2001

Use of Mortars in Military Operations on Urbanized Terrain (MOUT)

A Review of Doctrinal and Associated Literature

Edited by MAJ James E. Hutton, Military Analyst, Center for Army Lessons Learned

Every potential foe on the planet watched CNN during Desert Storm, and saw what we did to the Iraqi forces. They also watched what happened in Somalia, and saw our nation's Achilles heel. Believe me, the lesson was not lost on them. They will fight us where they believe we are weakest....and they will fight us asymmetrically.[1]

General Charles C. Krulak
Commandant, United States Marine Corps

Introduction

Potential U.S. adversaries fully realize the extreme price open-field maneuver warfare carries with it. The asymmetry about which General Krulak spoke will quite possibly manifest itself in fighting against determined, clever, and highly lethal adversaries who use city areas to limit U.S. technological and weaponry advantages.

The purpose of this review to provide an overview of doctrinal passages from selected doctrinal sources for use of **mortars** in offensive MOUT. This review, when combined with similar works related to other fire support components, will serve as the backdrop against which Combat Training Center (CTC) rotations and actual operations can be assessed by observers.

Tactics, techniques, and procedures (TTP) for fighting in major cities will undergo major change with the combined effects of urban and sub-urban sprawl, technological advancement, and the diverse capability levels of potential adversaries. Developing a framework for improving TTPs first requires an understanding of current doctrinal publications.

This review is not comprehensive. Other associated doctrinal issues, such as logistical demands, weapons maintenance, and training programs in MOUT, are not addressed here. Each of those issues, however, remain vital and deserve the attention of future research efforts.

Full endnote citations are included in this review. Ibidem referencing for multiple use from the same source was not used in order to enable Microsoft Word users to simply cut and paste reference material with endnotes intact. Quote marks are also not used. All items below are quoted verbatim from doctrinal sources except as specifically noted and in the conclusion paragraph.

Overview

Simplicity, ruggedness, maneuverability, and effectiveness are the principle characteristics of mortars.[2]

MORTAR OPERATIONS ON URBANIZED TERRAIN

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Mortars are valuable in providing indirect fire support during military operations on urbanized terrain. Indirect fire by FA has often been unavailable to infantrymen and in city combat due to building mask and lack of effective observation. Mortars have some distinct advantages during MOUT. Their high rate of fire, steep angle of fall, and short minimum range give mortar sections the ability to mass considerable firepower on specific enemy positions in the tight confines of city fighting. The use of multi-option fuzes and several types of rounds increases mortar fire versatility.[3]

- **Employment of Mortars**. Mortars are often the primary indirect-fire weapon for forward units in the assault or defense of a built-up area. Their high rate of fire, short minimum range, and high trajectory give mortar units the ability to fire in the tight confines of the city. Mortars can provide obscuration, neutralization, suppression, or illumination fires.[4]

- In the offense, **proper mortar employment is vital to the success of any mission**. Mortars provide the offensive-minded commander with the ability to change the defender's advantages of overhead cover and physical obstacles into disadvantages.[5]

- Light enemy overhead cover can be defeated with a **combination of the mortar's high angle of fire and multi-optional fuzes**. This ability to penetrate overhead cover makes the mortar the ideal weapon to defeat enemy positions in buildings.[6]

- Short **fields of fire work to the disadvantage of the defender** by limiting his engagement capabilities. The defender is also vulnerable to unrestricted mortar engagement.[7]

- Mortar fires for **rapid advance to a target area or for a systematic, building-by-building advance are identical** except for the firing restrictions given the mortars and the mode of support they are placed in. During a rapid advance, mortars are normally in general support; during a systematic building-by-building advance, they are in direct support of the lead element.[8]

    - The **attacking commander should ensure that his mortars have between one-third and two-thirds of their target engagement area beyond the forward edge** of the target to obtain the best possible fire support coverage.[9]

    - Forward observers **should initially be on key terrain** overlooking the target or with the forward element of the attacking force to engage targets of opportunity. Exact locations for the FOs are locations that allow the best overall fire support for the commander.[10]

- **Delivery of Fires**. Mortar fires are **effective in the offense as well as in the defense**. The indirect fires are extremely responsive. Mortars are well suited for combat in built-up areas because of their high rate of fire, steep angle of fall, and short minimum range. Mortar fires can be used to inhibit enemy fires and movement, allowing friendly forces to maneuver to a position of advantage. Effectively integrating mortar fires with dismounted maneuver is key to successful combat in a built-up area.[11]

- **Mortar fires** are a critical and **irreplaceable element** of the rifle company's maneuver. They either kill the enemy or suppress his fire, and thus allow the assaulting riflemen to close and kill him.[12]

- Mortar fires alone cannot destroy enemy armor but **contribute to the enemy's destruction** through synchronized action. Long-range HE fires force enemy armor to button up and reduce its speed of advance. HE and WP fires separate tanks from their dismounted infantry support, leaving them isolated and vulnerable to precision antitank weapons.[13]

- After the combined arms team wins the anti-armor battle, or is still fighting it around key engagement areas, friendly battalions face dismounted attacks by threat motorized infantry, day and night. The battalion commander uses mortar fires to **dominate and destroy** this enemy, while protecting and conserving the friendly force.[14]

BACKGROUND - PURPOSE OF INDIRECT FIRES

Indirect fires are employed for three main purposes: close support, counterfire, and interdiction. They may also be used for deception.[15]

- **Close support fires** are targeted against enemy troops, weapons, or positions that are threatening or can threaten the friendly unit during either the attack or the defense. Providing close support fires is the most common mission given the mortar platoon or section. Because mortar fires are immediately available, they allow the battalion or company commander to rapidly multiply combat power effects and quickly shift fires about the battlefield. Close support mortar fires are the key to a successful maneuver at the platoon and company level -- they can make the difference between success or failure in the defense. Close support mortar fires are normally requested and adjusted by platoon-level forward observers, but they may be initiated by any leader within the chain of command. Examples of close support fires include illumination, screening, suppressive, marking, preparatory, and final protective fires.[16]

- **Counterfires** are used to attack enemy indirect fire weapons, observation posts, and artillery command and control facilities. Counterfire at long range is mainly the responsibility of the field artillery, but mortar sections and platoons provide close counterfire, especially against enemy mortars. Mortar counterfire is an immediate action taken to restore the freedom of action to the maneuver commander before more powerful counterfire weapons can be brought to bear. Mortar fires are used to attack enemy mortars firing from reverse slopes and defilade positions that make them safe from low-angle artillery counterfire. Mortar smoke and WP rounds are used to obscure the view from enemy OPs, reducing the effectiveness of enemy indirect fire. During the defense of a strongpoint, mortar fires may be planned and integrated into the field artillery counterfire or the J-SEAD program. Their responsiveness, rapid rate of fire, and area target effects are used to suppress enemy gunners.[17]

