CHAPTER 7

SURVIVABILITY TECHNIQUES AND DEFENSE OF A MORTAR FIRING POSITION

Section I. THREATS TO MORTAR SURVIVABILITY

The mortar platoon leader must consider a number of threats. The greatest dangers to mortars are enemy counterfire, ground attacks, and air attacks.

7-1. THREATS

Mortar sections and platoons face an intense counterfire threat. Counterfire has the potential to reduce or degrade fire support from friendly mortars. Threat field artillery regiments often have an organic artillery reconnaissance battery or an organic target acquisition battalion. Radar, sound ranging, and reconnaissance methods are all used. Also, mortars can be located by radio direction-finding or other intelligence means. This large array of detection equipment, coupled with the huge amount of artillery available to many potential adversaries, presents a major threat to the survivability of US mortars.

a. Normally, mortars are not the first priority for enemy target acquisition systems. However, the mortar leader must assume the enemy will use them and take actions to neutralize friendly mortars.

(1) Visual observers with laser range finders can locate friendly mortar positions from up to 3 km away, with an error of less than 50 meters.

(2) Sound-ranging platoons can use simple acoustical sensors and sophisticated computer processors to determine the firing location of US mortars from as far away as 20 km. The accuracy of sound location varies but can locate firing mortars to about 100 meters.

(3) A widely used countermortar radar is the ARK-1. Mounted on a BMP chassis, the ARK-1 has a range of about 20 km. Its location error is small.

(4) Radio intercept/direction finding can rapidly identify and locate friendly radio transmitters. A successful intercept can result in countermortar fires within two to six minutes. Radio-direction finding can locate targets with an accuracy of 300 meters.

b. Many potential adversaries worldwide have recently begun a massive expansion in artillery and heavy mortar assets, combined with a parallel improvement in quality. Because of their size, range, and high-angle fire, mortars are the most likely indirect fire weapons to be used against US mortars.

c. The doctrine used by many potential adversaries calls for the massive use of indirect fire before an attack. US mortar platoons will be specifically targeted. As part of the battalion, they will receive heavy fire. Some armies plan to deliver up to 450 rounds on a company position as part of its 30-minute preparatory fires. The last few shells of the preparatory fire against mortars may be incendiary rounds. In addition to the common HE fragmentation rounds, some enemy weapons fire rounds that have enhanced blast effects or that release subprojectiles (flechettes). Exploding submunitions may also be used.

(1) Incendiary rounds are filled with thermite canisters in a WP matrix. When these rounds burst, they produce some fragmentation and dense smoke from the WP. The thermite canisters scatter and burn intensely, causing fires in exposed ammunition and fuel (Figure 7-1).

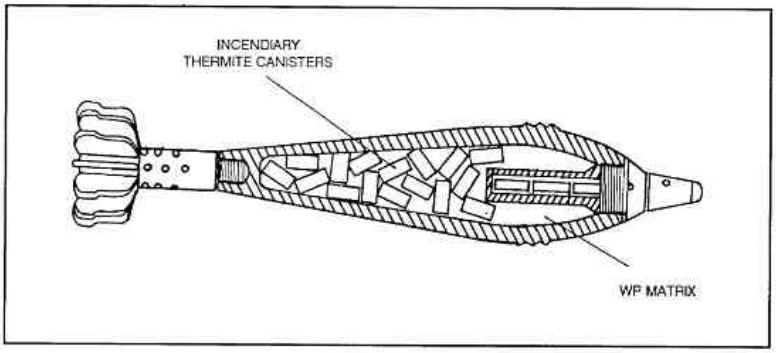

Figure 7-1. The 120-mm incendiary mortar round.

(2) Enhanced blast warheads are powerful but have little fragmentation. They are used to suppress and disrupt US tracked mortars, which are protected from fragments by their mortar carriers, and to crush field fortifications.

(3) Subprojectile warheads explode above the ground and scatter thousands of small, finned flechettes. These flechettes are deadly to unprotected personnel. There are two different sizes of flechettes, but each is effective against open mortar positions or carriers (Figure 7-2).

