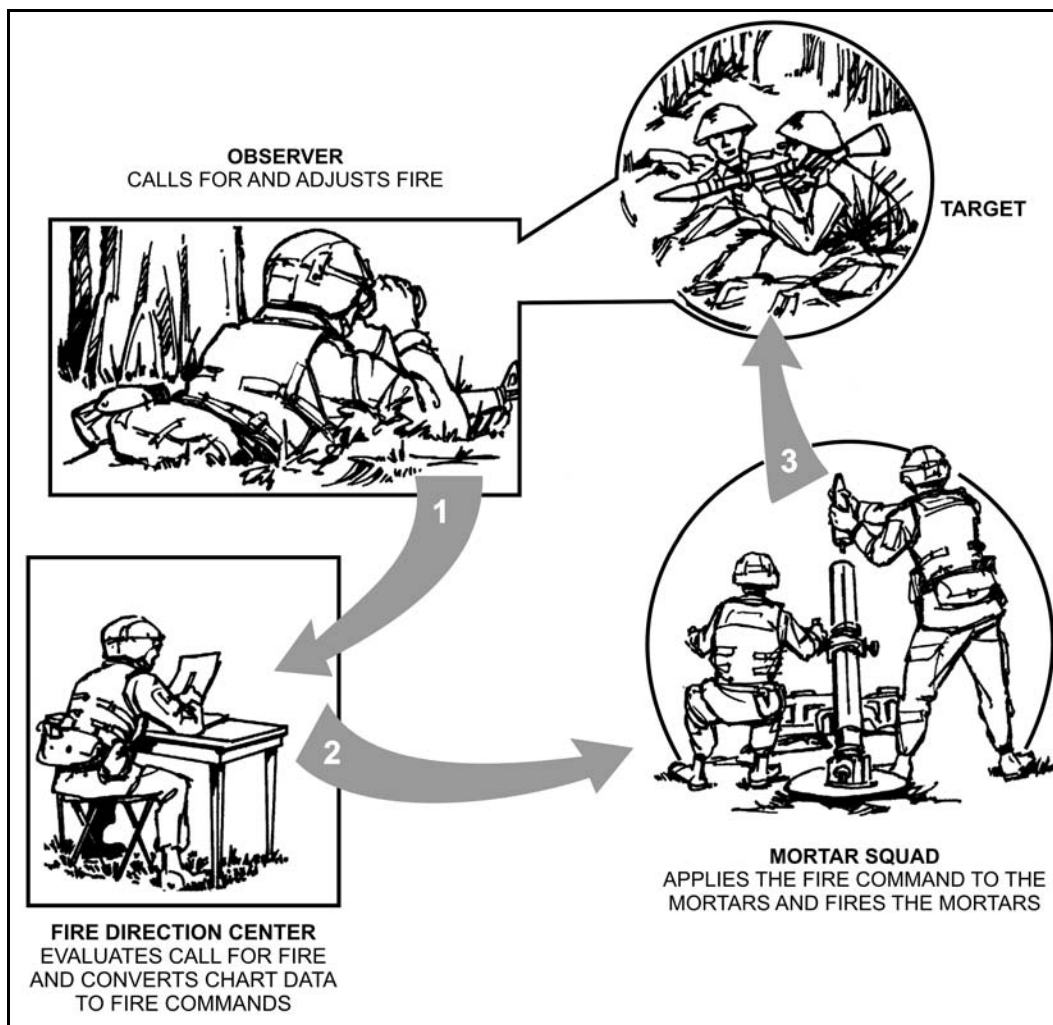


Figure 2-2. Indirect fire.

AMMUNITION

2-26. For the purpose of this manual, there are three categories of ammunition: high explosive (HE); penetration; and special purpose munitions. Only HE and penetration munitions are considered for achieving complementary and reinforcing effects. The leader is able to engage known enemy targets (those he can see and acquire) as well as likely enemy targets (those he cannot see and cannot clearly acquire). If the enemy remains hidden but suspected, the grenadier will engage him with high explosives. If the enemy attempts to move to a location that will protect him from HE munition, the automatic rifleman will engage him with a penetrating munition. Special purpose munitions are described for general information only.

High Explosive

2-27. HE munitions are used to kill enemy soldiers, force enemy soldiers to remain under protective field fortification cover, force an enemy vehicle to button up, or force an enemy vehicle into a less advantageous position. Only a direct hit will destroy or significantly damage an armored vehicle.

2-28. There are two noteworthy strengths of HE munitions. First, HE munitions do not have to score a direct hit to physically affect the target. This makes it possible to engage targets that are not clearly acquired, but are likely or suspected. Second, HE munitions are especially effective at destroying structures such as bunkers and vehicles.

Penetration

2-29. The effectiveness of penetration munitions is dependent on the weapon system's ability to generate velocity, and the ability of the munition's mass to punch a hole in the enemy target. It is fairly easy to gauge the effectiveness of penetration munitions. Soldiers can engage targets with confidence because of the known effect the round will have on a target. The three general categories of penetration munitions are ball and tracer, armor piercing, and high explosive antitank (HEAT).

Ball and Tracer

2-30. Ball and tracer rounds use high velocity to penetrate soft targets on impact. Penetration depends directly on the projectile's velocity, weight, and angle at which it hits. Ball and tracer rounds are usually small caliber (5.56 to 14.5 millimeters) and are fired from pistols, rifles, and machine guns.

Armor Piercing

2-31. Armor piercing rounds use shaped-charged or kinetic energy penetration warheads specially designed to penetrate armor plate and other types of homogeneous steel. They are used effectively against fuel supplies and storage areas.

HEAT (High Explosive Antitank)

2-32. HEAT rounds are designed to defeat armor through the use of shaped charge. A shaped charge is an explosive charge created so the force of the explosion is focused in a particular direction.

Special Purpose

2-33. There are many types of munitions that do not fit the profile of the two major categories (HE and penetration). These are called special purpose munitions. Examples are incendiary, obscuration, illumination, nuclear, and chemical rounds.

TRAJECTORY

2-34. Infantry Soldiers can more effectively engage moving enemy targets with low trajectory fire than high trajectory fire. Enemy reaction when engaged with friendly low trajectory fire is predictable: get down and seek frontal cover. When this happens, high trajectory fire can effectively engage enemy targets in fighting positions, holes, or deadspace where low trajectory fire cannot. Friendly high trajectory fire can also force the enemy to move out of the area and seek overhead cover, limiting their effectiveness.

2-35. Leaders create a dilemma for the enemy by combining low and high trajectory weapons. If the enemy gets up from his position and attempts to move, the automatic rifleman will engage him. If the enemy decides to stay in his position behind frontal cover, the grenadier will engage him. Either option results in the friendly force engaging the enemy. This united effect of the automatic rifleman and grenadier outweighs the effect either would have if they engaged the enemy without the other.

ENEMY TARGET TYPES

2-36. Weapons and munitions are designed for employment against the two general types of enemy targets: point, and area. A *point target* is located in a specific spot with a single aim point (enemy soldier, vehicle, piece of equipment). An *area target* is spread over an area with multiple aim points (formation of enemy soldiers, an enemy trench line). Some weapon systems such as machine guns and grenade launchers can effectively engage both point and area targets.

FIRE TEAM WEAPONS

2-37. The rate of fire is the number of rounds fired in a minute by a particular weapon system. The leader dictates the rate of fire for each weapon system under his control. There are two factors that contribute to

leader decisions about rates of fire: achieving fire superiority; and ammunition constraints. For information on equipment in the weapons squad or other supporting weapons, see Appendix A and Appendix B.

RIFLE

2-38. Rifleman and Infantry leaders are currently armed with the M4 rifle. The M4 rifle is a direct fire weapon that fires ball and tracer 5.56-mm ammunition. The rifleman's primary role is to kill the enemy with precision fire. In this capacity, the rate of fire for the M4 rifle is not based on how fast the Soldier can pull the trigger. Rather, it is based on how fast the Soldier can accurately acquire and engage the enemy. The second role of the rifleman is to engage likely or suspected enemy targets with suppressive fire.

M249 MACHINE GUN

2-39. The automatic rifleman is currently armed with an M249 machine gun. The M249 is a direct-fire, low trajectory weapon that is primarily used to fire ball tracer 5.56-mm ammunition linked at area targets. The M249 also has the ability to fire unlinked 5.56-mm ammunition in 30-round magazines, but reliability is greatly reduced. Firing with a magazine should be limited to emergency situations.

M240B MACHINE GUN

2-40. Two medium machine guns (currently the M240B) and crews are found in the Infantry platoon's weapons squad. Machine gunners are a self-contained support by fire element or with a rifle squad to provide long range, accurate, sustained fires against enemy Infantry, apertures in fortifications, buildings, and lightly-armored vehicles. Machine gunners also provide a high volume of short-range fire in self defense against aircraft. THE M240B fires 7.62-mm ammunition. Refer to Appendix A for further information on machine guns.

GRENADE LAUNCHER

2-41. The grenadier is currently armed with the M203 40-mm grenade launcher. The M203 is a direct fire, high trajectory weapon that can be used for either point or area targets. The M203 fires several types of munitions including, HE, high explosive dual purpose (HEDP) (antipersonnel/antiarmor), riot control (CS), buckshot, and signaling. As with the rifleman, the grenadier's rate of fire is based on how quickly he can accurately acquire and engage the enemy.

SHOULDER-LAUNCHED MUNITIONS

2-42. Shoulder-launched munitions (SLM) are lightweight, self-contained, single-shot, disposable weapons that consist of unguided free flight, fin-stabilized, rocket-type cartridges packed in launchers. SLM provide the Soldier a direct fire capability to defeat enemy personnel within field fortifications, bunkers, caves, masonry structures, and lightly armored vehicles. Soldiers use SLM to engage enemy combatants at very close ranges—across the street or from one building to another. Likewise, SLM may be fired at long distances to suppress the enemy or kill him. Soldiers may employ the SLM as a member of a support-by-fire element to incapacitate enemy forces that threaten the friendly assault element. When the assault element clears a building, the leader may reposition the SLM gunner inside to engage a potential counterattack force. Refer to Appendix B for further information on SLM.

COMPLEMENTARY AND REINFORCING EFFECTS AT THE FIRE TEAM LEVEL

2-43. One of the leader's primary duties is to control the distribution of his unit's fires. An Infantry team leader tasked to establish support by fire uses the principles of complementary and reinforcing effects to guide his unit's actions. The goal of each weapon system combination is to create an effect that outweighs the effects that either weapon system would make acting alone. The primary combination team leaders strive to employ are the weapons systems of the automatic rifleman and the grenadier. This combination is the center around which the remainder of the fire team's functions revolves.

THE RIFLEMAN

2-44. The rifleman's role when the grenadier and automatic rifleman combine their fires is to perform one of three functions:

- Reinforce the automatic rifleman. If necessary, the rifleman can replace the automatic rifleman for a short time.
- Fix another target while the automatic rifleman and grenadier destroy the target they are engaging.
- Provide security and observation.

THE TEAM LEADER

2-45. In weapon employment, the team leader's role is to maximize the complementary effects of the combination of the grenadier and automatic rifleman. He does this through using proper fire commands and control measures. The team leader's second role is to assume the duties of the rifleman if necessary.

SECTION III — ENGAGING THE ENEMY WITHOUT ENDANGERING FRIENDLY TROOPS

2-46. In the offense, effective friendly supporting fires require firing on enemy targets that are close to assaulting friendly Infantry Soldiers. A safe integration of fires and maneuver this close demands careful planning, coordination, and knowledge of the supporting weapons. In the defense, the most common close support is the final protective fire (FPF), which is normally placed very close to friendly positions. When planning close supporting fires for the offense or defense, leaders consider the effect required, accuracy of the delivery system, protection of Soldiers, integration of assets, timings and control, echelonment of fires, and tactical risk from enemy forces.

2-47. Munition effects do not distinguish between friendly forces, noncombatants, and the enemy. To inflict maximum casualties on the enemy while minimizing effects to friendly Soldiers and noncombatants, leaders must have an understanding of weapon-munition effects, SDZ, minimum safe distances (MSD), risk estimate distances (RED), and the terrain's influence on projectiles. Failure to account for characteristics of direct and indirect weapon systems when considering tactics, techniques, and procedures can result in serious unintended consequences.

2-48. There are many variables that impact on the accuracy of the weapon. Artillery and mortars are referred to as area weapon systems because every round fired from the same tube impacts in an area around target aiming point. This dispersion is greater in length than in width. The weather conditions (wind, temperature, and humidity), the condition of the weapon, and the proficiency of the crew also affect accuracy.

SURFACE DANGER ZONE

2-49. The SDZ is the ground and airspace for vertical and lateral containment of projectiles, fragments, debris, and components resulting from the firing, launching, or detonation of weapon systems (including explosives and demolitions). Each weapon system or munition has its own unique SDZ. The critical components of the SDZ are the primary danger area and the buffer zone.

2-50. Understanding the components of the SDZ enable leaders and their Soldiers to make good decisions concerning how close they can get to the effects of friendly weapon fire. SDZs are developed using precise technical data without considering the effects of terrain. This data should be consulted whenever exact specifications are required. However, because the technical data can be confusing, it is useful to describe SDZs in a general manner. For exact weapon SDZs (see DA Pam 385-63, *Range Safety*).

2-51. The primary danger area consists of the dispersion and ricochet area along the gun-target line for the maximum range of the weapon. The dispersion area is a 5-degree angle to the right and left of the gun-target line that accounts for human error, gun or cannon tube wear, and propellant temperature. The ricochet area contains any projectiles that make contact with surrounding terrain following the munition's

initial impact. It is located to the left and right of the dispersion area. The buffer zone is an area outside of the ricochet area allocated for additional safety measures. The buffer area exists to the sides of the gun-target line and at the far end of the weapon's maximum effect range.

DIRECT FIRE

2-52. For direct fire weapons, the risk of being hit by friendly munitions at the edge of the buffer zone is negligible. Based on the type of surface (earth, water, steel, or concrete), the risk increases significantly at the edge of the ricochet area. Risk is extremely high at the edge of the dispersion area. In accordance with DA PAM 385-63, the current level of acceptable risk in training is 1/1,000,000 (outside SDZ), but can be waived by the installation commander to 1/100,000 (outside ricochet area). In combat, most commanders use 1/100,000 (outside ricochet area) based upon METT-TC analysis and risk mitigation measures. Table 2-2 shows the probability of direct fire ricochets.

Table 2-2. Probability of ricochet.

Outside of Area	Probability
SDZ (Area A)	1/1,000,000
Ricochet area	1/100,000
Dispersion area	1/10,000

2-53. When Soldiers remain outside of the buffer zone, the probability of being hit by their own munitions is unlikely. This is true for training and combat. During training, units usually are not authorized to come any closer to the gun-target line than the buffer zone. However, there are many situations in combat that require Soldiers to get closer to the gun-target line of their supporting weapons than the buffer zone allows. In these situations, the leader must understand how to manage the risk to his unit. When assessing this risk the question for leaders to consider is: "Is the threat from the effects of my munitions greater than the threat from the enemy?"

REDUCING RISK

2-54. Given the uncertainty associated with combat and the threat of enemy action, leaders must understand how to reduce risks associated with fire and movement in proximity to direct and indirect fires. As a general rule, the dispersion and ricochet areas present an immediate danger to Soldiers. Observers and protective measures are therefore required.