- **Interdiction fires** are used to disrupt, delay, and destroy enemy forces that cannot fire their primary weapon system on friendly forces because of range limitations or intervening terrain. Field artillery cannon and missile battalions are responsible for most ground interdiction fires. Mortar sections and platoons fire limited, specific types of interdiction fires on likely or suspected enemy assault positions or assembly areas. As the advancing U.S. forces close on an objective, mortar fires can be shifted from preparatory or suppressive fire (close support fires) to interdiction fires targeted on likely enemy withdrawal routes or suspected rally points. Normally, the benefits gained from unobserved mortar interdiction fire intended to harass the enemy do not outweigh the costs of ammunition expended and the increased danger of counterfire. Dismounted infantry, decisively engaged with an enemy on close terrain, can employ harassment and interdiction fire to

its advantage. In some cases, when the enemy avenue of approach is canalized within deep defilade, such as a ravine or a street between high buildings, mortar interdiction fire may be the only way to attack him.[18]

- **Deception fires** are used to delude and confuse the enemy. Mortars can be used to fire false preparatory fires on enemy positions or landing zones. They can also be used to create deceptive smoke screens to focus the enemy in one location while friendly forces attack from another.[19]

EFFECTS OF INDIRECT FIRES

The battalion or company commander must decide, and then clearly state, what effects he wants to achieve with mortar fire on a particular target. **Four effects** are: destruction, neutralization, suppression, and obscuration.[20]

- **Destruction** renders the enemy combat ineffective. Since only direct hits with HE rounds can destroy hardened targets, such as armored vehicles or bunkers, mortars are not often used against them to achieve destruction. Against soft targets, such as trucks or frame buildings, mortars can be used for destruction, but even then the amount of ammunition expended is large. It requires about 30 percent casualties to render a unit combat ineffective. If the enemy infantry is exposed, mortar fires can easily achieve destruction on them. By themselves, mortars can rarely achieve destruction against a dug-in enemy. Only the 120-mm mortar is powerful enough to damage well-constructed field fortifications.[21]

- **Neutralization** knocks a target out of action temporarily. Against hardened targets, it is difficult to achieve neutralization with mortar fire. Against some targets it can be achieved, especially dismounted infantry or wheeled vehicles. Experience has shown that it takes about 10 percent casualties to neutralize a unit. A higher percentage may be required, depending on how experienced and strong the enemy is. Neutralization usually lasts no more than a few hours.[22]

- **Suppression** limits or prevents the enemy in the target area from firing back or performing other combat tasks. The effects of suppressive fires are immediate, but they last only as long as the fire continues. The key to any successful infantry assault is properly applying suppressive fires. A mortar platoon's high rate of fire and organizational responsiveness make it an excellent suppressor. Suppressive fires play a large role in generating combat power by infantry forces. The suppressive fires of mortars, along with other weapons, allow the infantry to close within range for a final assault. Effective suppressive fires increase infantry mobility. The more effective suppressive fires are, the less dependent infantrymen are on stealth, cover, and concealment. Mortar fires can continue to suppress the enemy until the assaulting forces are close enough to use their hand-carried weapons for suppression. Suppressive fires carry the assault over the last 200 meters and into the enemy's defensive position. At that point, the enemy either chooses to discontinue resistance by surrendering or withdrawing, or he is killed or wounded.[23]

- **Obscuration** interferes with the enemy's ability to observe the actions of friendly forces or prevents it altogether. Obscuration fires do not neutralize or suppress an enemy, since he can still employ his weapons, but reduces the effectiveness of enemy fire. Mortars can fire bursting WP rounds directly on an enemy position to both suppress and obscure, or they can fire either WP or smoke rounds to obscure observation. Mortar obscuration is effective for immediate response missions of limited scope and for short periods. The 81-mm (M252) and the 120-mm mortars have

the most effective obscuration rounds.[24]

- Smoke munitions should be used during a rapid advance to enhance obstacles created by rubble produced from previous fires. They reduce the ability of the enemy to acquire targets or to react to force movement.[25]
  - Offensive action against a strip area defense uses a heavy mixture of smoke and HE munitions at the point of friendly penetration, shifting to friendly flanks as advancement occurs. This mixture of munitions denies the enemy visual observation at the point of penetration, while suppressing and neutralizing enemy positions in the area. Once an objective has been secured, the mortars provide the friendly force an in-depth defensive ability.[26]

POSITION SELECTION

Key considerations for the selection of positions include:[27]

- The minimum range of the weapon.
- Terrain suitable for setting base plates.
- Dispersion and accessibility.
- **Mask and overhead clearance may initially be difficult** to achieve due to a combination of building heights and minimum-range requirements. Position selection should be open enough to allow full coverage of the sector of fire without mask or overhead interference at minimum ranges. Often, parking lots or parks must be used to achieve required clearances.[28]

The selection of mortar positions depends on the size of buildings, the size of the urban area, and the mission:[29]

- The **use of existing structures** for hide positions is recommended (for example, garages, office buildings, or highway overpasses) to afford maximum protection and minimize the camouflage effort. By proper use of mask, survivability can be enhanced. If the mortar has to fire in excess of 885 mils to clear a frontal mask, the enemy counterbattery threat is reduced. These principles can be used in both the offense and the defense.[30]

- Mortars **should not be mounted directly on concrete**; however, sandbags may be used as a buffer.[31]
  - Use two or three layers.
  - Butt them against a curb or a wall.
  - Extend them at least one sandbag width beyond the baseplate.

- **Rubble may be used** to make a parapet for firing positions.[32]

- Mortars are **usually not placed on top of buildings** because lack of cover and mask makes them vulnerable. They should not be placed inside buildings with damaged roofs unless the structure's ability has been checked. Overpressure can injure personnel, and the shock on the floor can weaken or collapse the structure.[33]

- The problem of **hard surfaces must be resolved** when using parking lots. Mortars tend to bounce and be inaccurate unless baseplates are cushioned by sandbags or other soft materials. Carrier-mounted mortars are ideal for use on hard surfaces. Aiming posts can be placed in cans of dirt to keep them upright.[34]

- The **political climate may require that no-fire or limited-fire zones** be set up to protect civilians, government buildings, and public utilities. Close coordination must be maintained between the forward unit elements and the mortar platoon to ensure no friendly troops are in the target area.[35]

COMMUNICATIONS

An increased use of wire, messenger, and visual signals will be required:[36]

- **Wire should be the primary means of communication** used between the forward observers, fire support team, fire direction center, and mortars since elements are close to each other.[37]