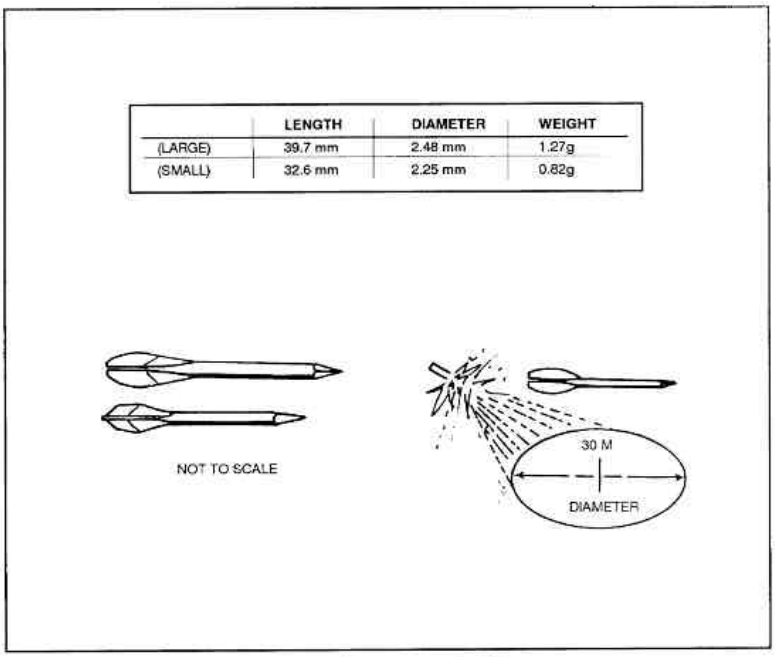

Figure 7-2. Flechette rounds, 152 mm.

7-2. GROUND ATTACK

When mortars support *offensive* operations, the greatest ground threat is chance contact with enemy forces that have been bypassed. When mortars support *defensive* operations, the greatest threats are enemy reconnaissance and main forces. Enemy reconnaissance teams may encounter mortars by chance contact or can be given the mission to locate mortar positions. Once reconnaissance teams encounter mortars, they may attack them or report their locations for destruction by indirect fire or by enemy ground forces. If mortars are located where enemy penetrations occur, they can be attacked by virtue of the enemy's momentum.

7-3. AIR ATTACK

Enemy aircraft pose a threat to mortars due to the difficulty in concealing mortar firing positions from aerial observation. Armed helicopters pose a major threat because of their standoff acquisition ability. Many armies in the world now have remotely piloted aircraft specifically used for reconnaissance.

a. The mortar platoon must hide itself from enemy aircraft through the use of passive air defense measures. These measures are described in FM 44-8 and must be part of normal OPSEC measures.

b. The mortar platoon usually does not engage in active air defense unless directly attacked by enemy aircraft, and then only in accordance with the air defense rules and procedures found in the air defense SOP. Individual small-arms weapons and machine guns provide a limited self-defense capability against enemy aircraft. (See FM 44-8 on techniques used to defend small units against enemy air attack.)

7-4. SURVIVABILITY TECHNIQUES

Crucial to evading counterfire is a sound mortar employment technique that considers this threat. The use of defilade and covered and concealed reverse-slope positions is the most effective survivability technique. Defilade is protection from hostile observation and fire provided by an obstacle such as a hill, ridge, or bank. It is important to mortars because of the difference in the trajectories of field guns, howitzers, rocket launchers, and mortars (Figure 7-3).

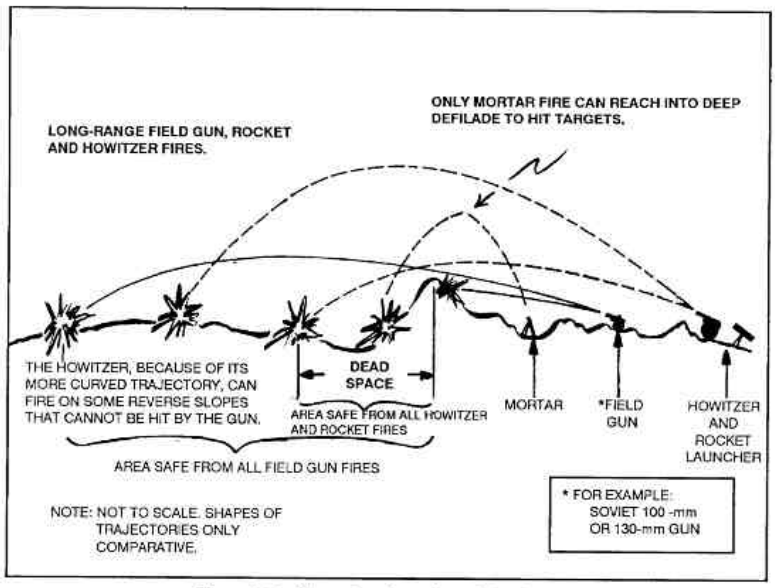

Figure 7-3. Example trajectories and dead space.