2-55. The easiest way to protect friendly forces from unintended consequences of their own weapons is to always have an observer. Skilled observers can see the impact of the rounds and any maneuver elements near that area. In circumstances where assigning observers is not possible, leaders must take other measures to mitigate the risk of unintended consequences to friendly forces. Some of the most common include:

- Wearing and requiring Soldiers to wear protective equipment (body armor, Kevlar helmet, eye protection, hearing protection).
- Using terrain, natural or man-made, to mask effects of munitions.
- Adding a buffer zone of additional distance to the gun-target line.
- Using armored vehicles.
- Using graphic control measures.
- Ensuring a highly qualified Soldier is operating the weapons system.

MINIMUM SAFE DISTANCE AND RISK ESTIMATE DISTANCE

2-56. When determining risk with indirect fires, leaders use a combination of minimum safe distances (MSDs), and risk estimated distances (REDs). The MSD risk is designed for training and ensures that friendly Soldiers are far enough away from the effects of munitions so the risk to them is negligible. REDs refer to a safe distance away from a given type of friendly munitions and are only used in combat. REDs are divided into two categories based on the percent of incapacitation (PI) to friendly Soldiers, expressed as

.1 PI and 10 PI. The former (.1 PI) means that one in one thousand Soldiers will not be able to fight because of potential weapon munitions effects. The latter (10 PI) means that one in ten Soldiers will not be able to fight because of weapon effects. When MSDs and REDs are put together, the leader is able to manage his risk from negligible—to 10 PI—based on his distance from the impact of friendly supporting indirect fire. Table 2-3 contains a complete listing of MSDs and REDs for common fire support assets at maximum range of weapons systems. (At lesser ranges the RED decreases).

Table 2-3. MSDs and REDs for common fire support assets.

Weapon System	MSD (Training)	RED (Combat)	
		.1 PI	10 PI
60-mm Mortar (M224)	250m	175m	65m
81-mm Mortar (M252)	350m	230m	80m
120-mm Mortar (M120/M121)	600m	400m	100m
105-mm Artillery (M102/M119)	550m	275m	90m
155-mm Artillery (M109/M198)	725m	450m	125m
155-mm Artillery DPICM	725m	475m	200m

WARNING

REDs are for combat use and do not represent the maximum fragmentation envelopes of the weapons listed. REDs are not minimum safe distances for peacetime training use.

SECTION IV — EMPLOYING DIRECT FIRE

2-57. This section discusses direct fire control and employment rules of engagement, control measures, engagement techniques, fire commands, range cards, adjustments, and closure reports.

RULES OF ENGAGEMENT

2-58. The rules of engagement (ROE) specify the circumstances and limitations under which friendly forces may engage. They include definitions of combatant and noncombatant elements, and stipulate the treatment of noncombatants. Factors influencing ROE are national command policy, operational requirements, and the law of war. ROE always recognize a Soldier's right of self-defense while at the same time clearly defining circumstances in which he may fire.

CONTROL MEASURES

2-59. Direct fire control measures are the means by which the platoon leader or subordinate leaders control their unit's direct fires. Application of these concepts, procedures, and techniques assists the unit in acquiring the enemy, focusing fires on him, distributing the effects of the fires, effectively shifting fires, and preventing fratricide. No single measure is sufficient to effectively control fires. At the platoon level, fire control measures will be effective only if the entire unit has a common understanding of what the fire control measures mean and of how to employ them.

LEADER RESPONSIBILITIES

2-60. The Infantry platoon or squad leader communicates to his subordinates the manner, method, time to initiate, shift, mass fires, and when to disengage by using direct fire control measures. The leader should control his unit's fires so he can direct the engagement of enemy systems to gain the greatest effect. The commander uses the factors of METT-TC and reconnaissance to determine the most advantageous way to use direct fire control measures to mass the effects on the enemy and reduce fratricide from direct fire systems. He must understand the characteristics of weapon systems and available munitions (such as the danger to unprotected Soldiers when tanks fire, discarding sabot ammunition over Soldiers' heads or near them). The primary graphic direct fire control measures are—

- Unit boundary.
- Target reference point.
- Sector of fire.
- Engagement area (EA).

2-61. Other direct fire control measures include—

- Trigger line.
- Maximum engagement line (MEL).
- Final protective line (FPL).
- Principle direction of fire (PDF).
- Priority targets.

2-62. The noise and confusion of battle may limit the use of some of these methods. Therefore, the leader must select a method or combination of methods that will accomplish the mission. The leader should arrange to have a primary and secondary signaling method. The method may be positive (hands on) or procedural (prearranged). There are three types:

- (1) Audio (radio, whistle, personal contact).
- (2) Visual (hand-and-arm signals, pyrotechnics).
- (3) Written (OPORD, range card, sector sketch).

FIRE CONTROL PROCESS

2-63. To bring direct fires against an enemy force successfully, leaders must continuously apply the four steps of the fire control process. At the heart of this process are two critical actions intended to achieve decisive effects on the enemy: rapid, accurate target acquisition, and the massing of fires. Target acquisition is the detection, identification, and location of a target in sufficient detail to permit the effective employment of the platoon's weapons. Massing of fires focuses direct fires at critical points, then distributes the fires for optimum effect. The four steps of the fire control process follow.

- (1) Identify probable enemy locations and determine the enemy scheme of maneuver.
- (2) Determine where and how to mass (focus and distribute) direct fires' effects.
- (3) Orient forces to speed target acquisition.
- (4) Shift direct fires to refocus or redistribute their effects.

TERRAIN-AND THREAT-BASED FIRE CONTROL MEASURES

2-64. Table 2-4 lists the control measures by whether they are terrain or threat-based.

Table 2-4. Common fire control measures.

Terrain-Based Fire Control Measures	Threat-Based Fire Control Measures
Target reference point Engagement area Sector of fire Maximum engagement line Final protective line Principal direction of fire Final protective fire Restrictive firing line	Fire patterns Engagement priorities Weapons ready posture Weapons control status Trigger Weapons safety posture

Terrain-Based Fire Control Measures

2-65. The platoon leader uses terrain-based fire control measures to focus and control fires by directing the unit to engage a specific point or area rather than an enemy element. The following paragraphs describe the terrain-based fire associated with this type of control measure.

Target Reference Point

2-66. A TRP is a recognizable point on the ground that leaders use to orient friendly forces and to focus and control friendly direct and indirect fires. Soldiers use TRPs for target acquisition and range determination. Leaders designate TRPs to orient fires to a particular point, define sectors of fire and observation, and define the limits of an EA. A TRP can also designate the center of a sector or an area where the leader plans to distribute or converge with fires. In addition, when TRPs are designated as indirect fire targets, they can be used in calling for and adjusting indirect fires. Leaders designate TRPs at probable enemy locations and along likely avenues of approach. These points can be natural or man-made. A TRP can be an established site such as a hill or a building, or a feature designated as an impromptu TRP such as a burning enemy vehicle or smoke generated by an artillery round. Friendly units also can construct markers to serve as TRPs (Figure 2-3). TRPs include the following features and objects:

- Prominent hill mass.
- Distinctive building.
- Observable enemy position.
- Destroyed vehicle.
- Ground-burst illumination.
- Smoke round.
- Laser point.

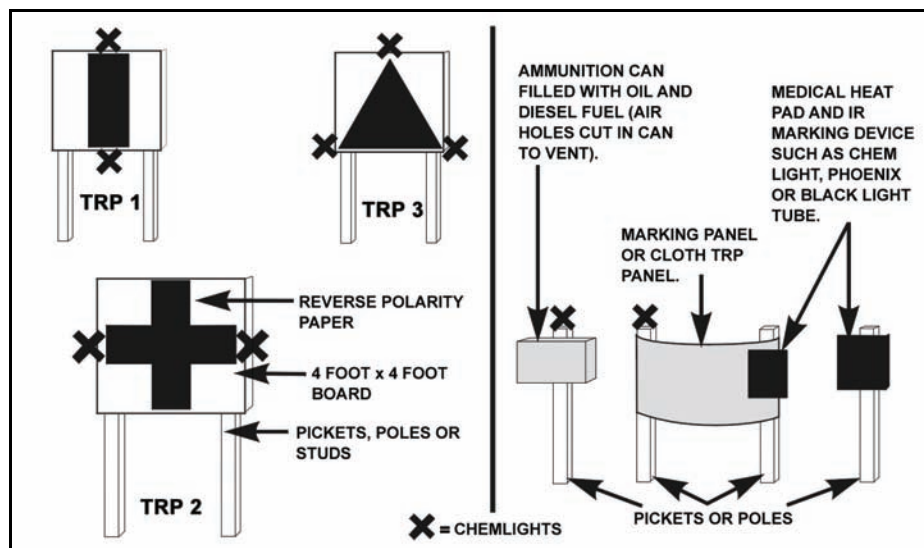


Figure 2-3. Example of constructed TRP markers.

2-67. Leaders designate natural terrain features, man-made terrain features, or any other visual means to be used as TRPs. While TRPs should be visible through all spectrums available to the unit, they should be visible in three observation modes (unaided, passive-infrared, and thermal). They must be easily identifiable to the defender during daylight, should be heated so they can be recognized with thermal sights, and should have an infrared signature so they can be recognized through night vision devices.

2-68. Leaders number TRPs for easy reference. For indirect fire systems, these numbers are assigned as targets (for example, AB1001). For direct fire systems, leaders use any system that is easy and recognizable to their subordinates. Figure 2-4 shows an example of a TRP numbering system when operating in a built-up area. The building and corner numbering system starts at the southwest corner of the objective area. Figure 2-5 shows an example of window and door numbering. In this technique, no distinction is made between windows and doors unless specified. The numbering and lettering always start at the bottom left of any completely visible structure. If a structure is obscured, an estimate is necessary until a more exact call can be made. Corrections to supporting fires are given like indirect fire corrections (for example, left 2, down 1).

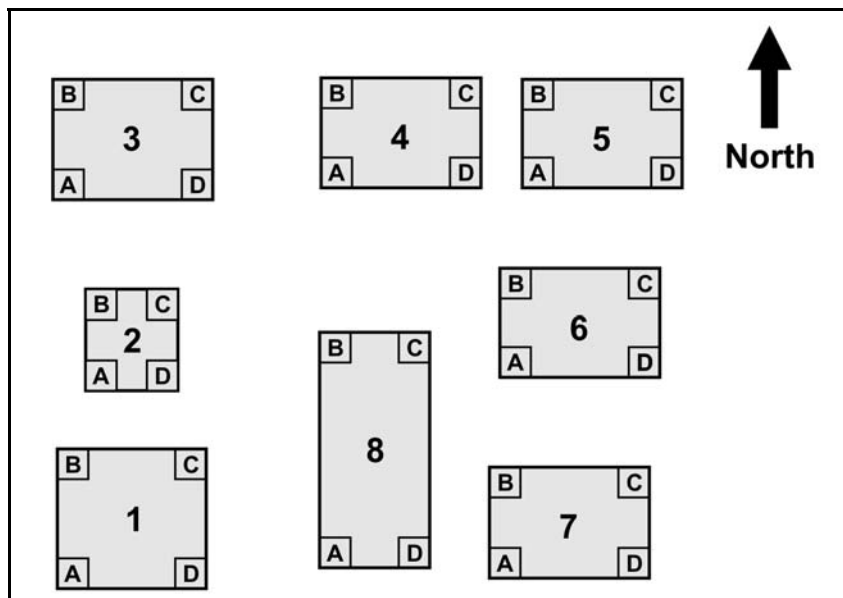


Figure 2-4. Example of TRP numbering system.

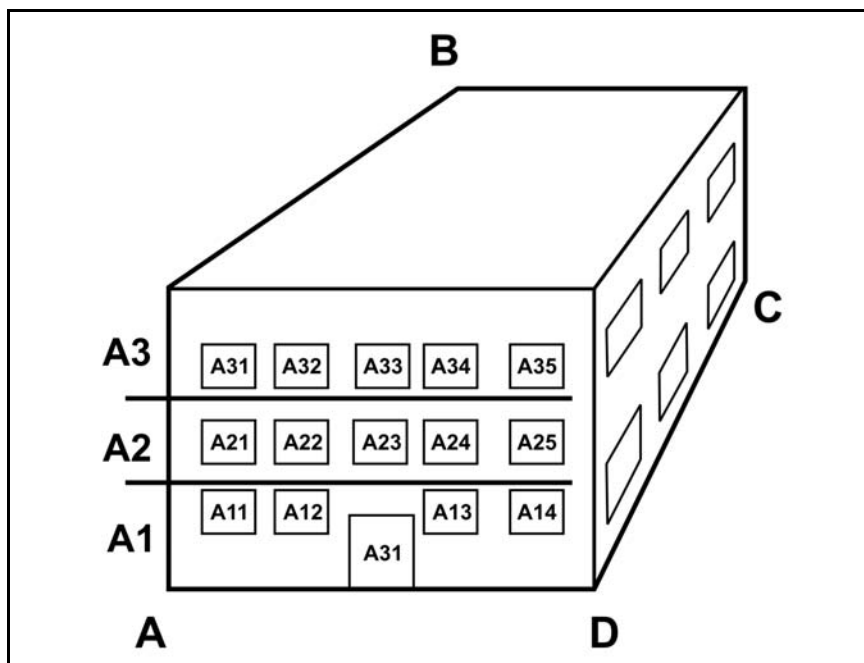


Figure 2-5. Example of window and door numbering.

Engagement Area

2-69. The engagement area (EA) is an area along a likely enemy avenue of approach where the platoon leader intends to mass the fires of all available weapons to destroy an enemy force. The size and shape of the EA are determined by the degree of relatively unobstructed visibility available to the friendly unit's weapons systems in their firing positions, and by the maximum range of those weapons. For an engagement area to be effective, the enemy must either choose to move through the area or be forced or channeled into the area by friendly action (obstacles, indirect fire). Typically, commanders delineate responsibility within the EA by assigning each platoon a sector of fire or direction of fire. These fire control measures are covered in the following paragraphs.

Sector of Fire

2-70. Leaders assign sectors of fire to Soldiers manning weapons or to a unit to cover a specific area of responsibility with observation and direct fire. In assigning sectors of fire, leaders consider the number and type of weapons available. The width of a sector of fire is defined by a right and left limit. Leaders may limit the assigned sector of fire to prevent accidental engagement of an adjacent friendly unit. The depth of a sector is usually the maximum range of the weapon system unless constrained by intervening terrain or by the leader (using a maximum engagement line [MEL]). At the platoon level, sectors of fire are assigned to each subordinate by the leader to ensure that the unit's area is completely covered by fire. Targets are engaged as they appear in accordance with established engagement priorities. Means of designating sectors of fire include:

- TRPs.
- Azimuth.
- Clock direction.
- Terrain-based quadrants.
- Friendly-based quadrants.

2-71. **Types of Sectors.** Leaders should assign a primary and a secondary sector of fire. The primary sector is the first priority; Soldiers and units are responsible for engaging and defeating the enemy here first. Fire then shifts to the secondary sector on order, when there are no targets in the primary sector, or when the leader needs to cover the movement of another friendly element. This secondary sector of fire can

correspond to another friendly element's primary sector of fire to obtain overlapping fires and mutual support.

2-72. Overlapping and Divided Sectors. When assigning sectors, leaders attempt to build in mutual support and redundancy. By building redundancy into the observation and fire plan, leaders increase their probability of early detection of the enemy. Two common techniques are overlapping a sector and dividing a sector (Figure 2-6).