- **FM radio transmissions in built-up areas are likely to be erratic**. Structures reduce radio ranges; however, remoting of antennas to upper floors or roofs may improve communications and enhance operator survivability. Another applicable technique is the use of radio retransmissions. A practical solution is to use existing civilian systems to supplement the unit's capability.[38]

MAGNETIC INTERFERENCE

In an urban environment, **all magnetic instruments are affected by surrounding structural steel**, electrical cables, and automobiles. Minimum distance guidelines for the use of the M2 aiming circle will be difficult to apply. To overcome this problem, obtain an azimuth to a distant aiming point. From this azimuth, subtract the back azimuth of the direction of fire. Index the difference on the red scale and manipulate the gun until the vertical crosshair of the sight is on the aiming point. Such features as the direction of a street may be used instead of a distant aiming point.[39]

AIMING POSTS

Posts may be **placed vertically in dirt filled cans or ammunition boxes if the frontal area is covered** by concrete or asphalt. Natural aiming points, such as the edges of buildings or lampposts, may also be used.[40]

HIGH-EXPLOSIVE AMMUNITION

During MOUT, **mortar HE fires are more heavily used** than any other type of indirect fire weapon. The most common and valuable use for mortars is often harassment and interdiction fires. One of their greatest contributions is interdicting supplies, evacuation efforts, and reinforcement in the enemy rear just behind his forward defensive positions. Although mortar fires are often targeted against roads and other open areas, the natural dispersion of indirect fires will result in many hits on buildings. Leaders must use care when planning mortar fires during MOUT to minimize collateral damage.[41]

- **High-explosive ammunition gives good results** when used on lightly built structures within cities, particularly the 120-mm projectile. It does not perform well against reinforced concrete

found in larger urban areas.[42]

- When using HE ammunition in urban fighting, **point detonating fuzes should normally be used**. The use of proximity fuzes should be avoided because the nature of built-up areas will cause proximity fuzes to function prematurely. Proximity fuzes, however, are useful in attacking targets such as OPs on tops of buildings.[43]

- During both World War II and recent Middle East conflicts, light mortar **HE fires have been used extensively during MOUT** to deny the use of streets, parks, and plazas to enemy personnel.[44]

OTHER CONSIDERATIONS

When planning the use of mortars, commanders must consider the following:[45]

- FOs should be positioned on tops of buildings so target acquisition and adjustments in fire can best be accomplished.

- Commanders must understand ammunition effects to correctly estimate the number of volleys needed for the specific target coverage. Also, the effects of using white or red phosphorus may create unwanted smoke screens or limit visibility which could interfere with the tactical plan.

- Mortar sections should plan to provide their own security.

- Commanders must give consideration to where, when, and how mortars are to displace in order to maintain immediate indirect fire support. Combat in built-up areas may adversely affect the ability of mortars to displace because of rubbling.

Characteristics.

The US currently has five models of mortars:[46]

WPN	AMMUNITION		METERS			RATES OF FIRE/NOTES
	MODEL	TYPE	MIN RANGE	MAX RANGE	DIA OF ILL	
60-mm M224	M720/M889	HE*	70	3,500(1)		30 rounds per minute for 4 minutes(2) then 20 rounds per minute, sustained
	M722	WP**	70	3,500		
	M721	ILLUM***	200	3,500	500	
	M302A1	WP	35	1,830		
	M83A3	ILLUM	725	950	300	
	M49A4	HE	45	1,830		
81-mm M29A1	M374A2	HE	70	4,600		25 rounds per minute for 2 minutes, then 8 rounds per minute, sustained
	M374A3	HE	73	4,790		
	M375A2	WP	73	4,595		
	M301A3	ILLUM	100	3,950	360	
81-mm M252	M821/M889	HE	80	5,800		30 rounds per minute for 2 minutes, then 15 rounds per minute, sustained
	M374A3	HE	73	4,790		
	M819	RP****	300	4,800		
	M375A2	WP	73	4,595		
	M853A1	ILLUM	300	5,060	650	
	M301A3	ILLUM	100	3.950		
107-mm M30	M329A2	HE	770	6,840		18 rounds per minute for 1 minute, then 9 rounds per minute for 5 minutes, then 3 rounds per minute sustained
	M329A1	HE	920	5,650		
	M328A1	WP	770	5,650		
	M335A2	ILLUM	440	5,490	800	
120-mm M120	M57	HE	200	7,200		15 rounds per minute for 1 minute, then 4 rounds per minute, sustained
	M68	WP	200	7,200		
	M91	ILLUM	200	7,100		
	M933	HE (PD)	200	7,200		
	M934	HE(MOF)	200	7,200		
	M929	WP	200	7,200		
	M930	ILLUM	200	7,200	1,500	

* HIGH EXPLOSIVE
** WHITE PHOSPHORUS
*** ILLUMINATION
**** RED PHOSPHORUS

(1) BIPOD-MOUNTED, CHARGE 4 (MAXIMUM RANGE HANDHELD IS 1,300 METERS)
(2) CHARGE 2 AND OVER. 30 ROUNDS PER MINUTE CAN BE SUSTAINED WITH CHARGE 0 OR 1

Table 1-1. Mortar characteristics.

Figure 1. Table 1-1 from FM 7-90

- **Light mortar**. The 60-mm mortar, M224, provides air assault, airborne, ranger, and light infantry rifle companies with an effective, efficient, and flexible weapon. The inherent limitations of a light mortar (short-range and small-explosive charge) can be minimized by careful planning and a thorough knowledge of its capabilities. The M224 can be employed in several different configurations. The lightest weighs about 18 pounds; the heaviest weighs about 45 pounds. Each round weighs about 4 pounds.[47]

- **Medium mortars**. The 81-mm mortars, M29A1 and M252, are the current U.S. medium mortars. The M252 is replacing the M29A1, but both will remain in the Army inventory for several years. Medium mortars offer a compromise between the light and heavy mortars. Their range and explosive power is greater than the M224, yet they are still light enough to be man-packed over long distances. The M29A1 weighs about 98 pounds. The M252 is slightly lighter, about 93 pounds. Both can be broken down into several smaller loads for easier carrying. Rounds for these mortars weigh about 15 pounds each.[48]

    - **Special techniques can be used to position and lay the 81-mm mortar**. These techniques include placing buffers under base plates, using curbs and sandbags to anchor or brace mortars, and filling cans with dirt or using sandbags to emplace aiming posts. Fixed objects may be used as distant aiming points. When the depth of the defensive position is shallow, or when suitable firing positions are not available, mortars may have to be positioned behind the reserve. Positioning of mortars behind buildings greatly enhances survivability. Displacement is often executed by section. Mortars are usually not placed on top of buildings because the location lacks cover and concealment, and recoil/concussion could collapse roofs.[49]