a. The flatter trajectory of field guns, howitzers, and rocket launchers creates a dead space behind large hill masses and tall buildings. US mortars can occupy positions in this area and be almost impervious to counterfire. Because of their high trajectories, US

mortars can still fire out of defilade to hit targets. Even deep defilade only partly reduces the maximum range of a mortar (Figure 7-4). Deep defilade protects mortar positions from field gun and howitzer fires but not from enemy mortar fires. However, to shoot into the dead space, enemy mortars must be moved close to friendly positions, making them vulnerable to counterfire.

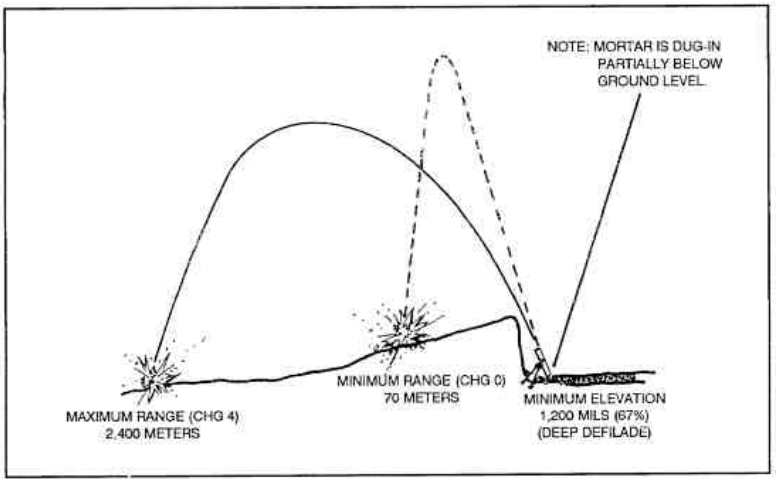

Figure 7-4. Example of range coverage from deep defilade (M224 60-mm mortar).

b. A geometric formula can be used to determine the exact extent of the dead space. However, the cotangent of the angle of fall (COT of fall) for the weapon firing must be known. For US-type mortars, this can be found in Table E, Supplementary Data, of the tabular firing tables (Figure 7-5).

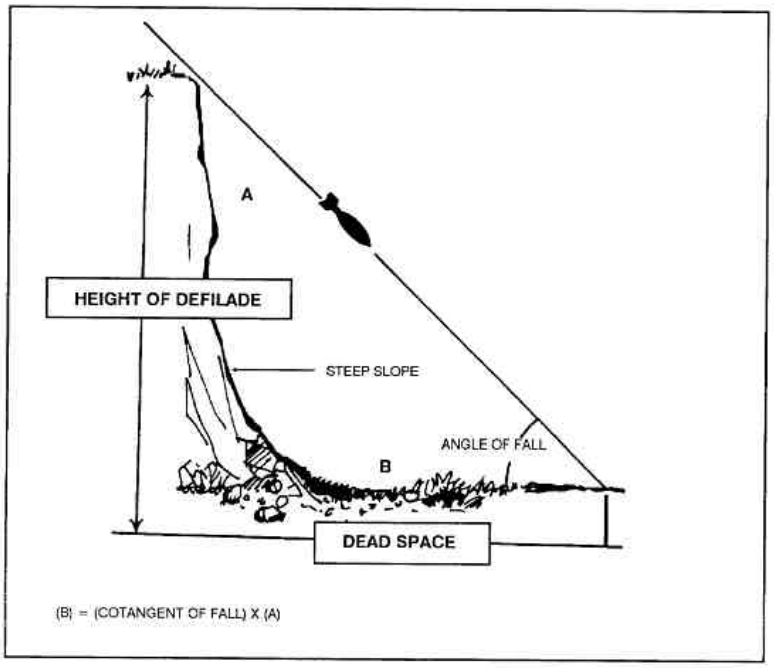

Figure 7-5. Geometric relationships.