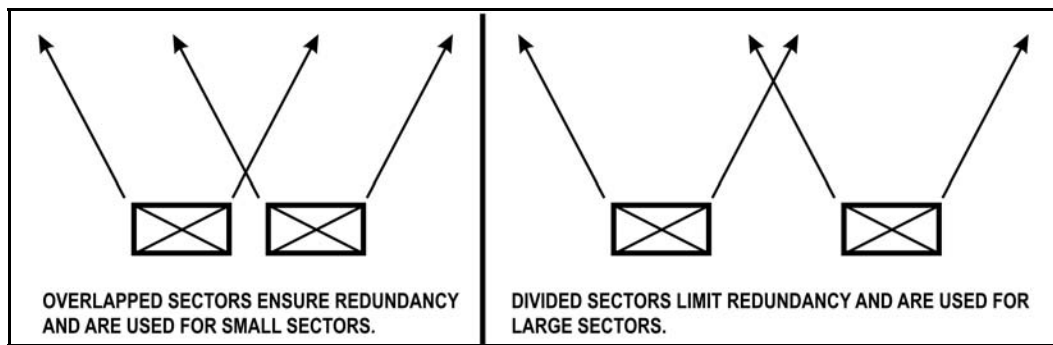


Figure 2-6. Overlapping and divided sectors.

2-73. Dead Space. It is important to identify dead space within a sector of fire. Dead space is any area that cannot be observed or covered by direct-fire weapons systems, including where the waist of a Soldier falls below a gunner or automatic rifleman's point of aim. When stationary, the most accurate method for determining dead space is to have one Soldier walk the weapon's line of sight and make a pace count of those areas where he encounters dead space. When the Soldier is not able to walk the line of fire, he can also determine dead space by observing the flight of tracer ammunition from a position behind and to the flank of the weapon.

2-74. All dead space within the sector must be identified to allow the leader and subordinate leaders to plan high trajectory fires (mortars, artillery, or M203) to cover that area.

2-75. Searching the Sector. Searching is the act of carefully watching the assigned sector. Individual and unit observation plans are inherent in all military operations. Individual Soldiers scan their sectors by conducting a rapid scan followed by a slow scan. When conducting a rapid scan, Soldiers make a quick overall search for obvious targets and unnatural colors, outlines, or movement. They follow the rapid scan with a slow deliberate scan, searching for signatures and indicators of common targets. Soldiers who use a more deliberate method to scan their sectors are generally more successful at detecting targets.

Maximum Engagement Line

2-76. The maximum engagement line (MEL) is the depth of the sector and is normally limited to the maximum effective engagement range of the weapons systems. However, it is also influenced by the enemy target description and the effects of terrain. Slope, vegetation, structures, and other features provide cover and concealment that may prevent the weapon from engaging out to the maximum effective range. To assist in determining the distance to each MEL, Soldiers should use a map to ensure the MELs are depicted accurately on the range card. Identifying the MEL prevents squads from engaging targets beyond the maximum effective ranges of their weapon systems and establishes criteria for triggers. This decreases needless and ineffective ammunition expenditure during an engagement.

Final Protective Line

2-77. If a final protective line (FPL) is assigned, a machine gun is sighted along it to employ grazing fire except when other targets are being engaged. An FPL becomes the machine gun's contribution to the unit's final protective fire (FPF). An FPL is fixed in direction and elevation. However, a small shift for search must be employed to prevent the enemy from crawling under the FPL. A small shift will also compensate for irregularities in the terrain or the sinking of the tripod legs into soft soil during firing.

Principal Direction of Fire

2-78. A PDF is generally assigned when the terrain does not lend itself to a FPL. A PDF is a direction of fire that is assigned priority to cover an area that has good fields of fire or has a likely dismounted avenue of approach. It also provides mutual support to the adjacent unit. Machine guns are sighted using a PDF if an FPL has not been assigned. If a PDF is assigned and other targets are not being engaged, machine guns remain on the PDF. The main difference between a PDF and an FPL is that the PDF is a sector, while the FPL is a fixed line. Means of designating a direction of fire include—

- Closest TRP.
- Clock direction.
- Cardinal direction and or magnetic azimuth.
- Tracer on target.
- Infrared laser pointer.

Final Protective Fire

2-79. The FPF is a line of fire established where an enemy assault is to be checked by the interlocking fires of all available friendly weapons, to include indirect fire. The FPF is reinforced with protective obstacles whenever possible. Initiation of the FPF is the signal for all squads, crews, and individual Soldiers to shift fires to their assigned portion of the FPL.

Restrictive Fire Line

2-80. An RFL is a linear fire control measure beyond which fires are prohibited without coordination. In the offense, the platoon leader may designate an RFL to prevent a base-of-fire squad(s) from firing into the area where an assaulting squad(s) is maneuvering. This technique is particularly important when mechanized vehicles directly support the maneuver of Infantry squads. In the defense, the platoon leader may establish an RFL to prevent squads from engaging one of the platoon's other rifle squads positioned in restricted terrain on the flank of an enemy avenue of approach. Figure 2-7 illustrates fire control measures on an example platoon sector sketch.

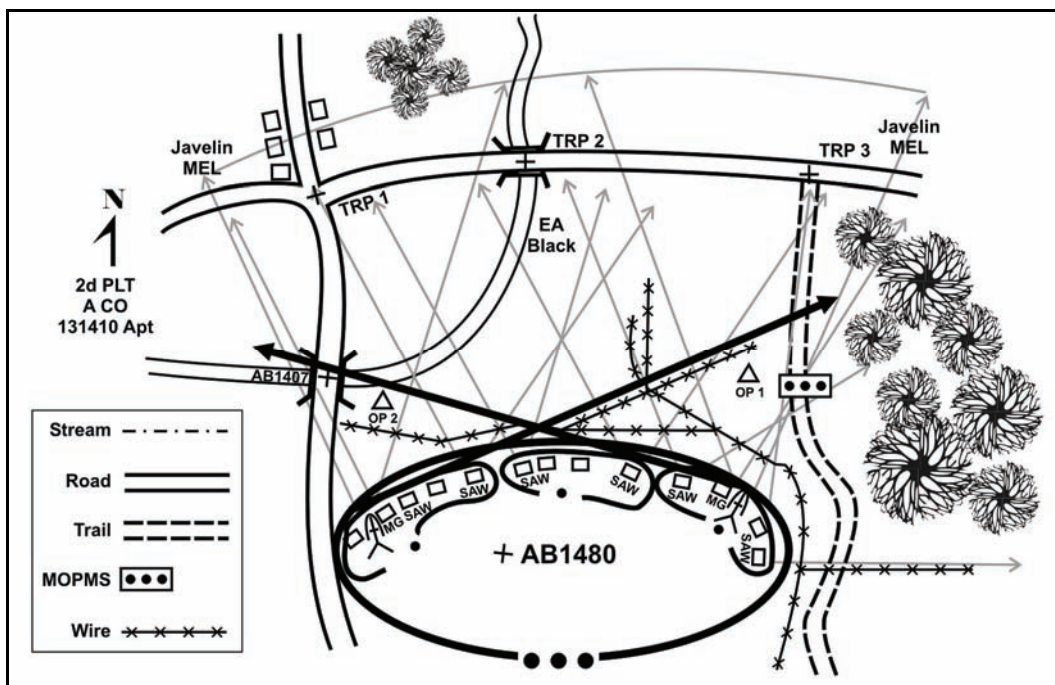


Figure 2-7. Example of fire control measures in platoon sector sketch.

Threat-Based Fire Control Measures

2-81. The platoon leader uses threat-based fire control measures to focus and control fires by directing the unit to engage a specific, templated enemy element rather than fire on a point or area. Threat-based fire control measures may be difficult to employ against an asymmetric threat. The following paragraphs describe the threat-based fire associated with this type of control measure.

Fire Patterns

2-82. Fire patterns are a threat-based measure designed to distribute the fires of a unit simultaneously among multiple, similar targets. Platoons most often use them to distribute fires across an enemy formation. Leaders designate and adjust fire patterns based on terrain and the anticipated enemy formation. The basic fire patterns are frontal fire, cross fire, and depth fire (Figure 2-8).

2-83. **Frontal Fire.** Leaders may initiate frontal fire when targets are arrayed in front of the unit in a lateral configuration. Weapons systems engage targets to their respective fronts. For example, the left flank weapon engages the left-most target; the right flank weapon engages the right-most target. As they destroy enemy targets, weapons shift fires toward the center of the enemy formation and from near to far.

2-84. **Cross Fire.** Leaders initiate cross fire when targets are arrayed laterally across the unit's front in a manner that permits diagonal fires at the enemy's flank, or when obstructions prevent unit weapons from firing frontally. Right flank weapons engage the left-most targets; left flank weapons engage the right-most targets. Firing diagonally across an EA provides more flank shots, increasing the chance of kills. It also reduces the possibility that friendly elements will be detected if the enemy continues to move forward. As they destroy enemy targets, weapons shift fires toward the center of the enemy formation.

2-85. **Depth Fire.** Leaders initiate depth fire when targets are dispersed in depth perpendicular to the unit. Center weapons engage the closest targets; flank weapons engage deeper targets. As they destroy targets, weapons shift fires toward the center of the enemy formation.

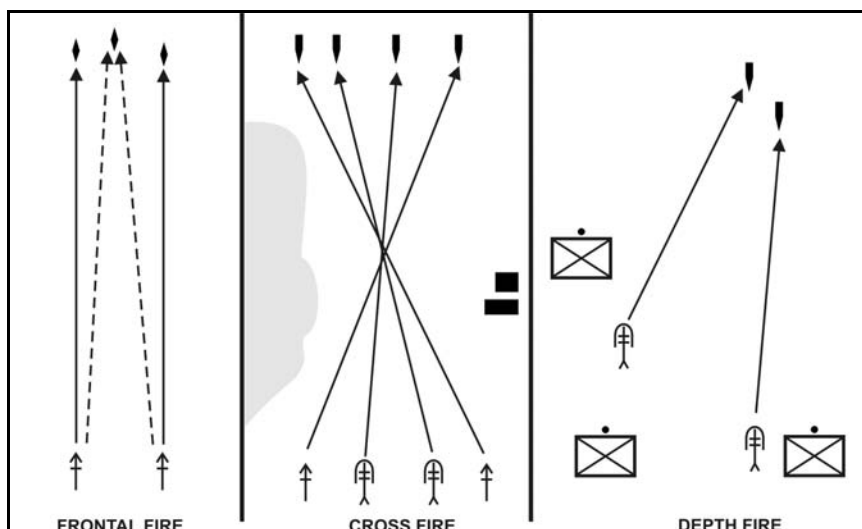


Figure 2-8. Fire patterns.

Engagement Priority

2-86. In concert with his concept of the operation, the company commander determines which target types provide the greatest payoff or present the greatest threat to his force. He then establishes these as a unit engagement priority. The platoon leader refines these priorities within his unit. Engagement priority specifies the order in which the unit engages enemy systems or functions. Engagement priorities are situational dependent. Subordinate elements can have different engagement priorities. For example, the leader establishes his engagement priorities so his medium machine guns engage enemy unarmored

vehicles while his SLM and CCMS engage enemy tanks. Normally, units engage the most dangerous targets first, followed by targets in depth.

Weapons-Ready Posture

2-87. To determine the weapons-ready posture, leaders use their estimate of the situation to specify the ammunition and range for the engagement. Range selection is dependent on the anticipated engagement range. Terrain, visibility, weather, and light conditions affect range selection.

2-88. Within the platoon, weapons-ready posture affects the types and quantities of ammunition carried by the rifle and weapons squads.

2-89. For Infantry squads, weapons-ready posture is the selected ammunition and indexed range for individual and crew-served weapons. For example, an M203 grenadier whose likely engagement is to cover dead space at 200 meters from his position might load HEDP rounds. He will also set 200 meters on his quadrant sight for distance to the dead space. To prepare for an engagement in a wooded area where engagement ranges are extremely short, antiarmor specialists may be armed with SLM instead of CCMS.

Weapons Control Status

2-90. The three levels of weapons control status outline the conditions, based on target identification criteria, under which friendly elements may engage. The platoon leader sets and adjusts the weapons control status based on friendly and enemy disposition, and the clarity of the situation. In general, the higher the probability of fratricide, the more restrictive the weapons control status. The three levels are—

- **Weapons Hold.** Engage only if engaged or ordered to engage.
- **Weapons Tight.** Engage only targets that are positively identified as enemy.
- **Weapons Free.** Engage any targets that are not positively identified as friendly.

2-91. As an example, the platoon leader may establish the weapons control status as weapons hold when other friendly forces are passing friendly lines. Or the platoon leader may be able to set a weapons free status when he knows there are no friendly elements in the vicinity of the engagement. This permits his elements to engage targets at extended ranges even though it is difficult to distinguish targets accurately at ranges beyond 2,000 meters under battlefield conditions. The platoon leader may change the weapons control status for his elements based on situational updates. Weapons control status is extremely important for forces using combat identification systems. Establishing the weapons control status as weapons free permits leaders to engage an unknown target when they fail to get a friendly response.

Trigger

2-92. Triggers are an event or time-oriented criteria used to initiate planned actions to achieve surprise and inflict maximum destruction on the enemy. A designated point or points (selected along identifiable terrain) in an engagement area used to mass fires at a predetermined range (FM 1-02). Triggers can be a physical point on the ground (trigger line), a laser or lazed spot, or an action or event that causes friendly forces to do something. When using triggers to control fires, leaders ensure they have allocated them to start, shift, and cease fires. Leaders use triggers within the context of the ROE and the weapons control status. For example, a leader might say, WAIT UNTIL ENEMY SOLDIERS CROSS PL BLUE BEFORE ENGAGING.

2-93. A trigger line is a phase line used to mass fires at a predetermined range. The trigger line can be used when attacking or defending. In the offense, the trigger line is preferably perpendicular to the friendly axis of advance and is used to initiate or cease fires when reached by the unit. If defending, the leader initiates fire as the enemy reaches the trigger line.

Weapons Safety Posture

2-94. The weapons safety posture is an ammunition-handling command that allows leaders to control the safety status of their weapons. Soldier adherence to and leader supervision of the weapons safety posture prevents accidental discharge of weapons. Examples include:

- Handling live ammunition and weapons in peace time training in the same safe way during combat.
- Finger off the trigger and weapon on safe.
- Hand grenades attached correctly to the ammo pouches.
- Safety zones and back blast areas enforced.
- Strict enforcement of unit weapons and ammunition-handling SOPs at all times.

ENGAGEMENT TECHNIQUES

2-95. Engagement techniques are effects-oriented fire distribution measures. The most common engagement techniques in platoon operations are—

- Point fire.
- Area fire.
- Volley (or simultaneous) fire.
- Alternating fire.
- Sequential fire.
- Observed fire.
- Time of suppression.
- Reconnaissance by fire.

POINT FIRE

2-96. Point fire involves concentrating the effects of the platoon or squad's fire against a specific, identified target such as an enemy vehicle, machine gun bunker, or ATGM position. When leaders direct point fire, all the unit's weapons engage the target. They fire until they destroy it, or until the required time of suppression expires. Employing converging fires from dispersed positions makes point fire more effective because the target is engaged from multiple directions. The unit may initiate an engagement using point fire against the most dangerous threat, and then revert to area fire against other, less threatening point targets.

AREA FIRE

2-97. Area fire involves distributing the effects of a unit's fire over an area in which enemy positions are numerous or are not obvious. Typically, the primary purpose of area fire is suppression. However, sustaining effective suppression requires judicious control of the rate of fire.