- **Heavy mortars**. The 107-mm mortar, M30, and the 120-mm mortar, M120, are the current U.S. heavy mortars. The M120 is replacing the M30, but both will remain in the U.S. inventory for several years. The M30 is a rifled mortar, stabilizing its projectile by spinning it rapidly. The M120, like all other U.S. mortars, fires fin-stabilized ammunition from a smooth bore. Although heavy mortars require trucks or tracked mortar carriers to move them, they are still much lighter than field artillery pieces. They outrange light and medium mortars, and their explosive power is much greater. The M30 weighs about 675 pounds. The M120 is much lighter at about 320 pounds. Rounds for the 107-mm mortar weigh about 28 pounds. Those for the 120-mm mortar weigh almost 33 pounds each.[50]

Mortar Fires

There are various **types** of mortar fires are as follows:

- **High explosive**. High-explosive rounds are used to suppress or kill enemy dismounted infantry, mortars, and other supporting weapons, and to interdict the movement of men, vehicles and supplies in the enemy's forward area. Bursting WP rounds are often mixed with high-explosive rounds to enhance their suppressive and destructive effects.[51]

- **HE Ammunition.** HE is used more than any other type of ammunition. Although mortar fires are often targeted against roads and other open areas, the natural dispersion of indirect fires will result in many hits on buildings. Leaders must use care when planning mortar fires to minimize collateral damage. Considerations when using HE include:

- HE ammunition is particularly effective when used on lightly built structures within cities. However, it does not perform well against reinforced concrete found in larger urban areas.

- Point-detonating fuzes should be used. The use of proximity fuzes should be avoided because the nature of built-up areas causes proximity fuzes to function prematurely. However, proximity fuzes are useful in attacking targets such as OPs on tops of buildings.

- During World War II, the Middle East conflicts, and most recently in Bosnia, mortar HE fires have been used extensively to deny the use of streets, parks, and plazas to enemy and civilian personnel.[52]

- **Obscuration**. Obscuration rounds are used to conceal friendly forces as forces maneuver or assault, and to blind enemy supporting weapons. Obscuration can be used to isolate a portion of the enemy force while it is destroyed piecemeal. Some mortar rounds use bursting WP to achieve this obscuration; others employ more efficient technology. Bursting WP is also used to mark targets for engagement by other weapons, usually aircraft, and for signaling.[53]

- **Illumination**. Illumination rounds are used to reveal the location of enemy forces hidden by darkness. They allow the commander to confirm or deny the presence of the enemy without revealing the location of friendly direct-fire weapons. Illumination fires are often coordinated with HE fires to both expose the enemy and to kill or suppress him.[54]

  - **In the offense**, illumination rounds should burst above the objective to put enemy troops in the light. Buildings reduce the effectiveness of the illumination by creating shadows. If the illumination is behind the objective, the enemy troops would be in the shadows rather than in the light. In the defense, illumination is planned to burst behind friendly forces to put them in the shadows and place the enemy forces in the light. Continuous illumination requires close coordination between the FO and the fire direction center (FDC) to produce the proper effect.[55]

  - Mortar, synchronized with ground-mounted antitank weapons and AH-1 attack helicopters, **reveals and destroys** hidden enemy armored forces during darkness. Mortars also contribute to synchronization by providing marking rounds for CAS and attack helicopters. They also illuminate and suppress enemy defenders who can then be destroyed by direct fires and close assault forces.[56]

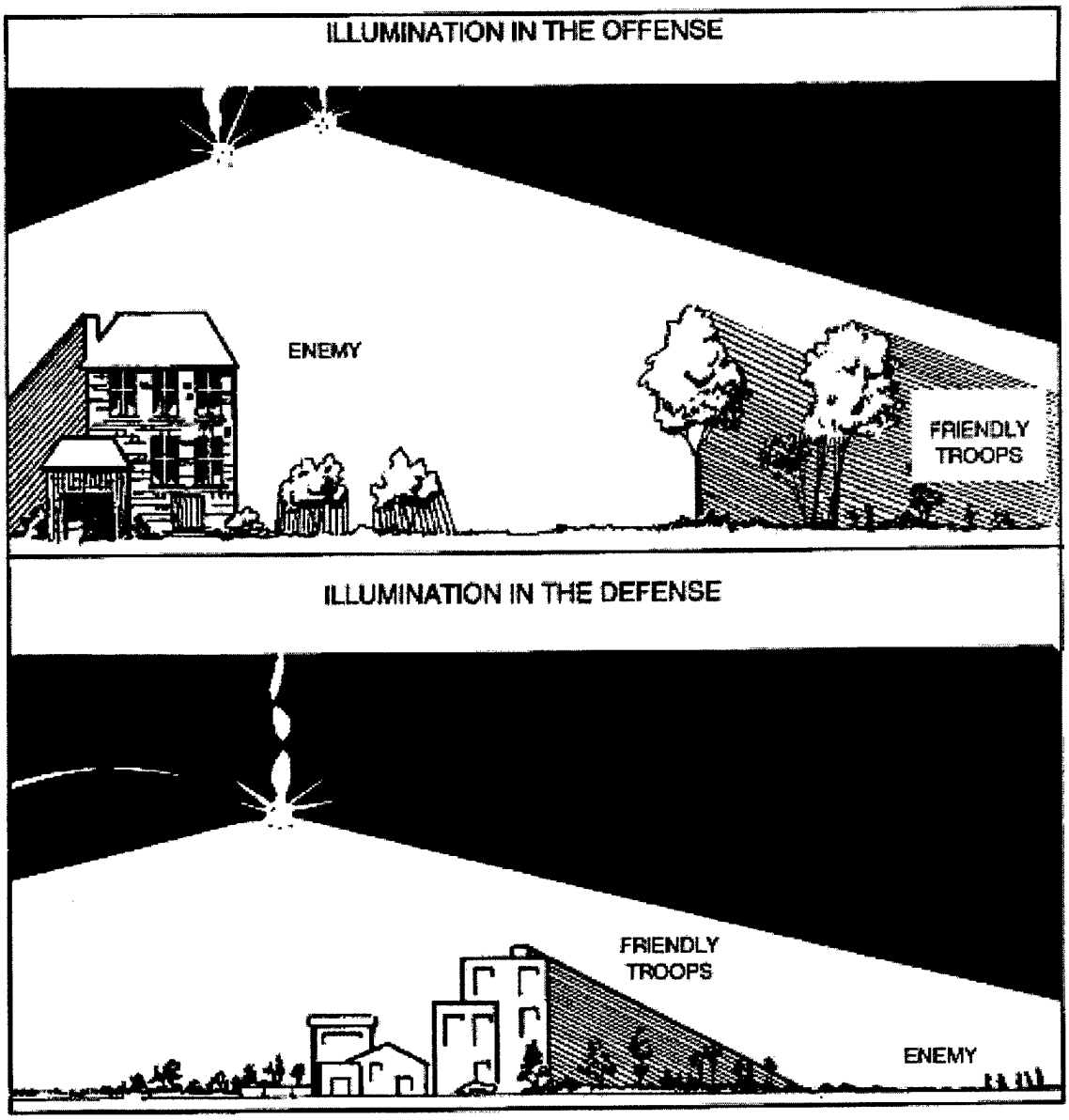


Figure J-1. Use of illumination fires during MOUT.