c. The average angle of fall of howitzers is about 25 degrees, which equates to a COT of fall of about 2.0. Therefore, the dead space is about two times the height of the defilade. If a mortar position is chosen that has a minimum safe elevation of 900 mils, that position is safe from 122-mm and 152-mm howitzer rounds fired directly over the hill mass or ledge. The angle of fall of field guns is even lower; their dead space is much greater.

d. On flat terrain, deep defilade may be hard to find. On rolling or slightly broken terrain, it can usually be located. Deep defilade is easily located in mountainous terrain and built-up areas. Large buildings create huge amounts of dead space that can extend over several streets. The dead space created by a large building is about three times the height of the building for howitzers and about one-half the building height for mortar fires. (These distances are only guidelines.) The actual size of the dead space depends on the weapon, round, charge, range combination, and elevation difference between the weapon and the target.

NOTE: If the enemy fires artillery or rockets at an elevation of 800 mils, the dead space behind each building will be about equal to the height of the building.

e. If our mortars are close to a tall mass construction building and firing at near maximum elevation, they will be virtually impervious to frontal fires from one of the world's most effective counterbattery weapons, the BM-21 Multiple Rocket System. The BM-21 has a maximum firing elevation of about 885 mils. If the mortar position is within the building's dead space, the incoming rounds from that direction either will strike the building or pass over the mortars to strike behind them. (Figure 7-6.) US mortars should move as close to buildings as possible while maintaining clearance to fire over the building. If 81-mm mortars are firing at 1335 mils or higher elevation, the mortars should be back from the building a distance about one-quarter its height. A 4.2-inch mortar firing at 1065 mils elevation should be back from the building a distance about one-half the height. This positioning puts the mortars well within the building's dead space.

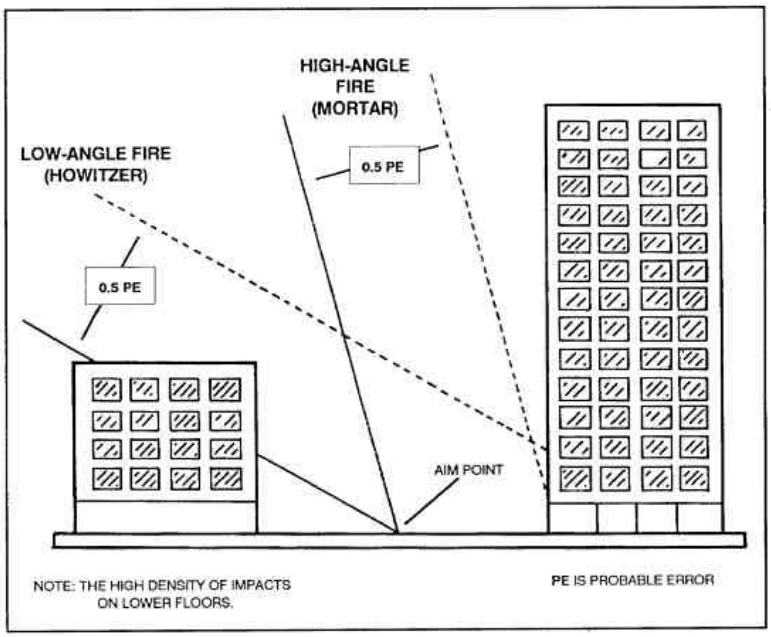

Figure 7-6. Expected locations of impact from high and low angles of fire.

f. Mortars should not be positioned close to buildings that have a large surface area made of glass because of the secondary fragment hazard. Short buildings close to the mortar position on any side do not provide much dead space in which to position mortars, but they will stop fragments from that side. If the open area the mortar is firing from is small and the adjacent walls will stop fragments, the incoming rounds have to be almost a direct hit to damage the mortar or crew.

g. Establishing mortar firing positions within the dead space created by a hill mass or building does not eliminate the enemy's ability to locate it. It does make it difficult for the enemy to place effective countermortar fire on the US position. Because of their high trajectory and powerful charges, US mortars can fire out of deep defilade against most targets in the battalion or company area.