VOLLEY FIRE

2-98. Volley fire is released when two or more firers engage a single target and the range is known. These firers engage the target at the same time on a prearranged signal such as a command, whistle, booby trap, mine, or TRP. This can be the most effective means of engagement as it places the most possible rounds on one enemy target at one time, thereby increasing the possibility of a kill.

2-99. Units employ simultaneous fire to rapidly mass the effects of their fires or to gain fire superiority. For example, a unit may initiate a support-by-fire operation with simultaneous fire, and then revert to alternating or sequential fire to maintain suppression. Volley fire is also employed to negate the chance that one of the Soldiers might miss his intended target with fire from his SLM. For example, a squad may employ volley fire with its SLM to ensure rapid destruction of an enemy vehicle that is engaging a friendly position.

ALTERNATING FIRE

2-100. During alternating fire, pairs of elements continuously engage the same point or area targets one at a time. For example, an Infantry platoon may alternate the fires of a pair of machine guns. Alternating fire

permits the unit to maintain suppression for a longer duration than does volley fire. It also forces the enemy to acquire and engage alternating friendly points of fire.

SEQUENTIAL FIRE

2-101. In sequential fire, the subordinate elements of a unit engage the same point or area target one after another in an arranged sequence. Sequential fire can also help prevent the waste of ammunition, as when rifle squads wait to see the effects of the first CCMS before firing another. Additionally, sequential fire permits elements that have already fired to pass on information they have learned from the engagement. For example, an Infantryman who missed a BMP with SLM fires could pass range and lead information to the next Soldier preparing to engage the BMP with a SLM.

OBSERVED FIRE

2-102. Observed fire allows for mutual observation and assistance while protecting the location of the observing element and conserving ammunition. The company commander may employ observed fire between elements in the company. He may direct one platoon to observe while another platoon engages the enemy. The platoon may use observed fire when it is in protected defensive positions with engagement ranges of more than 800 meters. For example, the platoon leader may direct the weapons squad to engage an enemy at long range and the Infantry squads to observe the effects of the fires. The observing elements prepare to engage the enemy on order in case the weapons squad fails to effectively engage the enemy, encounters weapon malfunctions, or runs low on ammunition.

TIME OF SUPPRESSION

2-103. Time of suppression is the period, specified by the platoon leader, when an enemy position or force must be suppressed. Suppression time is typically dependent on the time it will take a supported element to maneuver, so suppression is generally more event- than time-driven. Normally, a friendly unit suppresses an enemy position using the sustained rate of fire of its automatic weapons. In planning for sustained suppression, leaders must consider several factors, including:

- The estimated time of suppression.
- The size of the area being suppressed.
- The type of enemy force to be suppressed.
- The range to the enemy target.
- The rates of fire.
- The available ammunition quantities.

RECONNAISSANCE BY FIRE

2-104. Reconnaissance by fire is the process of engaging possible enemy locations to elicit a tactical response from the enemy, such as return fire or movement. This response permits Infantry leaders to make accurate target acquisition and to mass fires against the enemy element. Typically, the platoon leader directs a subordinate squad to conduct the reconnaissance by fire. He may, for example, direct an overwatching squad to conduct the reconnaissance by fire against a probable enemy position before initiating movement by the bounding squad(s).

FIRE COMMANDS

2-105. Fire commands are the technical instructions used to initiate fires and can be used for individuals, crews, or units (but for simplicity, this section just refers to Soldiers). Fire commands are used to initiate, control, and synchronize fires. The fire command procedure takes the principles of direct fire employment and puts them into a coherent, usable format.

2-106. There are two types of commands: initial fire commands (issued to commence firing); and subsequent fire commands (issued to change firing data and to cease firing). The elements of both commands follow the same sequence. Subsequent commands include only such elements that are changed.

A correct fire command is brief, clear, and includes all the elements necessary for accomplishing the mission. Fire commands are sent to the firing unit or gunner by the best understood means (visually or vocally). To limit errors in transmission, the person receiving the commands repeats each element as it is received.

2-107. Fire commands for direct fire weapons consist of six elements: alert, location, target description, method of engagement, ammunition, and execution. When and how the leader issues a fire command is not as important as covering the information in the fire command with his subordinates. Frequently, especially at the fire team and crew-served weapon level, leaders use the elements of a fire command without adhering to a strict format. The point is not that the leader adheres to a format, but that he maintains positive control over his subordinates' fires. However, using a more formal approach to fire commands usually provides more clarity and certainty for Soldiers and crews.

ELEMENTS OF A FIRE COMMAND

2-108. Fire commands consist of—

- **Alert.** The leader designates which weapon(s) is to fire by weapon type, Soldier's position, or Soldier's name.
- **Location.** The leader guides the Soldier onto the target.
- **Target Description.** The leader identifies the target. For multiple targets, he also tells which target to engage first.
- **Method of Engagement.** The leader tells the Soldier how to deliver the fire onto the target.
- **Ammunition.** The leader tells the Soldier which ammunition to use if munitions are other than HE (this applies to M203 only).
- **Execution (Time).** The leader reconfirms that the target is hostile, then gives an execution command.

2-109. The full fire command is given when targets are not obvious and sufficient time is available to issue a full order.

2-110. Brief fire commands are given when the target is obvious and time is limited.

2-111. Delayed fire commands are used when the leader can anticipate what is going to happen. The Soldier or unit gets ready to fire but waits until the right moment before opening fire.

2-112. Subsequent fire commands are used to make adjustments in direction and elevation, change rates of fire after a fire mission is in progress, interrupt fires, or to terminate the alert.

TERMS AND TECHNIQUES

2-113. The following list of terms and techniques clarify the different elements of the fire command.

Location

2-114. Leaders can use one or more of the following methods to assist Soldiers in locating and distinguishing between targets (Table 2-5).

- **Use of Laser/Tracer.** ("On my laser/tracer.") To prevent loss of surprise when using tracer to designate targets, the leader's tracer fire becomes the last element of the fire command.
- **The Clock Method.** An imaginary clock face is superimposed on the landscape with 12 o'clock being the direction of travel.
- **The TRP Method.** The leader uses the closest, easily-recognizable point on the ground.
- **Cardinal Direction.** Uses general compass directions (N, NE, E, SE, S, SW, W, and NW).
- **Pointing.** The leader points his finger or weapon in the general direction of the target.
- **Orally.** The leader gives the direction to the target in relation to the Soldier's position (for example, front, left front, right front).

Table 2-5. Common means of identifying and marking target locations.

Terrain Features	Naked Eye (Day/Night)	Thermals (All Used at Night)
Hilltops	Azimuth (degree, mil) (D/N)	Burn barrels
Roads/streets	VS-17 panel (D)	BBQ grills
Streams	Engineer tape (D)	Reverse polarity paper
Road intersections	Chem light bundle (N)	Heated ammo can
Building corners	Strobe light (N)	IR (N)
Anything easily identifiable	Illumination (D/N)	Lasers (PAQ-4, PEQ-2, GCP, AIM 1)
	Pyrotechnics (D/N)	Beacon/firefly strobe
	Tracer fire (D/N)	Strobe light
	Destroyed vehicle (D/N)	

2-115. In defensive operations, the team leader and weapons squad leader use existing features as TRPs, or they can emplace specially-made markers. The Soldier captures these TRPs and sectors on a range card. In offensive operations, leaders normally predetermine location for TRPs and sectors based on the scheme of maneuver of the platoon leader or commander. These TRPs and sectors are useful for planning. However, the team leader/weapons squad leader must confirm them once they actually get on the ground.

Target Description

2-116. The most natural way for a leader to control his subordinates' fire when in contact is to simply describe the intended target(s). There are several terms used to shortcut the process, though leaders can use whatever means possible to ensure understanding. To shorten the target description, the team leader or weapons squad leader describes standard targets with standard procedure words (Table 2-6).

Table 2-6. Target descriptions and terms.

Target Type	Procedure Word
Tank or tank-like target	Tank
Personnel carrier	PC
Unarmored vehicle	Truck
Personnel	Troops
Helicopter	Chopper
Machine gun	Machine gun
Antitank gun or missile	AT weapon or RPG
Bunker	Bunker
Trench line	Trench
Urban structures	Door, window, room

Method of Engagement

2-117. The leader uses control to convey how he wants the target attacked. Common forms of this element of the fire command are—

- **Rates of Fire.** When changing rates, the leader needs only indicate rapid, sustained, or scan and shoot.
- **Machine Gun Manipulation.** Manipulation dictates the class of fire with respect to the weapon and is announced as FIXED, TRAVERSE, SEARCH, or TRAVERSE AND SEARCH.

Execution

- 2-118. The leader uses one of the following orders to initiate fires:
- **Fire.** The default rate of fire is at the sustained rate. The command to fire can occur in more than one form, including:
 - Pre-arranged visual signal.
 - Pre-arranged event.
 - Pre-arranged audio signal.
 - **Rapid Fire.** Open fire at the rapid rate.
 - **Scan and Shoot.** Fire when targets appear in the designated sector.
 - **At My Command.** Be prepared to fire but do not initiate until the order to fire is given.

HAND-AND-ARM SIGNALS

- 2-119. Following are commonly used hand-and-arm signals for fire control (Figure 2-9).
- **Ready.** The Soldier indicates that he is ready to fire by yelling, UP or raising his hand above his head toward the leader.
 - **Commence Firing or Change Rate of Firing.** The leader brings his hand (palm down) to the front of his body about waist level and moves it horizontally in front of his body. To signal an increase in the rate of fire, he increases the speed of the hand movement. To signal slower fire, he decreases the speed of the hand movement.
 - **Change Direction or Elevation.** The leader extends his hand and arm in the new direction and indicates the amount of change necessary by the number of fingers extended. The fingers must be spread so the Soldier can easily see the number of fingers extended. Each finger indicates 1 meter of change for the weapon. If the desired change is more than 5 meters, the leader extends his hand the number of times necessary to indicate the total amount of change. For example, *right nine* would be indicated by extending the hand once with five fingers showing and a second time with four fingers showing for a total of nine fingers.
 - **Interrupt or Cease Firing.** The leader raises his hand and arm (palm outward) in front of his forehead and brings it downward sharply.
 - **Other Signals.** The leader can devise other signals to control his weapons. A detailed description of hand-and-arm signals is given in FM 21-60, *Visual Signals*.

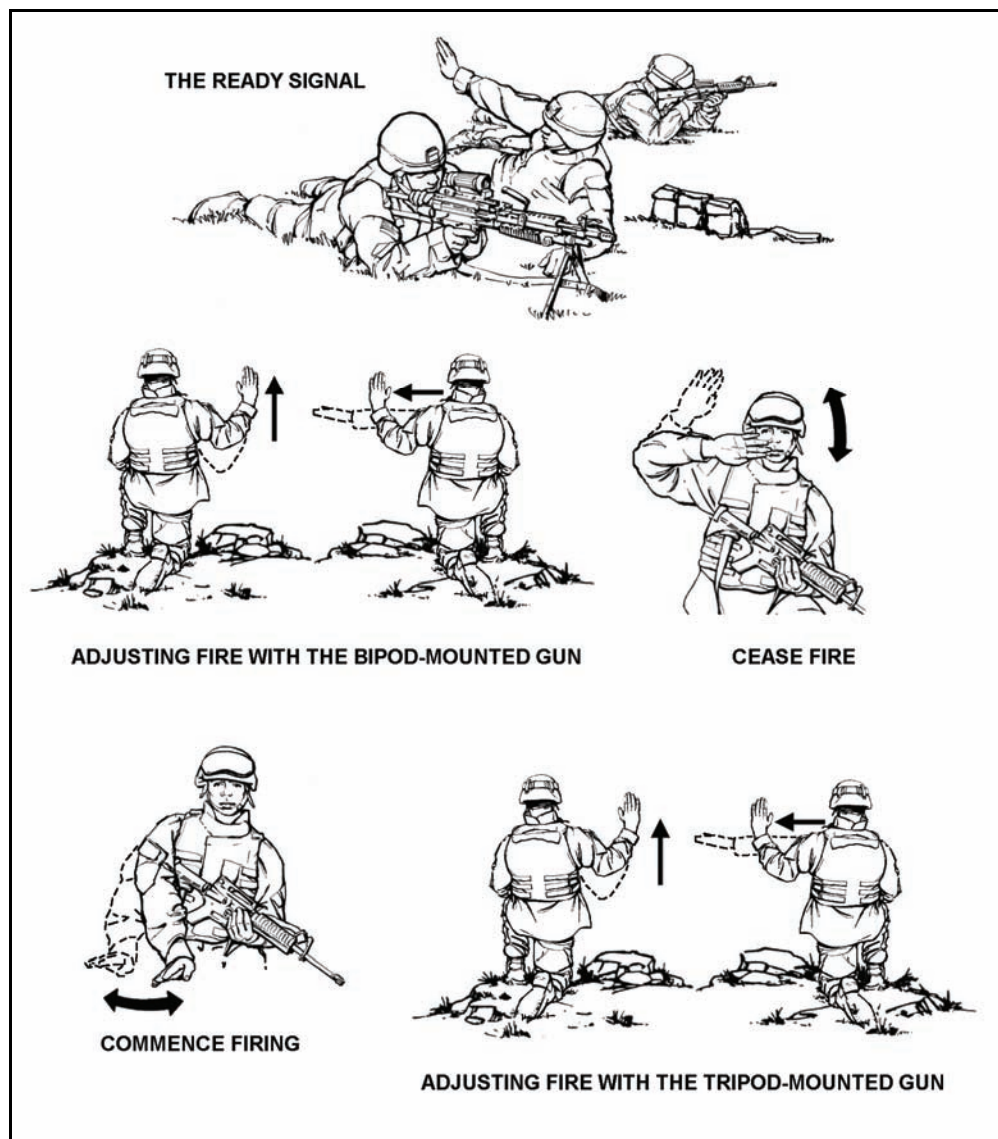


Figure 2-9. Hand-and-arm signals.

RANGE CARDS

2-120. A range card (DA Form 5517-R, *Standard Range Card*) is a sketch of the assigned sector for a direct fire weapon system on a given sector of fire (Figure 2-10). A range card aids in planning and controlling fires and aids the crews and squad gunners in acquiring targets during periods of limited visibility. Range cards show possible target areas and terrain features plotted in relation to a firing position. The process of walking and sketching the terrain to create a range card allows the individual Soldier or gunner to become more familiar with his sector. Range cards also aid replacement personnel in becoming oriented on the sector. Soldiers should continually assess the sector, and if necessary, update their range cards.

STANDARD RANGE CARD <small>For use of this form see FM 3-21.71; the proponent agency is TRADOC.</small>					
SQD <u>2</u> PLT <u>1</u> CO <u>C</u>	May be used for all types of direct fire weapons.				 MAGNETIC NORTH
DATA SECTION					
POSITION IDENTIFICATION <u>FL93668141</u>				DATE <u>9 Jun 05</u>	
WEAPON <u>M240B</u>			EACH CIRCLE EQUALS <u>100 METERS</u>		
NO.	DIRECTION/DEFLECTION	ELEVATION	RANGE	AMMO	DESCRIPTION
1		+50/3	600		FPL
2	R350°	+50/45	600		LONE TREE
3	L300°	0/20	650		TRAIL JUNCTION
REMARKS:					

DA Form 5517-R, FEB 86

Figure 2-10. Example of completed DA Form 5517-R range card (primary sector with final protective line).

ADJUSTMENTS

2-121. Direct fire adjustments are fairly easy to make because the observer is also the shooter. However, when using an observer or spotter, direct fire adjustments are similar to those of indirect fire adjustments. This includes making deviation and range corrections. Deviation corrections move the round right or left toward the target, while range corrections add or drop the round toward the target with respect to the observer.