Figure 2. Figure J-1 from FM 7-90

- **Incendiary Fires.** Employment of these munitions is planned in detail to prevent burning of buildings and surrounding terrain that may create obstacles to friendly forces.[57]

Considerations for Use of Mortars

The primary role of mortars is to provide immediately available, responsive indirect fires that support the maneuver of the company or battalion, and that reinforce direct fires during close combat.[58]

In the attack, effective maneuver requires a base of fire, both direct and indirect, to do the following:[59]

- To establish the conditions for maneuver.
- To suppress the enemy.
- To fix him in place.
- To provide close supporting fires for the assault.

In the defense, this base of fire is used as follows:[60]

- To force armored vehicles to button up.
- To breakup enemy troop concentrations.
- To reduce the enemy's mobility and canalize his assault forces into engagement areas.
- To deny him the advantage of defilade terrain and force him into areas covered by direct fire weapons.
- To break up the enemy combined arms team and destroy his synchronization.
- To protect the infantry against a close dismounted assault.

Mortar sections and platoons provide the commander with--[61]

- An organic indirect fire capability that is always present and always responsive to the maneuver commander regardless of the changing demands placed on any supporting field artillery.[62]

- Supporting fire that is immediately at hand and close to the company and battalion fight. The mortar section or platoon is aware of the local situation and ready to respond quickly without lengthy coordination.[63]

- Unique plunging fires that complement, but do not replace, the heavier fires of supporting field artillery, close air support, and naval gunfire.[64]

- Weapons whose high rate of fire and lethality fill the gap between the time field artillery fires shift to deeper targets, and the assault elements close onto the objective.[65]

- A solid base of fire upon which to anchor his maneuver to the critical point of enemy weakness.[66]

Mortars allow the maneuver commander to quickly place killing indirect fires on the enemy, independent of whether he has been allocated supporting artillery. Heavy forces use carrier-mounted mortars to allow the mortar platoon to move cross-country at speeds compatible with the battalion task force. Light forces use wheeled vehicles or hand carry mortars into firing positions. Some companies have light mortars that can be manpacked across all terrain. All mortar sections and platoons exist to provide immediate, organizationally responsive fires that can be used to meet the rapid changes in the tactical situation.[67]

COMPANY- AND BATTALION-LEVEL BATTLE

Suppressing the enemy inhibits his fire and movement, while allowing friendly forces to gain a tactical mobility advantage. At the company- and battalion-level battle, mortar fire acts both as a killer of enemy forces and as an enhancer of friendly mobility.[68]

FACTORS LEADING TO USE OF MORTARS

- Field artillery assets at all levels are limited. For brigade and division commanders to concentrate offensive combat power at the critical point, they must decentralize elsewhere. Some maneuver units will always have less artillery support than others. Mortars compensate for this and reduce the degree of combat risk.[69]

- Mortars unstress commanders at the next higher level from which they are organic. Since maneuver battalions have mortars, brigade commanders can divert field artillery fire support away from them for limited periods to win the critical fight elsewhere.[70]

- Mortars contribute to the battalion's antiarmor battle by forcing the enemy to button up, obscuring his ability to employ supporting fires, and separating his dismounted infantry from their BMPs and accompanying tanks. The battalion's antiarmor fires become more effective when used against buttoned up enemy armor.[71]

- Heavy mortars can penetrate buildings and destroy enemy field fortifications, preparing the way for the dismounted assault force.[72]

- Mortars guarantee the battalion and company commanders the ability to cover friendly obstacles with indirect fire, regardless of the increasing calls for artillery fire against deep targets or the visibility on the battlefield.[73]

- Mortar fire combines with the FPF of a company's machine guns to repulse the enemy's dismounted assault. This frees artillery to attack and destroy follow-on echelons, which are forced to slow down and deploy as the ground assault is committed. Mortars can use the protection of deep defilade to continue indirect fire support, even when subjected to intense counterfire.[74]

- Mortars can fire directly overhead of friendly troops from close behind the forward elements. This allows combat power to be concentrated and synchronized on close terrain.[75]

    - Mechanized infantry and armor **battalions** are equipped with **heavy mortars**, either 107-mm or 120-mm (Figure 3). Both the mortar squads and the FDC personnel operate from tracked carriers, which offer protection from small-arms fire and shell fragments. TOEs differ in the number of mortar squads and FDCs within the mortar platoon. Mechanized infantry companies in some Reserve Component battalions also have mortar platoons, which have 81-mm mortars in tracked mortar carriers.[76]

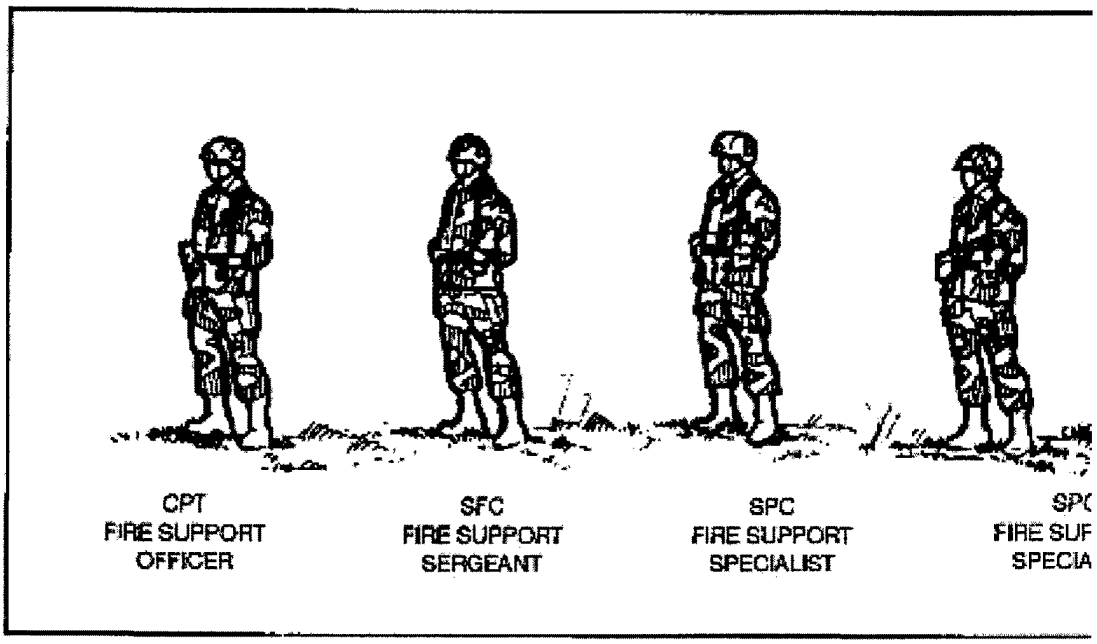


Figure 1-1. Typical battalion fire support section.