Section II. DUG-IN POSITIONS

Mortars fight a complex, fluid, ever-changing battle. They may stop in a firing position only long enough to fire a few missions before displacing. Other times, they may occupy a good defilade firing position for several days. All infantry and mortar squads dig in during defensive operations and continue to improve their positions as long as they occupy them. If mortar platoons or sections defend from a strongpoint, they dig extensive fortifications to withstand a dismounted assault supported by heavy fire. Preparing hardened mortar positions takes much time and material. If completely accomplished by hand, preparing hardened mortar positions is a slow and fatiguing process. If engineer equipment is available to assist, protective positions can be built more quickly, which results in more rested and responsive mortar crews.

7-5. DISMOUNTED MORTARS

There is only one type of dismounted dug-in mortar position. It has variations as to the depth it is dug and its stage of construction. The standard dismounted dug-in mortar position has three stages of construction (Figure 7-7):

STAGE I-Gun pit.
STAGE II-Gun pit with personnel shelters.
STAGE III-Gun pit with personnel shelters and ammunition bunkers.

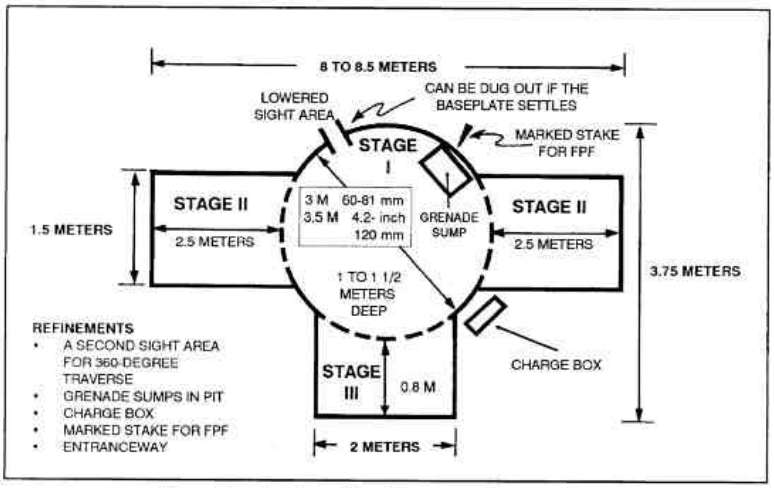

Figure 7-7. Mortar position (three stages of construction).

A dug-in position for the 81-mm/60-mm mortars is the same as for the 4.2-inch/120-mm mortars with only slight changes in dimensions. The standard mortar position must be constructed with a flat bottom. It can be constructed totally below, partly above, or completely above ground, depending on the time and material available and the composition of the ground at the intended position. The below-ground position offers the best protection.

a. **STAGE I.** After the position's general location is selected, the exact baseplate position is marked and construction begins. The mortar pit for 81-mm/60-mm mortars should be 3 M16-rifle lengths (about 3 meters) wide and a maximum of 11/2 M16-rifle lengths (1.5 meters) deep. All walls or parapets above ground must be at least 1 M16-rifle length (1 meter) thick for protection against small-arms fire and shell fragments. Sandbags, logs, 55-gallon drums, dirt-filled ammunition boxes, timber, or other materials can be used in constructing walls or parapets. The gunner must be able to see the aiming posts or the distant aiming point through all deflection and elevation settings. Construction for a heavy mortar pit is the same, except the pit diameter is 31/2 M16-rifle lengths (31/2 meters).

b. **STAGE II.** When time allows, increase protection by constructing personnel shelters with overhead cover. Construct the personnel shelters perpendicular to the principal direction of fire with firing ports positioned as determined by assigned small-arms sectors of fire. Build the shelters at the same depth (1.5 meters) as the pit, and 11/2 M16-rifle lengths (1.5 meters) wide, and 21/2 M16-rifle lengths (2.5 meters) long on opposite sides of the pit with a minimum of 1/2 an M16-rifle length (0.5 meters) of overhead cover. There should be a blast barrier of at least two sandbags in thickness separating the

personnel shelters from the mortar pit. The firing ports can be made using wooden ammunition boxes with the bottoms knocked out. Personnel should use sandbags to adjust the opening to the smallest usable size. Corrugated metal culvert halves covered with earth make excellent personnel shelters (Figure 7-8). Whatever design is selected, it should never support the weight of the overhead cover on sandbags. Use timber or some other structurally sound material.