CLOSURE REPORT

2-122. The closure report completes the mission and provides a battle damage assessment. The report should go to both the FDC and the parent unit. Higher headquarters staff officers use battle damage assessment to update their running estimate and feed the common operating picture (COP).

SECTION V — EMPLOYING INDIRECT FIRES

2-123. The purpose of this section is to discuss techniques associated with calling for and adjusting indirect fires.

CALL FOR FIRE

2-124. The battalion fire support execution matrix may require the platoon to call for and adjust its own indirect fire support. Normally, the battalion fire support annex will designate company targets. However, the matrix also might designate platoon targets. The platoon uses these preplanned artillery targets to call for and adjust indirect fire. Either a Soldier or a forward observer (FO) can prepare and request a call for fire. To receive immediate indirect fire support, the observer must plan targets and follow proper call-for-fire procedures. If available, he should use a GPS and laser range finder.

2-125. The call for fire consists of required and optional elements. If the observer is untrained, FDC personnel are trained to assist him in the call-for-fire procedure and subsequent adjustments by asking leading questions to obtain the information needed. Optional elements, methods of engagement, and methods of fire and control require a relatively high level of experience, but are not necessary to get fire support.

REQUIRED ELEMENTS

2-126. Calls for fire must include the following three elements:

- Observer identification and warning order.
- Target location.
- Target description.

Observer Identification and Warning Order

2-127. Observer identification tells the fire direction center (FDC) who is calling. It also clears the net for the duration of the call. The WARNO tells the FDC the type of mission and the method of locating the target. The types of indirect fire missions are adjust fire, fire for effect (FFE), suppress, and immediate suppression.

Adjust Fire

2-128. Use this command when uncertain of target location. Calling an adjust fire mission means the observer knows he will need to make adjustments prior to calling a fire for effect.

Fire for Effect

2-129. Use this command for rounds on target, no adjustment. An example of this situation is if it is known that the target is in building X. Building X is easily identified on the map as Grid ML 12345678910.

Suppress

2-130. Use this command to obtain fire quickly. The suppression mission is used to initiate fire on a preplanned target (known to the FDC) and unplanned targets. An example is calling for fire to force the enemy to “get down and seek cover.” This should enable friendly forces to close with and destroy the enemy with direct fire.

Immediate Suppression

2-131. Use this command to indicate the platoon is already being engaged by the enemy. Target identification is required. The term “immediate” tells the FDC that the friendly unit is in direct fire contact with the enemy target.

Target Location Methods

2-132. When locating a target for engagement, the observer must determine which of the target location methods he will use: grid, polar, or shift from a known point.

Grid Mission

2-133. The observer sends the enemy target location as an 8- or 10-digit grid coordinate. Before the first adjusting rounds are fired, the FDC must know the direction from the observer’s location. The observer sends observer-target (OT) direction (to the nearest 10 mils) from his position to the target (Table 2-7).

Table 2-7. Example fire mission, grid.

Initial Fire Request From Observer to FDC	
Observer	FDC
Z57, THIS IS 271, ADJUST FIRE, OVER.	THIS IS Z57, ADJUST FIRE, OUT.
GRID NK180513, OVER.	GRID NK180513, OUT.
INFANTRY PLATOON IN THE OPEN, ICM IN EFFECT, OVER.	INFANTRY PLATOON IN THE OPEN, ICM IN EFFECT, OUT.
Message to Observer	
FDC	Observer
Z, 2 ROUNDS, TARGET, AF1027, OVER.	Z, 2 ROUNDS, TARGET IS AF1027, OUT.
For Subsequent Rounds (From Observer to FDC)	
Observer	FDC
DIRECTION 1680, OVER.	DIRECTION 1680, OUT.
Note: Send direction before or with the first subsequent correction.	

Polar Mission

2-134. The observer sends direction, distance, and an up or down measurement (if significant) from his location to the enemy target. The FDC must know the observer’s location prior to initiating the call for fire. The word “polar” in the WARNO alerts the FDC that the target will be located with respect to the observer’s position. The up or down correction is an estimated vertical shift from the observer’s location to the target and is only significant if greater than or equal to 35 meters. If the target is higher, it is an up correction. If the target is lower, it is a down correction (Table 2-8 and Figure 2-11). Normally, inexperienced observers only send a direction and distance and ignore the up or down correction.

Table 2-8. Example fire mission, polar plot.

Initial Fire Request From Observer to FDC	
Observer	FDC
Z56, THIS IS Z31, FIRE FOR EFFECT, POLAR, OVER.	THIS IS Z56, FIRE FOR EFFECT, POLAR, OUT.
DIRECTION 4520, DISTANCE 2300, DOWN 35, OVER.	DIRECTION 4520, DISTANCE 2300, DOWN 35, OUT.
INFANTRY COMPANY IN OPEN, ICM, OVER.	INFANTRY COMPANY IN OPEN, ICM, OUT.
Message to Observer	
FDC	Observer
Y, VT, 3 ROUNDS, TARGET AF2036, OVER.	Y, VT, 3 ROUNDS, TARGET AF2036, OUT.

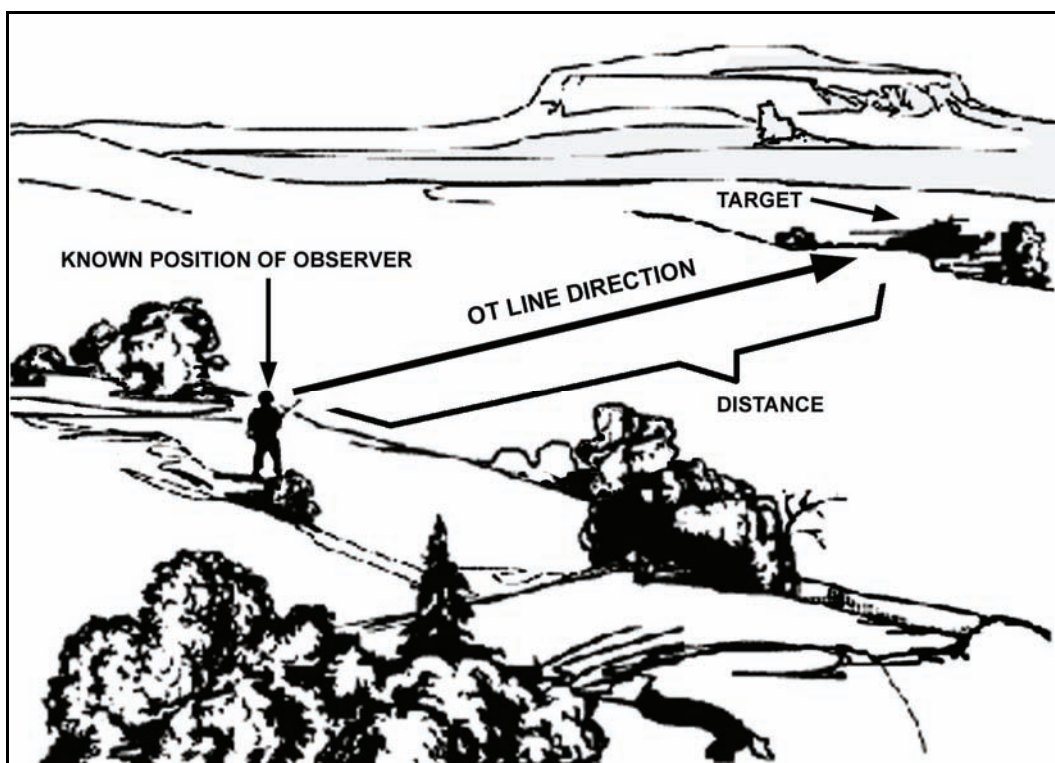


Figure 2-11. Polar plot method of target location.

Shift From a Known Point

2-135. Shift from a known point is performed when the observer and FDC have a common known point. The observer sends OT line and then determines the lateral and range shifts. The enemy target will be located in relation to a preexisting known point or recorded target. The point or target from which the shift is made is sent in the WARNO. (Both the observer and the FDC must know the location of the point or recorded target.) The observer sends a target/known point number, a direction, and left/right, add/drop, and up/down corrections as listed below (Table 2-9, and Figures 2-12 and 2-13):

- Direction from observer (grid azimuth in mils) to target.
- The lateral shift in meters (how far left or right the target is) from the known point (Figure 2-13).

- The range shift (how much farther [ADD] or closer [DROP] the target is in relation to the known point, to the nearest 100 meters) (Figure 2-13).
- The vertical shift (how much the altitude of the target is above [UP] or below [DOWN] the altitude of the known point, expressed to the nearest 5 meters). A vertical shift is usually only significant if it is greater than or equal to 35 meters.

Table 2-9. Example fire mission, shift from a known point.

Initial Fire Request From Observer to FDC	
Observer	FDC
H66 THIS IS H44, ADJUST FIRE, SHIFT AA7733, OVER.	THIS IS H66, ADJUST FIRE, SHIFT AA7733, OUT.
DIRECTION 5210, LEFT 380, ADD 400, DOWN 35, OVER.	DIRECTION 5210, LEFT 380, ADD 400, DOWN 35, OUT.
COMBAT OP IN OPEN, ICM IN EFFECT, OVER.	COMBAT OP IN OPEN, ICM IN EFFECT, OUT.
Message to Observer	
FDC	Observer
H, 1 ROUND, TARGET AA7742, OVER.	H, 1 ROUND, TARGET AA7742, OUT.

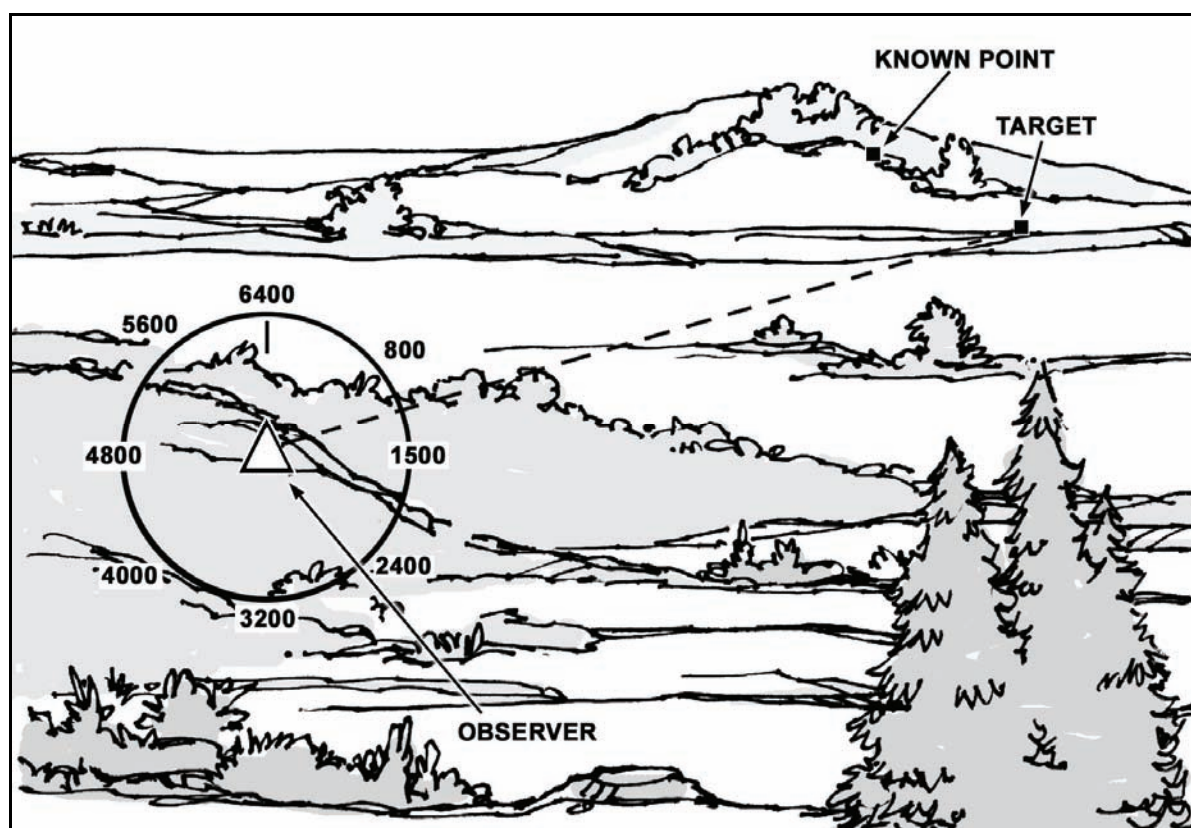


Figure 2-12. Shift from a known point method using direction (in mils).

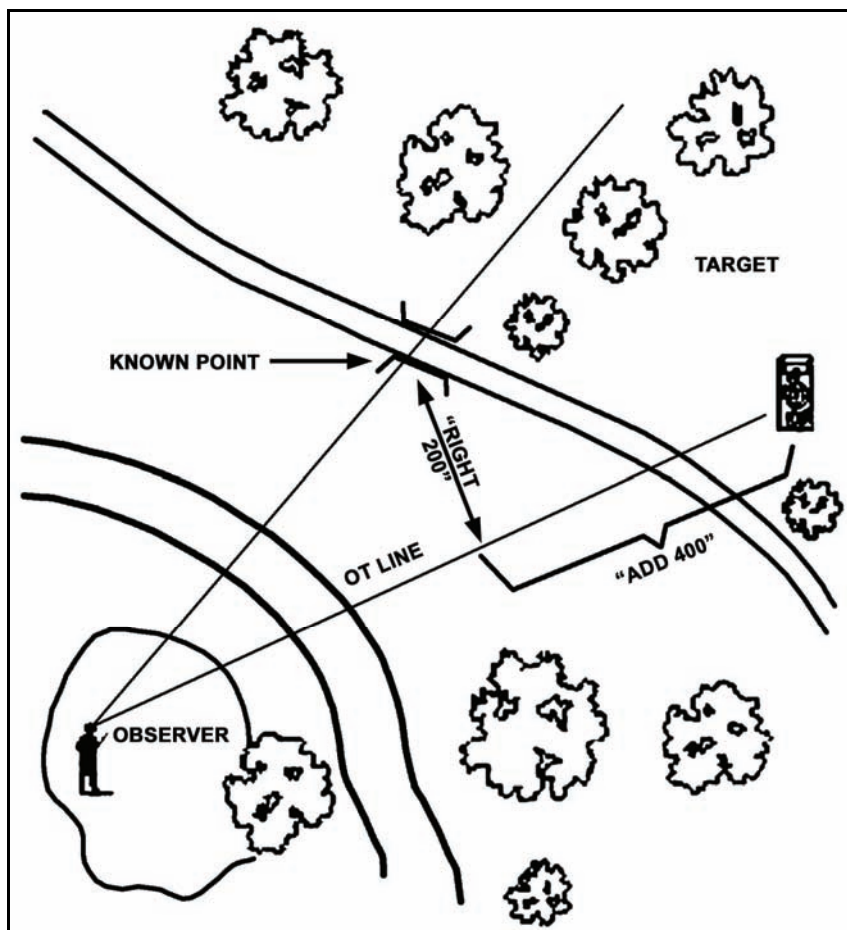


Figure 2-13. Lateral and range shifts from a known point.