Figure 3. Figure 1-1 from FM 7-90

- **Airborne, air assault, and light infantry battalions** have mortar platoons at battalion and mortar sections at company levels. The mortar platoon at **battalion** level is equipped with **81-mm** mortars. The mortar section at **company** level has the **60-mm** mortar. The battalion mortar platoon is equipped with trucks and trailers, but the company's 60-mm mortars are hand carried.[77]

- Some infantry **battalions** in the **Reserve Component** also have mortar platoons at both battalion and company levels. The mortar platoon at battalion level is equipped with **either the 107-mm or 120-mm** mortar. The **company** mortar platoon has **81-mm** mortars. Both platoons are authorized trucks and trailers for movement.[78]

- **Ranger battalions are not authorized battalion-level mortars** but do have a weapons platoon within each ranger rifle company. These weapons platoons are equipped with 60-mm mortars that they hand carry.[79]

- Ground **cavalry troops** have heavy mortar sections equipped with either the **107-mm or 120-mm** mortar, track-mounted. Cavalry mortar sections do not have dedicated FDC personnel.[80]

ASSOCIATED ORGANIZATIONS

No element of the combined arms force operates independently. Each assists or coordinates with others. Several associated organizations work with mortar sections and platoons to maximize and coordinate the effects of mortar fire. There is a field artillery fire support coordinator at each echelon of command from company through brigade. At brigade level, he is the direct support artillery battalion commander. At

battalion level and below, field artillery fire support coordinators are designated as FSOs.[81]

- A direct support field artillery battalion normally provides a fire support section (FSS) to each of its supported infantry, mechanized infantry, and tank battalions (Figure 1-1). The battalion FSO, a captain, is in charge of this section. He is the principal advisor to the maneuver commander on fire support matters and is the fire support coordinator for the battalion. In mechanized infantry and armor battalions, the FSS is equipped with a special tracked vehicle with radios that allow communications by both voice and digital transmissions. A key piece of communications equipment used by the FSS is the FIST-DMD. This is an enhanced version of the standard digital message device supplied to each FO team. Using the FIST-DMD, the FSO can operate in four separate digital radio nets, and accept input from laser designators. In infantry battalions, the FSS uses wheeled vehicles, and its digital communications nets may be limited.[82]

- Each infantry and armor maneuver company normally has a fire support team (FIST) (Figure 4). The FIST is led by a field artillery lieutenant, the company FSO, and has three two-man FO teams for each infantry company. The FO teams are normally attached, one to each rifle platoon, but they can be employed in other ways. In tank companies and armored cavalry troops, the FIST consists only of the FIST headquarters with no FO teams. The FO's functions are performed by leaders within the platoons. The FIST, and each FO team, is equipped with radios that can be man-packed. They also have a digital message device. In mechanized and armored battalions, the FIST has a FIST-V. In infantry and ranger battalions, the FIST may have a wheeled vehicle or he may operate dismounted.[83]

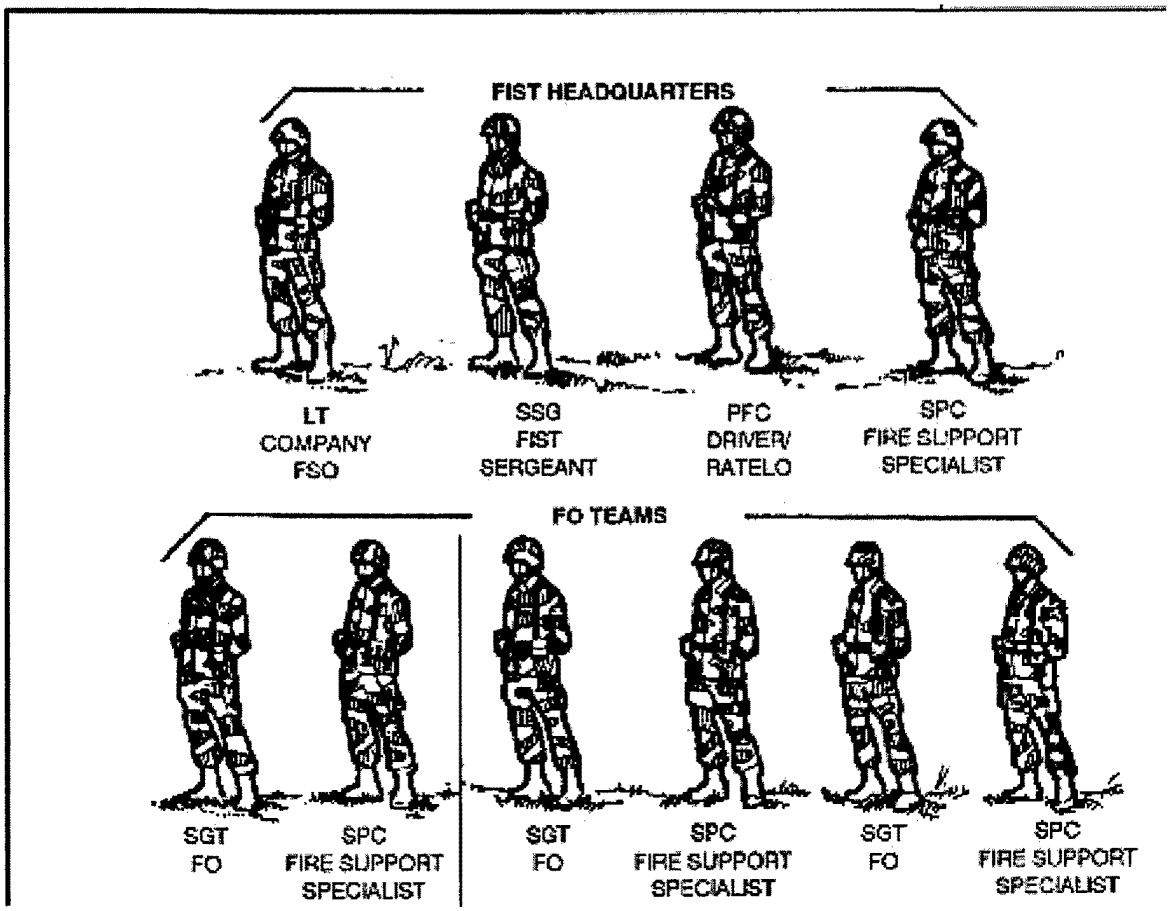


Figure 1-2. Typical infantry company fire support team.