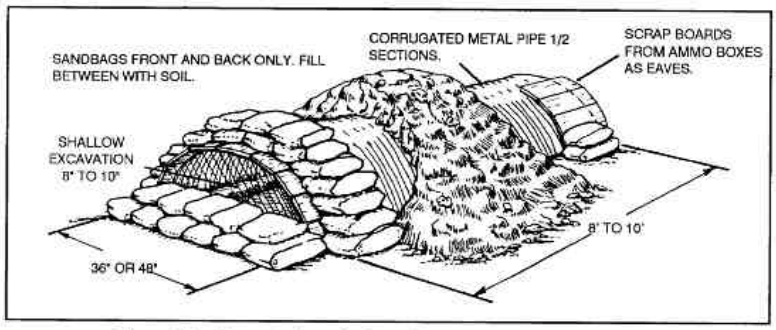

Figure 7-8. Corrugated metal culvert halves used as personnel shelter.

c. **STAGE III.** As position improvement continues, construct ammunition bunkers. A bunker should be two M16-rifle lengths (2 meters) wide, one ammunition box (length) deep, and two ammunition boxes (stacked on their sides) high (three for a 4.2-inch mortar position). The bunker is divided into four sections separated by the ammunition boxes stacked on their sides (Figure 7-9). Ammunition boxes form the floor on which the ammunition is stacked. U-shaped pickets or other suitable support material are placed across the stacked boxes, providing a base on which to place dirt-filled ammunition boxes to enclose the top of the bunker. All boxes are filled with dirt to increase stability and add protection. A canvas tarpaulin or plastic sheet available from the ammunition packing material should be placed on the top of the ammunition boxes, then covered with dirt and sandbags to form at least an 18-inch layer over the bunker. The tarpaulin should also drape over the opening to the bunker to protect the ammunition from dirt and moisture.

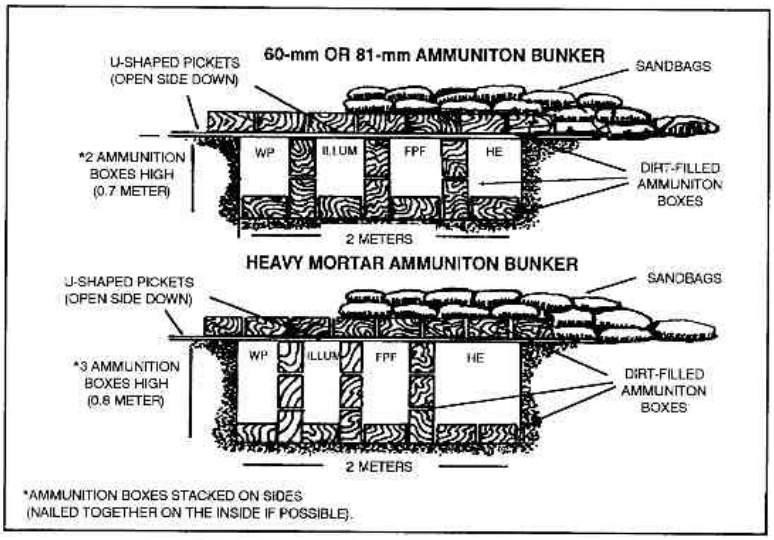

Figure 7-9. Ammunition storage area (front view).

The sandbags on top add protection and increase stability to the bunker and to reduce the danger of wooden splinters if a round impacts close by.

d. Once the mortar position is completed to STAGE III, personnel can add refinements.

(1) Add another sight area to allow 360-degree traverse.

(2) Dig grenade sumps (at least one) in the circular pit. They are dug against the wall of the pit, using the trench-style pit as shown in FM 7-8.

(3) Add an entry with a 90-degree blast baffle. This can enter either the circular pit or one of the personnel shelters. Eventually, it should connect with a crawl trench toward the FDC.

(4) Dig a hole, outside the circular pit, near the ammunition bunker for placing excess charges until disposal. Personnel should place an empty ammunition box in this hole; the cover will protect the excess charges from flash fires. Sandbags should be placed on the box lid when not placing charges into it (Figure 7-10).