Sergeant Orest Bisko, a patrol leader from the 1st Marine Force Reconnaissance Company, knew how to use artillery. When occupying an observation post, Bisko fired his artillery at a set of known coordinates. This would enable him to later shift from that known point to the target with speed and precision. On 26 July 1966, while his four-man patrol was occupying an observation post, they spotted a large collection of enemy encamped in a small, wooded grove. The enemy force, he observed, apparently was in no hurry to move. Sergeant Bisko deliberately whispered fire commands over his radio to his direct support artillery. He ordered them to shift the distance from the known target and fire for effect. Three minutes later shells began crashing into the enemy perimeter. After approximately 30 minutes, 50 enemy were dead and the patrol had escaped in the confusion.

*Shifting from a Known Point
Small Unit Actions in Vietnam
Francis J. West*

Target Description

2-136. The target description helps the FDC to select the type and amount of ammunition to best defeat the enemy target. Following is a brief description of the target using the mnemonic SNAP:

- Size and or shape (“one enemy soldier” or “platoon of enemy soldiers”).
- Nature and or nomenclature (“T72,” “sniper team,” “machine gunner”).

- Activity (“stationary” or “moving”).
- Protection and or posture (“in the open,” “dug in,” or “on a rooftop”).

Message to Observer

2-137. After the FDC receives the call for fire, it determines if and how the target will be attacked. That decision is announced to the observer in the form of a message to the observer (Tables 3-7, 3-8, and 3-9). The observer acknowledges the message to observer by reading it back in its entirety.

2-138. Additionally, the FDC will send the following transmissions:

- **Shot.** The term SHOT, OVER is transmitted by the FDC after each round fired in adjustment and after the initial round in the fire for effect (FFE) phase. The observer acknowledges with SHOT, OUT.
- **Splash.** The term SPLASH, OVER is transmitted by the FDC to inform the observer when his round is five seconds from detonation/impact. The observer responds with SPLASH, OUT.
- **Rounds Complete.** The term ROUNDS COMPLETE, OVER signifies that the number of rounds specified in the FFE have been fired. The observer responds with ROUNDS COMPLETE, OUT.

OPTIONAL ELEMENTS

2-139. A call for fire also might include the following information:

- Method of engagement.
- Danger close.
- Method of fire and control.
- Refinement and end of mission.

Method of Engagement

2-140. The observer uses the method of engagement portion of the call for fire to tell the FDC how to attack the enemy target. The method of engagement consists of the type of engagement, trajectory, danger close (if applicable), ammunition, and distribution.

Trajectory

2-141. A low-angle trajectory is standard without a request. A high-angle trajectory is at the request of the observer or when required due to masking terrain. An example of this terrain would be an enemy position in defilade on the backside of a mountain range. This allows the indirect fire munitions to successfully clear the top of the masking terrain and have more of a vertical descent, resulting in the munitions impacting directly on the enemy position.

Danger Close

2-142. Danger close is announced when applicable. Include the term *danger close* in the method-of-engagement portion of the call for fire when the target is within 600 meters of any friendly elements for both mortars and field artillery. When adjusting naval gunfire, announce DANGER CLOSE when the target is located within 750 meters and naval guns 5 inches or smaller are in use. For naval guns larger than 5 inches, announce DANGER CLOSE when the target is within 1,000 meters. The creeping method of adjustment will be used exclusively during danger close missions. The forward observer makes range changes by creeping the rounds to the target using corrections of less than 100 meters.

Ammunition

2-143. Ammunition is the type of projectile, the type of fuse action, and the volume of fire desired in the fire-for-effect phase stated in rounds per howitzer. The type of ammunition can be requested by the observer, but final determination is by the FDC based on Class V unit basic load and target description.

Method of Fire and Control

2-144. The method of fire and control indicates the desired manner of attacking the target, whether the observer wants to control the time or delivery of fire, and whether he can observe the target. The observer announces the appropriate method of fire and control.

Fire When Ready

2-145. FIRE WHEN READY is standard without request, and is not announced. The mission will be fired as soon as the data is processed, guns are laid on the target, and munitions are loaded.

At My Command

2-146. If the observer wishes to control the time of delivery of fire, he includes AT MY COMMAND in the method of control. When the pieces are ready to fire, the FDC announces PLATOON (or BATTERY or BATTALION) IS READY, OVER. (Call signs are used.) The observer announces FIRE when he is ready for the pieces to fire. In certain scenarios, the observer must consider the time of flight for the munitions to leave the indirect fire system and impact on the target. The "time of flight" data can be requested by the observer and determined by the FDC. This only applies to adjusting rounds and the first volley of an FFE. AT MY COMMAND remains in effect throughout the mission until the observer announces CANCEL AT MY COMMAND, OVER.

2-147. AT MY COMMAND can be further specified. BY ROUND AT MY COMMAND controls every round in adjustment and every volley in the FFE phase.

Time on Target

2-148. The observer may tell the FDC when he wants the rounds to impact by requesting, for example, TIME ON TARGET, 0859, OVER. The observer must ensure his time and the FDC's time are synchronized prior to the mission.

Time to Target

2-149. The observer may tell the FDC when he wants the rounds to impact by requesting TIME TO TARGET (so many) MINUTES AND SECONDS, OVER, STANDBY, READY, READY, HACK, OVER. Time to target is the time in minutes and seconds after the "hack" statement is delivered when rounds are expected to hit the target.

Check Firing

2-150. CHECK FIRING is used to cause an immediate halt in firing. Use this command only when necessary to *immediately* stop firing (for example, safety reasons) as it may result in cannons being out of action until any rammed/loaded rounds can be fired or cleared from the tubes.

Repeat

2-151. REPEAT can be given during adjustment or fire-for-effect missions. During adjustment, REPEAT means firing another round(s) with the last data and adjusting for any change in ammunition if necessary. REPEAT is not sent in the initial call for fire.

2-152. During fire for effect, REPEAT means fire the same number of rounds using the same method of fire for effect as last fired. Changes in the number of guns, the previous corrections, the interval, or the ammunition may be requested.

Request Splash

2-153. SPLASH can be sent at the observer's request. The FDC announces SPLASH to the observer 5 seconds prior to round impact. SPLASH must be sent to aerial observers and during high-angle fire missions.

Refinement and End of Mission

2-154. The observer should observe the results of the fire for effect and then take one of the following actions to complete the mission:

- Correct any adjustments.
- Record as target.
- Report battle damage assessment.
- Report end of mission.

ADJUST FIRE

2-155. If the rounds have accurately impacted the target after the initial call for fire, the observer requests fire for effect. If the rounds are not impacting the target, the observer adjusts the indirect fire onto the enemy target. Making adjustments to an indirect fire mission requires the observer to determine deviation and range corrections. Deviation corrections move the round right or left toward the target while range corrections add or drop the round toward the target with respect to the observer's position. If the observer cannot locate the target (due to deceptive terrain, lack of identifiable terrain features, poor visibility, or an inaccurate map), he adjusts the impact point of the rounds. The observer chooses an adjusting point. For a destruction mission (precision fire), the target is the adjusting point. For an area target (area fire), the observer picks a well defined adjusting point close to the center. The observer spots the first and each successive adjusting round and sends range and deviation corrections back to the FDC until rounds hit the target. The observer spots each round by relating the round's point of impact to the adjusting point. See FM 6-30, *Tactics, Techniques, and Procedures for Observed Fire*, for a more detailed discussion of adjusting mortar and artillery fire.

DEVIATION SPOTTING

2-156. Deviation spotting (left or right) involves measuring the horizontal angle (in mils) between the actual burst and the adjusting point (Figure 2-14). For example, a burst to the right of the target is spotted as "(so many) mils right." The observer uses an angle-measuring device to determine deviation. He might use the mil scale on his binoculars (Figure 2-15), or he might use his hand and fingers (Figure 2-16).

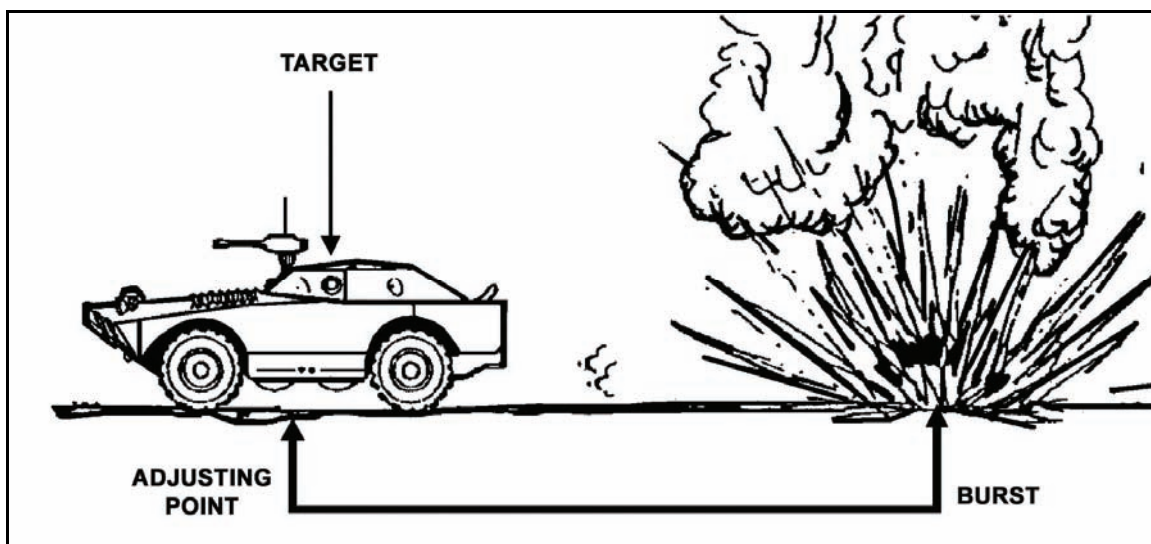


Figure 2-14. Deviation spotting.

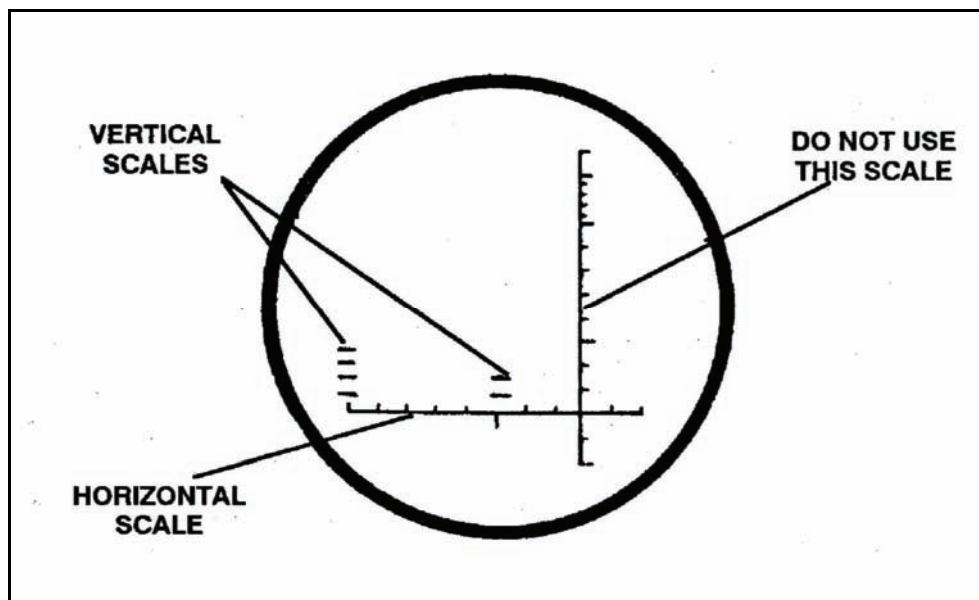


Figure 2-15. Binocular reticle with mil scale.

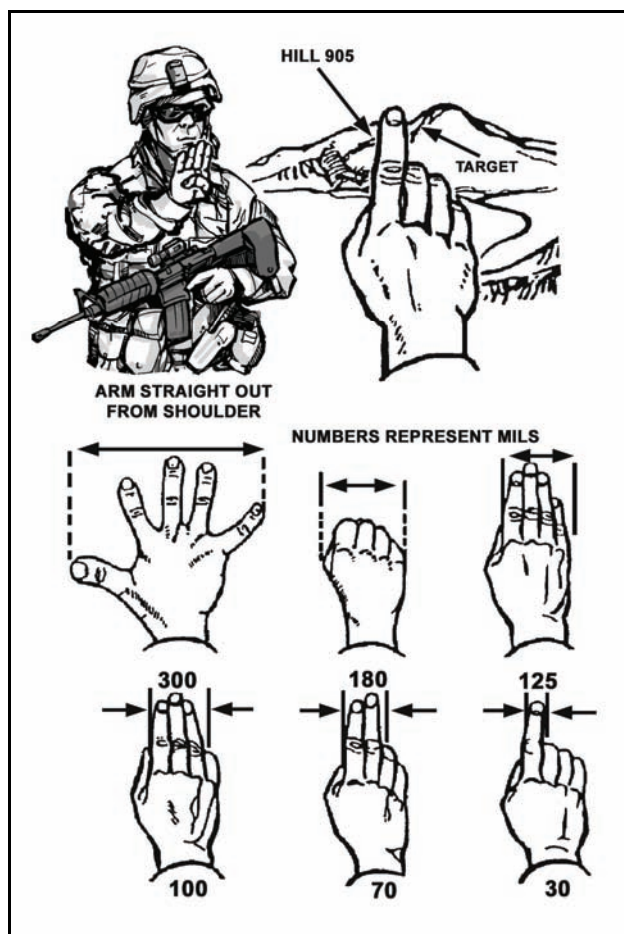


Figure 2-16. Estimating deviation angles with your hand.

2-157. On binoculars, the horizontal scale is divided into 10-mil increments and is used for measuring horizontal angles. The vertical scales in the center and on the left of the reticle (divided into 5-mil increments) are used for measuring vertical angles. The scale on the right, if present, is no longer used.

2-158. A burst on the OT line is spotted as "line." Deviation (left or right) should be measured to the nearest 5 mils for area targets, with measurements taken from the center of the burst. Deviation for a destruction mission (precision fire) is estimated to the nearest mil. Figure 2-17 shows the adjusting point at the center of the binocular horizontal scale.