Figure 4. Figure 1-2 from FM 7-90

- Maneuver battalions may have one or more special lasing teams attached or supporting them (Figure 5). These teams are equipped with either the FIST-V or man-portable lasers that can be used to designate targets for aircraft or to provide terminal guidance for precision munitions such as Copperhead, Hellfire, or laser-guided bombs. The colt also calls for and adjusts conventional indirect fires, including mortar fires.[84]

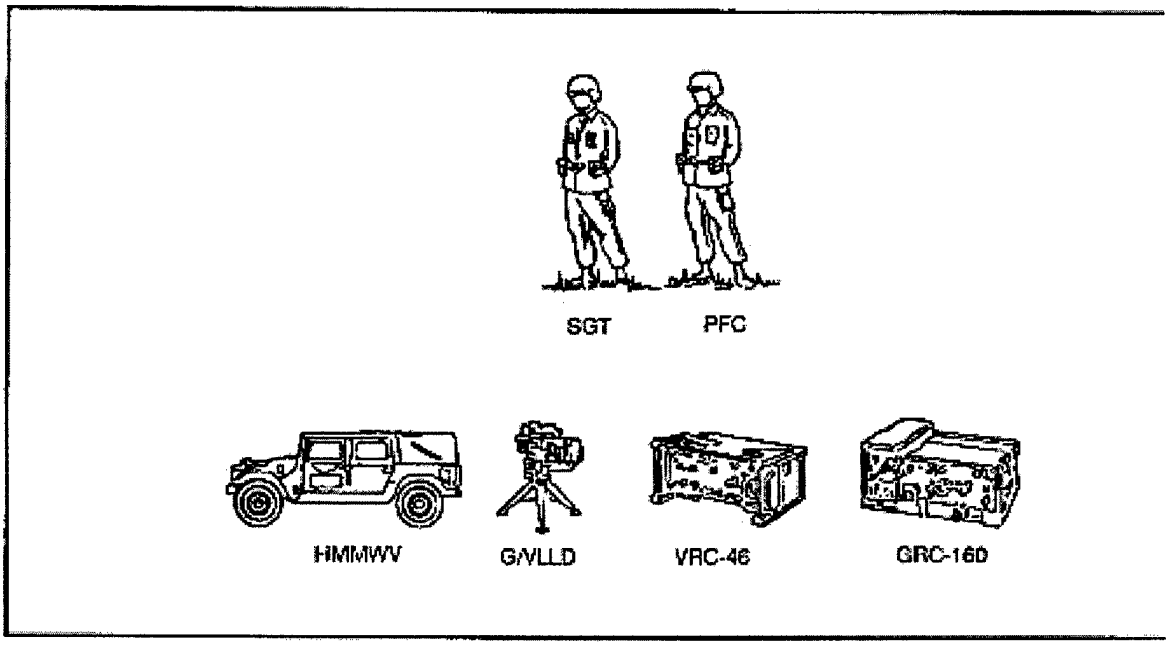


Figure 1-3. Typical combat observation lasing team.

Figure 5. Figure 1-3 from FM 7-90

- If a maneuver battalion is operating near the coast, it may be supported by elements of the air and naval gunfire liaison company (ANGLICO) (Figure 6). The ANGLICO normally provides each battalion a supporting arms liaison team (SALT) consisting of one officer and six enlisted men. The SALT is capable of planning, requesting, coordinating, and controlling naval gunfire, and naval/marine air strikes. In the absence of a U.S. Air Force TACP, the SALT can also control USAF close-air support. Each SALT is equipped with a wheeled vehicle, a radar bombing beacon, and sufficient radios to allow it to operate in the following nets:[85]

    - Naval gunfire support net.
    - Brigade or battalion command net.
    - Naval gunfire spot net.
    - Tactical air request net.