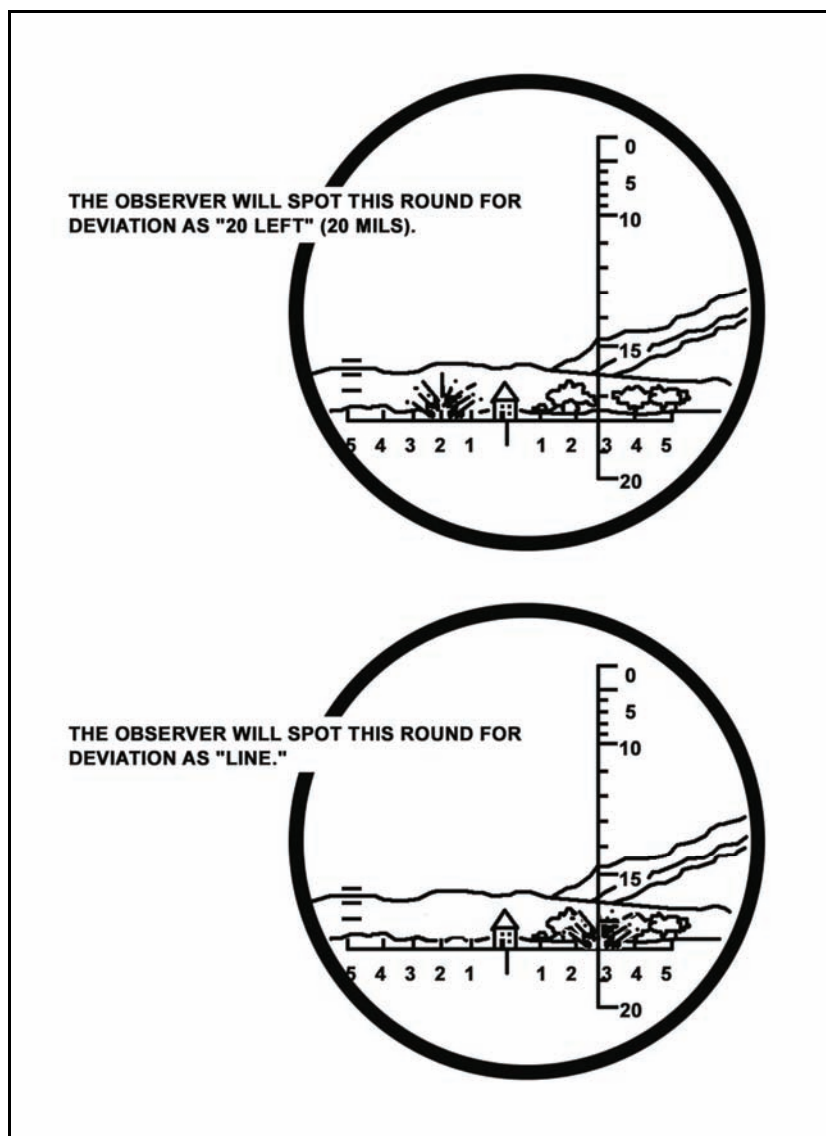


Figure 2-17. Deviation spotting with binoculars.

DEVIATION CORRECTION

2-159. Deviation correction is the distance (in meters) the burst must be moved left or right to be on line between the observer and the target. Once the mil deviation has been determined, the observer converts it into a deviation correction (in meters). The OT distance is converted to a number called the OT factor (see FM 6-30). The OT factor is used in adjusting fires after the initial call for fire. The OT direction is usually determined in mils but degree azimuths can be used if necessary. OT distance is determined through individual range estimation or through the use of specific technical laser range-finding equipment (such as

MELIOS). To determine the OT factor, take the range to the target, divide by 1,000, then round to the nearest even whole number.

2-160. The deviation correction is determined by multiplying the observed deviation in mils by the distance from the observer to the target in thousands of meters (the OT factor). The result is expressed to the nearest 10 meters (Figure 2-18 [Example 1]).

2-161. In adjustment of area fire, small deviation corrections (20 meters or less) can be ignored except when a small change determines a definite range spotting. Throughout the adjustment, the observer moves the adjusting rounds close enough to the OT line so range spotting is accurate. A minor deviation correction (10 to 20 meters) should be made in adjustment of precision fire.

2-162. If the OT distance is greater than 1,000 meters, round to the nearest thousand and express it in thousands of meters (Figure 2-18 [Example 2]). If the OT distance is less than 1,000 meters, round to the nearest 100 meters and express it as a decimal in thousands of meters (Figure 2-18 [Example 3]).

Deviation Correction

Example 1:
Observer deviation 20 mils
OT distance 2,000 meters
OT factor 2
Observer deviation x OT factor = deviation correction
 $20 \times 2 = 40$ meters

Example 2:
OT distance 4,200 meters – OT factor 4
OT distance 2,700 meters – OT factor 3

Example 3:
OT distance 800 meters – OT factor 0.8

Figure 2-18. Determining deviation correction.

ANGLE T

2-163. Angle T (Figure 2-19) is the angle formed by the intersection of the gun-target line and the OT line with its vertex at the target. If angle T is 500 mils or greater, the FDC should tell the observer. If this occurs, the observer continues to use the OT factor to make his deviation corrections. If he sees that he is getting more of a correction than he has asked for, the observer should consider cutting the corrections in half to better adjust rounds onto the target.

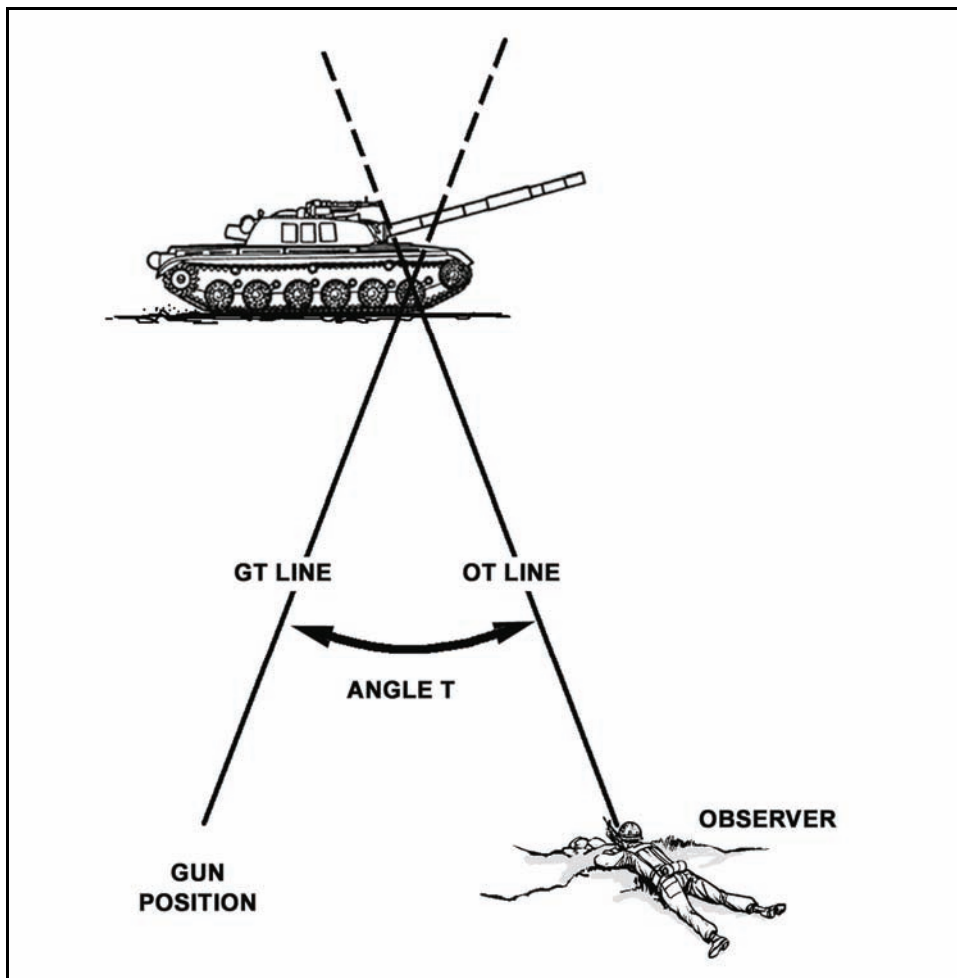


Figure 2-19. Angle T.

RANGE SPOTTING

2-164. Range spotting (short or over) requires adjusting the range to obtain fire on the target. An adjusting round's burst on or near the OT line gives a definite range spotting. If he cannot make a definite spotting, the observer announces a "lost" or "doubtful" spotting. In these situations only, he gives the deviation correction to the FDC. Deviation corrections include—

- **Over.** The observer sees the burst beyond the adjusting point.
- **Short.** The observer sees the burst between himself and the adjusting point.
- **Target.** The observer sees the burst hit the target. He uses this spotting only in precision fire (destruction missions).
- **Range Correct.** The observer believes that the burst occurred at the correct range.
- **Doubtful.** The observer sees the burst but cannot tell whether it occurred over, short, target, or range correct.
- **Lost.** The observer cannot see or hear the burst.

RANGE CORRECTION

2-165. With each successive correction, the adjusting round lands over or short of the adjusting point, but closes on the target. There are three methods of range corrections: successive bracketing; hasty bracketing; and the creeping method.

Successive Bracketing

2-166. In bracketing, the observer deliberately gives range corrections that land over or short of the target. After spotting the first round, the observer makes a drop/add correction which he believes will give him one round over and one round short of the target. For example, if the first round impacts over the target, the observer will give a drop correction which is large enough to cause the next round to impact short of the target. Once the observer meets the goal of one round over and one round short of the target, he cuts each correction in half and drops or adds as necessary. The observer continues bracketing until his correction is less than 50 meters. At this point his adjustment is finished and he transitions to a fire-for-effect mission. Using the above example, his final adjustment would be “add 50 meters fire for effect.” This technique is called successive bracketing (Figure 2-20).

2-167. When bracketing, the observer uses the following guide to determine his first range correction:

- OT distance between 1,000 to 2,000 meters – initial add or drop at least 200 meters (+/- 200, +/- 100, +/- 50 fire for effect).
- OT distance greater than 2,000 meters – initial add or drop at least 400 meters (+/- 400, +/- 200, +/- 100, +/- 50 fire for effect).

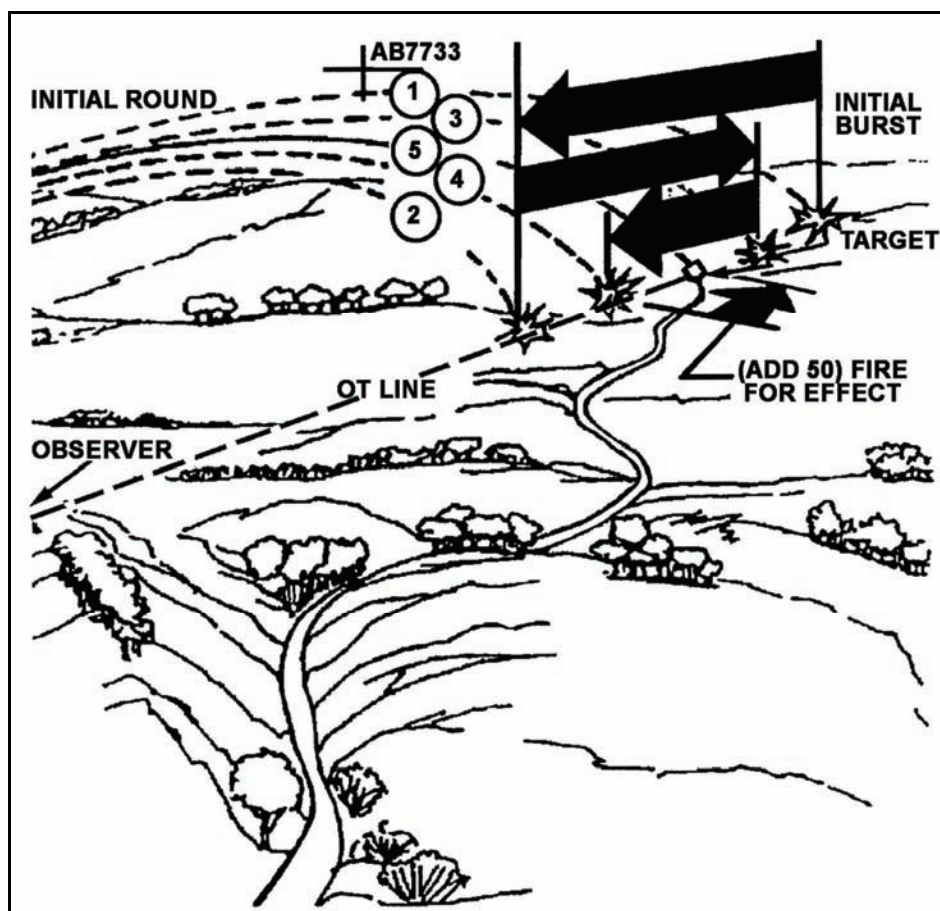


Figure 2-20. Successive bracketing technique.

Hasty Bracketing

2-168. An alternative to successive bracketing is hasty bracketing. Bracketing is an effective technique in that it is sure to bring fire on the target. However, bracketing is relatively time consuming. If the target is moving, bracketing may not be fast enough to engage the target.

2-169. A successful hasty bracket depends on a thorough terrain analysis, which gives the observer an accurate initial target location. For his first correction, the observer receives a bracket similar to that used for successive bracketing. Once the observer receives the initial bracket, he uses it like a yardstick to determine the subsequent correction. He then sends the FDC the correction to move the rounds to the target and to fire for effect (Figure 2-21). Hasty bracketing improves with observer experience and judgment.

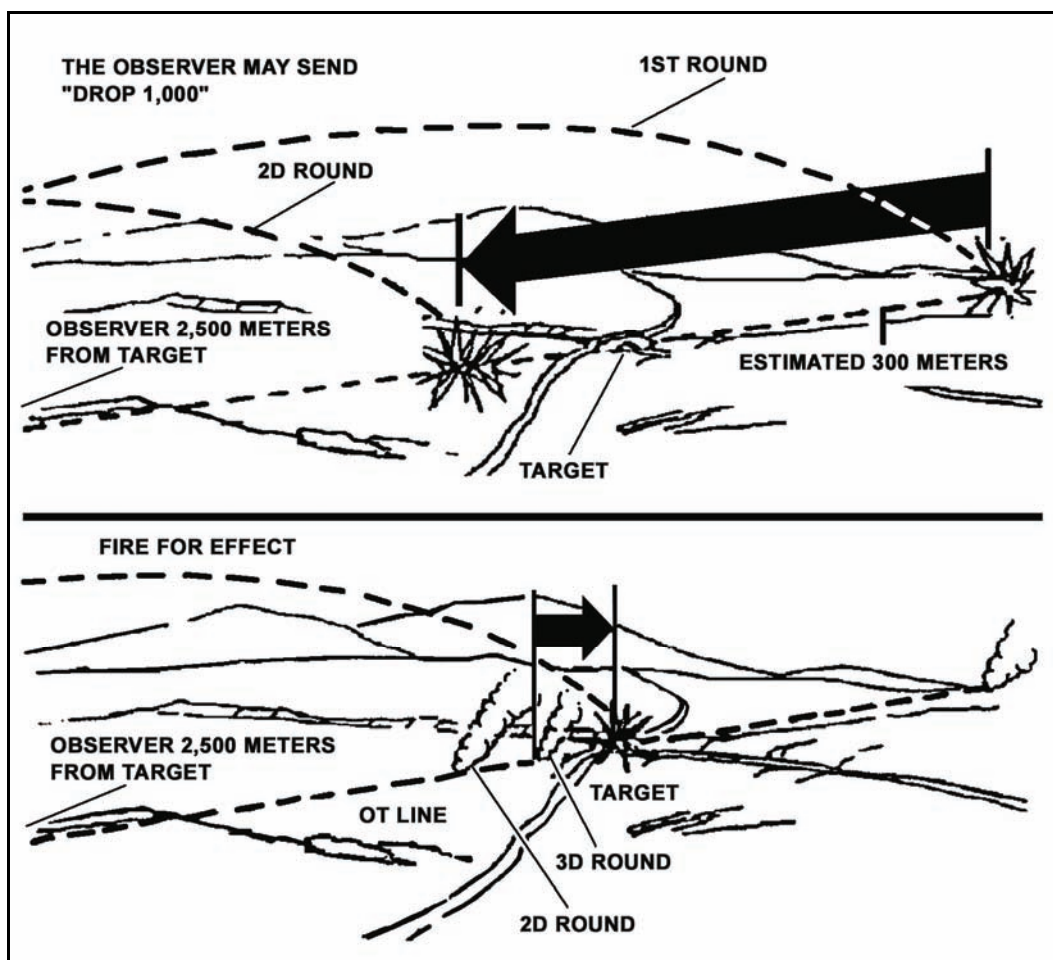


Figure 2-21. Hasty bracketing technique.

Creeping Method

2-170. In danger close situations, the observer uses the creeping method of adjustment. He calls for the first round and deliberately overshoots the target. He adjusts rounds in 100-meter increments or less until the fire hits the target (Figure 2-22). This method requires more time and ammunition than other methods. Therefore, the observer uses it only when he must consider safety first.

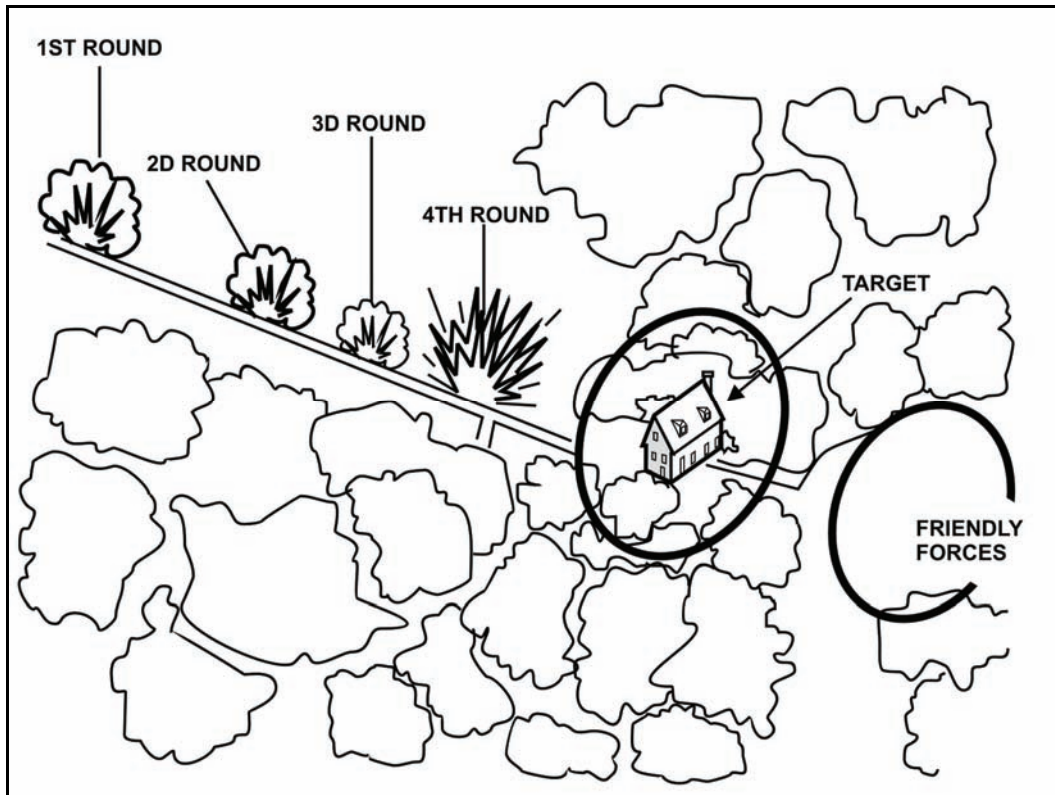


Figure 2-22. Creeping method of adjustment.

END OF MISSION

2-171. End of mission completes the mission and reports the battle damage assessment. The report should go to both the FDC and parent unit. Higher headquarters staff officers use battle damage assessment to update their staff estimates and feed the common operating picture. The proper report format for an indirect fire mission is END OF MISSION, TARGET# ____, BDA, OVER. An example of battle damage assessment is FOUR T72s DESTROYED, or ENEMY SNIPER TEAM SUPPRESSED.

FIRE SUPPORT COORDINATION MEASURES

2-172. Leaders use fire support coordination measures (FSCM) to facilitate both the engagement of targets and protection of friendly forces. Boundaries are the most basic FSCM. Boundaries are both permissive and restrictive FSCM. The fire support coordinator recommends FSCM to the leader based on the leader's guidance, location of friendly forces, scheme of maneuver, and anticipated enemy actions. Once the leader establishes FSCM, they are entered into or posted on all the unit's displays and databases (see FM 1-02).

PERMISSIVE FSCM

2-173. The primary purpose of permissive measures is to facilitate the attack of targets. Once they are established, further coordination is not required to engage targets affected by the measures. Permissive FSCM include a coordinated fire line, fire support coordination line, and free-fire area.

Coordinated Fire Line

2-174. A coordinated fire line (CFL) is a line beyond which conventional, direct, and indirect surface fire support means may fire at any time within the boundaries of the establishing headquarters. This is done without additional coordination. The purpose of the CFL is to expedite the surface-to-surface attack of

targets beyond the CFL without coordination with the ground commander in whose area the targets are located (see JP 3-09, *Joint Fire Support*). Brigades or divisions usually establish a CFL, though a maneuver battalion may establish one. It is located as close as possible to the establishing unit without interfering with maneuver forces to open up the area beyond to fire support.

Fire Support Coordination Line

2-175. The fire support coordination line (FSCL) is an FSCM that facilitates the expeditious attack of surface targets of opportunity beyond the coordinating measure. The FSCL applies to all fires of air-, land-, and sea-based weapon systems using any type of ammunition. Forces attacking targets beyond an FSCL must inform all affected commanders in sufficient time to allow necessary reaction to avoid fratricide. Supporting elements attacking targets beyond the FSCL must ensure that the attack will not produce adverse effects on or to the rear of the line. Short of an FSCL, all air-to-ground and surface-to-surface attack operations are controlled by the appropriate leader responsible for that area.

Free-Fire Area

2-176. A free-fire area is a specific area into which any weapon system may fire without additional coordination with the establishing headquarters. Normally, division or higher headquarters establish a free-fire area on identifiable terrain.

RESTRICTIVE FSCM

2-177. A restrictive FSCM prevents fires into or beyond the control measure without detailed coordination. The primary purpose of restrictive measures is to provide safeguards for friendly forces. Restrictive FSCM include no-fire area, restrictive fire area, and restrictive fire line.

No-Fire Area

2-178. A no-fire area (NFA) is a land area designated by the appropriate commander into which fires or their effects are prohibited. Leaders use the NFA to protect independently-operating elements such as forward observers and special operating forces. They also use it for humanitarian reasons such as preventing the inadvertent engagement of displaced civilian concentrations, or to protect sensitive areas such as cultural monuments. There are two exceptions to this rule:

- (1) The establishing headquarters may approve fires within the NFA on a case-by-case mission basis.
- (2) When an enemy force within an NFA engages a friendly force, the friendly force may engage a positively-identified enemy force to defend itself.

Restrictive Fire Area

2-179. A restrictive fire area (RFA) is an area in which specific restrictions are imposed and into which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters. The purpose of the RFA is to regulate fires into an area according to the stated restrictions such as no unguided conventional or dud-producing munitions. For example, no DPICM rounds should be fired into an area of land that is later going to be occupied by friendly forces. These types of munition have a dud rate and could possibly result in friendly forces being incapacitated. Maneuver battalion or larger ground forces normally establish RFAs. On occasion, a company operating independently may establish an RFA. An RFA is usually located on identifiable terrain by grid or by a radius (in meters) from a center point. The restrictions on an RFA may be shown on a map or overlay, or reference can be made to an operation order that contains the restrictions.

Restrictive Fire Line

2-180. A restrictive fire line is a phase line established between converging friendly forces that prohibits fires or their effects across that line. The purpose of this phase line is to prevent fratricide between converging friendly forces. The next higher common commander of the converging forces establishes the

restrictive fire line. Alternatively, the commander can use a restrictive fire line to protect sensitive areas such as cultural monuments. This control measure can also be used as a direct fire control measure.

SECTION VI — CLOSE AIR SUPPORT AND NAVAL GUNFIRE

2-181. Close air support (CAS) is defined in JP 3-09.3, *Joint Tactics, Techniques, and Procedures for Close Air Support (CAS)*, as: air action by fixed- and rotary-wing aircraft against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire and movement of these forces.

2-182. Very rarely will an Infantry platoon be directly supported by naval gunfire. But if they are, Navy liaison representatives located with supported ground forces coordinate the control of the fire. Naval gunfire can provide large volumes of immediately available, responsive fire support to land combat forces operating near coastal waters.

CLOSE AIR SUPPORT

2-183. The air liaison officer (ALO) is the battalion commander's advisor in planning, requesting, and executing CAS missions. The ALO serves as a link between the maneuver element and the attacking aircraft. The platoon may provide information that the ALO or tactical air control party (TACP) uses to target enemy forces. A joint terminal air controller (JTAC) may also be attached to the platoon to facilitate communication. The need for a JTAC should be identified during the planning phase of the mission.

2-184. Soldiers may provide emergency control if an ALO, FSO, FO, or JTAC is not available (ground force commander accepts responsibility for friendly casualties). This is possible only if the platoon has a UHF capable radio or if the aircraft is equipped with FM radios. Some U.S. Air Force, Navy, and Marine Corps fixed-wing aircrafts only have ultra high frequency (UHF) radios (AV-8B and F-14) (see FM 6-30). Others have FM capability (A/OA-10, F16, F/A-18, and AC-130). The platoon may also provide information on battle damage as observed. Figure 2-23 shows the format for assessing battle damage.

Battle Damage Assessment	
Successful or unsuccessful	
Target coordinates	
Time on target	
Number and type destroyed	
Number and type damaged	
Killed by air	
Wounded by air	
Dud bombs	

Figure 2-23. Assessing battle damage.

AC-130 GUNSHIP

2-185. If the enemy air defense threat is low, the battalion requests CAS from an AC-130H or AC-130U gunship. The AC-130 provides effective fires night operations and flies CAS and special operations. The AC-130H aircraft contains one 40-mm gun and one 105-mm howitzer (the AC-130U has an additional 25-mm cannon). It is equipped with sensors and target acquisition systems that include forward-looking infrared radar and low-light television. It is effective in urban environments due to its advanced sensors.

ATTACK HELICOPTERS AND CLOSE COMBAT ATTACK

2-186. The primary mission of attack helicopter units is to destroy enemy armor and mechanized forces or to provide precision fires. Employing attack helicopters increases the lethality of ground maneuver forces.

2-187. The close combat attack is a technique for using aviation direct fires closely integrated with close fight on the ground. It may be planned or unplanned, but works most effectively when the company integrates aviation assets into the planning process.

2-188. To request immediate close combat attack, if METT-TC permits, the ground unit in contact executes a face-to-face coordination or uses a radio transmission to provide a situation update to the attack aircraft. Figure 2-24 illustrates a close combat attack coordination checklist.

Close Combat Attack Coordination Checklist	
1. Enemy situation – specific target identification.	
2. Friendly situation – location and method of marking friendly positions.	
3. Ground maneuver mission and scheme of maneuver.	
4. Attack aircraft scheme of maneuver.	
5. Planned EA and battle position/support-by-fire position.	
6. Method of target marking.	
7. Fire coordination and fire restrictions.	
8. Map graphics update.	
9. Request for immediate aviation close fight support – used for targets of opportunity or for ground-to-air target handoff.	

Figure 2-24. Checking close combat coordination.

2-189. After receipt of a request for immediate close combat attack, the attack team leader informs the ground unit leader of the battle position, assault by fire position, or the series of positions his team will occupy. This information should provide the best observation and fields of fire into the engagement or target area. The attack team leader then provides the ground maneuver unit leader with his concept for the team's attack on the objective. Depending on SOP and tactical requirements, the flight lead may initially talk with the Infantry battalion, but will likely get pushed to the company net and may talk directly to the platoon leader.

2-190. Upon mission completion, the attack team leader provides the ground maneuver commander a battle damage assessment of the intended target.

MARKING FRIENDLY POSITIONS

2-191. Whenever possible, friendly positions are marked to enhance safety, minimize the possibility of fratricide, and provide target area references. Methods of marking friendly positions are shown in Table 2-10.

Table 2-10. Methods of marking friendly positions.

METHOD	DAY/ NIGHT	ASSETS	FRIENDLY MARKS	TARGET MARKS	REMARKS
Smoke	D/N	All	Good	Good	Easily identifiable, may compromise friendly position, obscure target, or warn of fire support employment. Placement may be difficult due to structures.
Smoke (IR)	D/N	All/ NVD at night	Good	Good	Easily identifiable, may compromise friendly position, obscure target, or warn of fire support employment. Placement may be difficult due to structures. Night marking is greatly enhanced by the use of IR reflective smoke.
ILLUM, ground burst	D/N	All	N/A	Good	Easily identified, may wash out NVDs.

Table 2-10. Methods of marking friendly positions (continued).

METHOD	DAY/ NIGHT	ASSETS	FRIENDLY MARKS	TARGET MARKS	REMARKS
Signal mirror	D	All	Good	N/A	Avoids compromise of friendly location. Dependent on weather and available light and may be lost in reflections from other reflective surfaces such as windshields, windows, and water.
Spotlight	N	All	Good	Marginal	Highly visible to all. Compromises friendly position and warns of fire support employment. Effectiveness is dependent upon degree of urban lighting.
IR Spotlight	N	All NVD	Good	Marginal	Visible to all with NVDs. Less likely to compromise than overt light. Effectiveness dependent upon degree of urban lighting.
Visual laser	N	All	Good	Marginal	Highly visible to all. Risk of compromise is high. Effectiveness dependent upon degree of urban lighting.
Tracers	D/N	All	N/A	Marginal	May compromise position. May be difficult to distinguish mark from other gunfire. During daytime use, may be more effective to kick up dust surrounding target.
Electronic beacon	D/N	See remarks.	Excellent	Good	Ideal friendly marking device for AC-130 and some United States Air Force fixed wing (not compatible with Navy or Marine aircraft). Least impeded by urban terrain. Can be used as a TRP for target identification. Coordination with aircrews essential to ensure equipment and training compatibility.
Strobe (overt)	N	All	Marginal	N/A	Visible by all. Effectiveness dependent upon degree of urban lighting.
Strobe (IR)	N	All NVD	Good	N/A	Visible to all NVDs. Effectiveness dependent upon degree of urban lighting. Coded strobes aid in acquisition.
Flare (overt)	D/N	All	Good	N/A	Visible by all. Easily identified by aircrew.
Flare (IR)	N	All NVD	Good	N/A	Visible to all NVDs. Easily identified by aircrew.
Glint/IR panel	N	All NVD	Good	N/A	Not readily detectable by enemy. Very effective except in highly lit areas.
Combat identification panel	D/N	All FLIR	Good	N/A	Provides temperature contrast on vehicles or building. May be obscured by urban terrain.
VS-17 panel	D	All	Marginal	N/A	Only visible during daylight. Easily obscured by structures.
Chemical heat sources	D/N	All FLIR	Poor	N/A	Easily masked by urban structures and lost in thermal clutter. Difficult to acquire, can be effective when used to contrast cold background or when aircraft knows general location.
Spinning chem light (overt)	N	All	Marginal	N/A	Provides unique signature. May be obscured by structures. Effectiveness dependent upon degree of urban lighting.
Spinning chemlight (IR)	N	All NVD	Marginal	N/A	Provides unique signature. May be obscured by structures. Effectiveness dependent upon degree of urban lighting.

NAVAL GUNFIRE SUPPORT

2-192. Naval gunfire has a wide variety of weapons extending from light conventional armament to heavy missiles and nuclear weapons. It can play a vital role in reducing the enemy's capability of action by destroying enemy installations and fortifications before a ground assault, and by protecting and covering the supporting offensive operations of the land force after the assault.