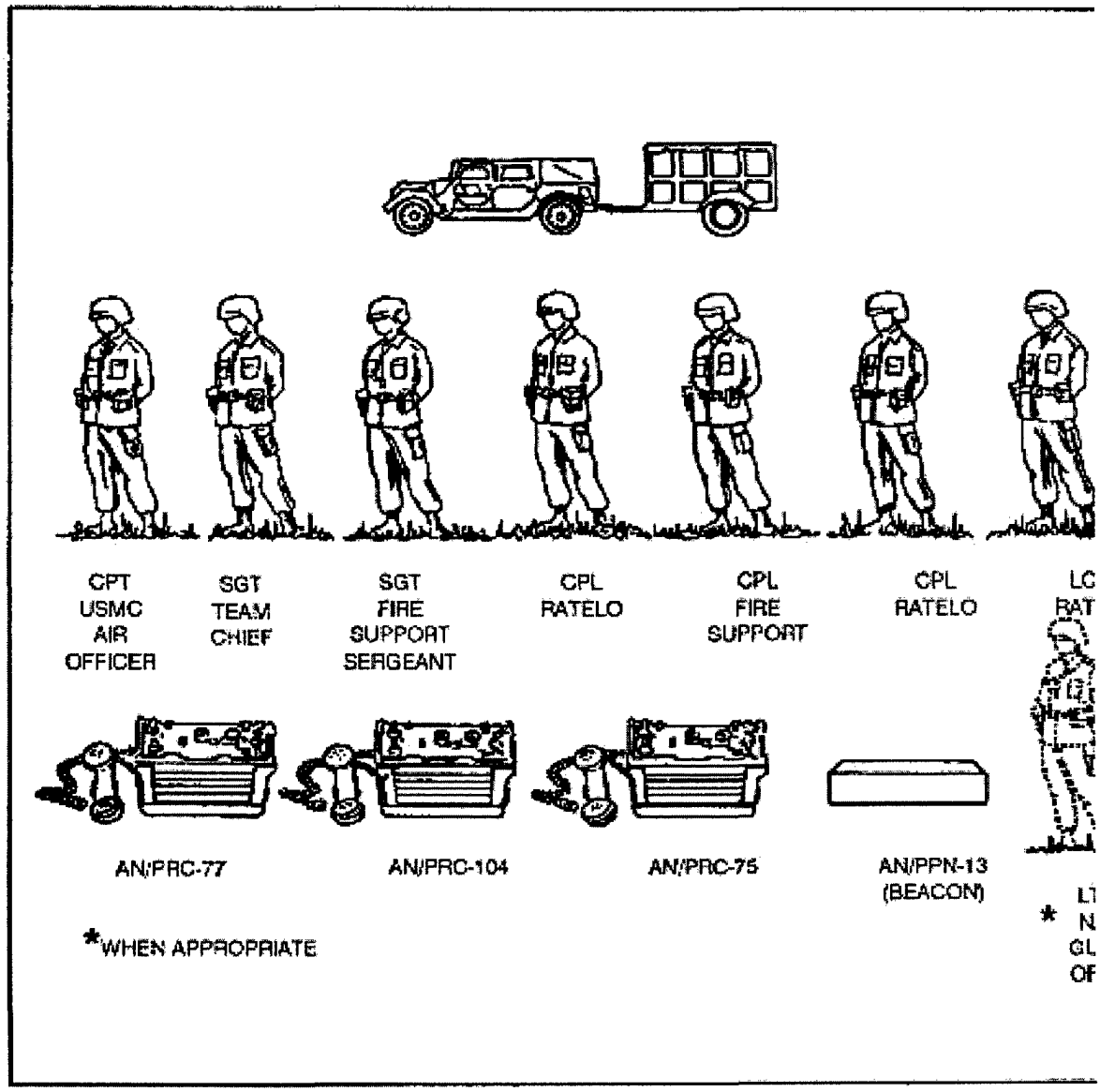


Figure 1-4. Typical supporting arms liaison team.

Figure 6. Figure 1-4 from FM 7-90

- Each SALT has two firepower control teams (FCT). These teams perform much the same functions as the company-level FIST. They call for and adjust naval gunfire, and control naval close-air support. Each FCT is composed of one officer and five enlisted men. The team has a wheeled vehicle and sufficient radios to operate in the following nets:[86]

    - Battalion or company command net.
    - Naval gunfire spot net.
    - Tactical air request net.

  Each FCT also has a radar transponder (beacon) used to control beacon offset bombing missions. One FCT normally supports a company and may be attached to it (Figure 7).[87]

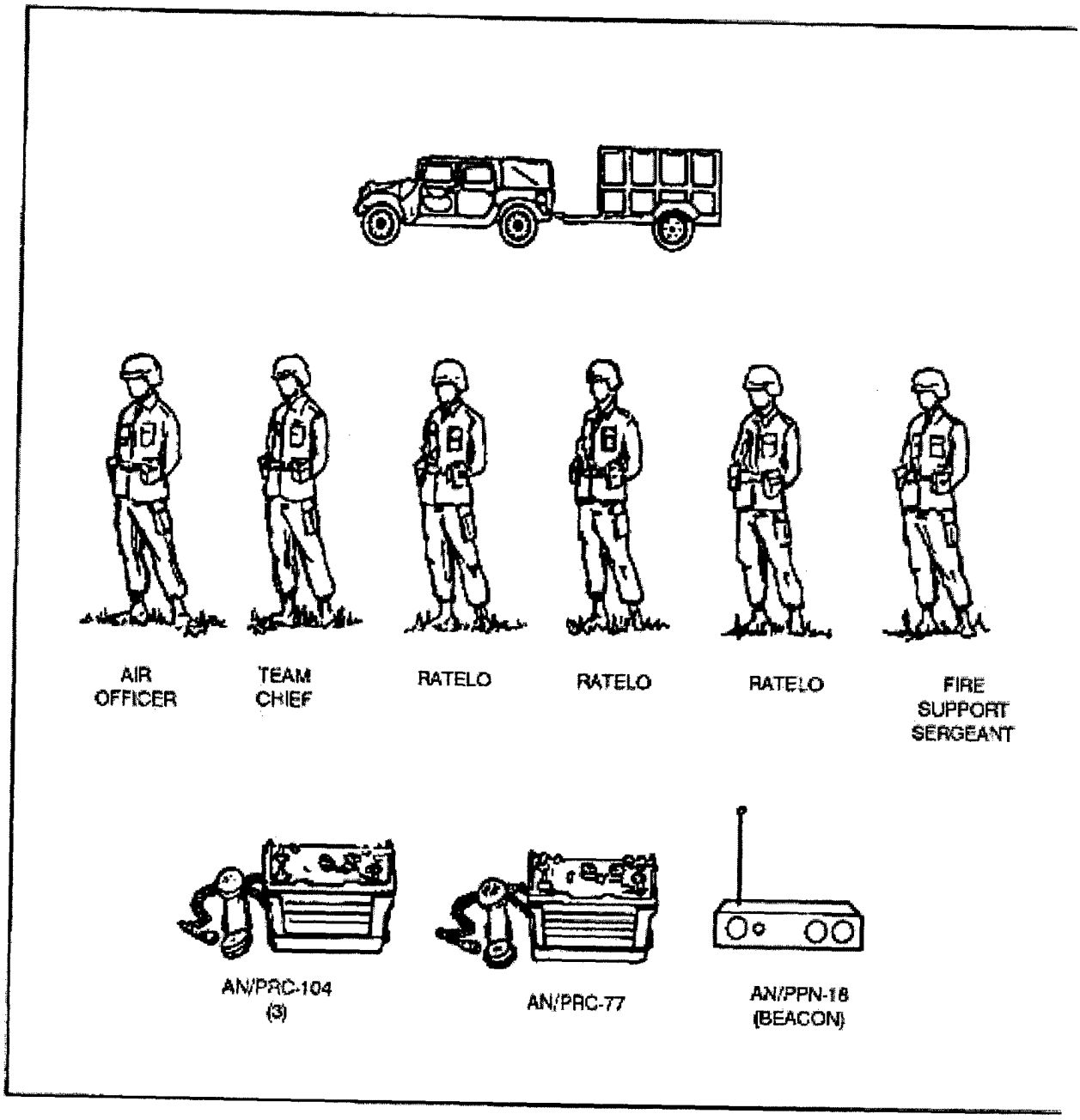


Figure 1-5. Typical firepower control team.

Figure 7. Figure 1-5 from FM 7-90

Conclusion

Mortars are an essential weapon system in MOUT. The various U.S. Army and other U.S. military doctrinal publications serve as the basis of current understanding of MOUT TTP. As technology alters capabilities and urban areas expand in area and complexity, MOUT planners must incorporate and improve methods of attack. Further reading for fire supporters must include focus on field artillery, Army/Marine Corps combat aviation, U.S. Navy capability, and U.S. Air Force capability. Only through

the application of all fire support means can fire supporters ensure victory over determined and capable adversaries.

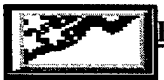
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