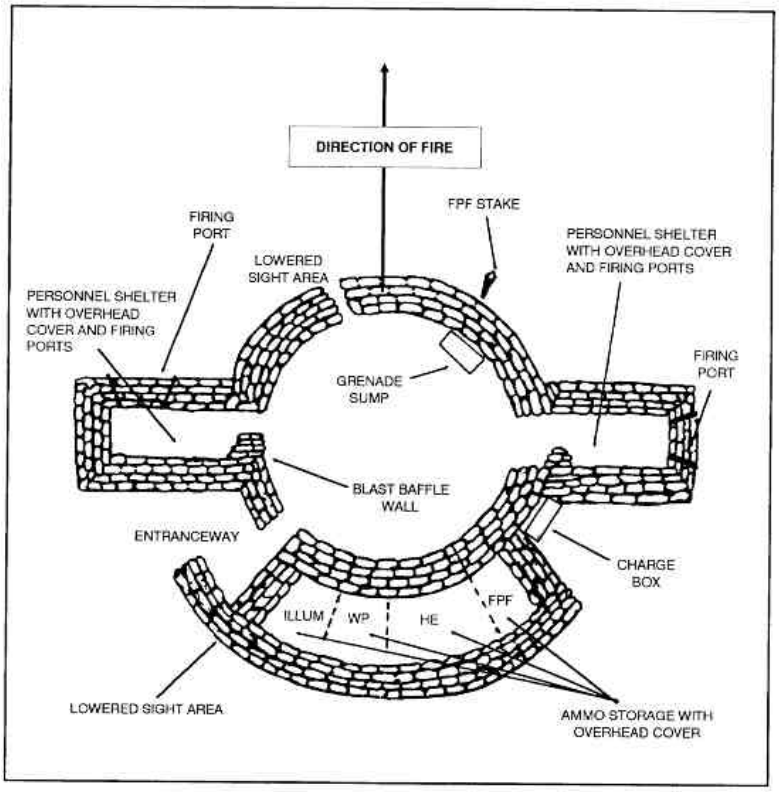

Figure 7-10. Completed dismounted mortar position (overhead view) with refinements.

(5) Place stakes around the rim of the circular pit corresponding to priority targets. Personnel mark the stake corresponding to the FPF with a distinctive mark; these stakes are for reference. Stakes are not as accurate as using aiming posts, but can be used if the aiming posts are disturbed or obscured. These stakes are useful for illumination targets, since precise lay of the mortar is not required. They can make the illumination mortar more responsive. Put the stakes in securely and do not disturb them.

(6) Install alternate wire lines from the mortar positions to the FDC and tag the alternate and primary lines.

(7) Sandbag the base of the aiming posts without disturbing them. This protects them from being blown over by enemy fire.

(8) Bury all communications wire at least 4 inches below the ground.

e. A STAGE III dismounted mortar position will take from 30 to 40 man-hours if it is dug by hand, depending on the type soil and the tools used. If engineer equipment can be used to make the initial pit and bunkers, this time can be shortened. Each mortar position will require approximately the following amount of fortification material (the exact amount depends on the depth of the excavation):

- 6,000 sandbags.
- 50 wooden ammunition boxes, or an equivalent amount of timber.
- 150 U-shaped pickets (72 inches long).

f. As time permits, personnel should add sandbag layers to increase protection. These sandbags must be properly supported. Poorly supported, overweight bunkers can collapse under enemy fire, killing or injuring the soldiers inside. (See FM 5-103 and FM 5-34 for guidance on support beams.)

7-6. FDC BUNKERS

There is no standard FDC bunker design. Any of several versions depicted in FM 5-103 is satisfactory. Figures 7-11 through 7-13 show various bunker designs and standards.

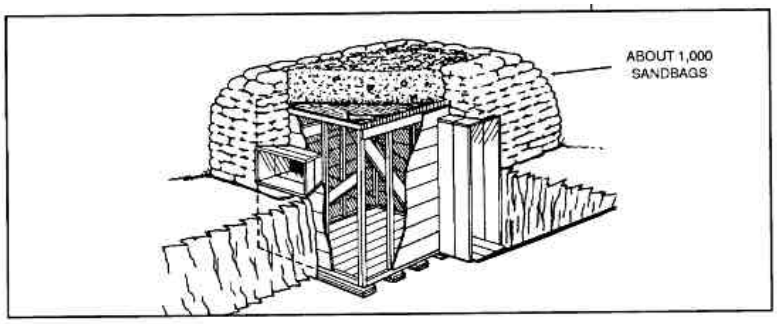

Figure 7-11. Cutaway view of a standard bunker.

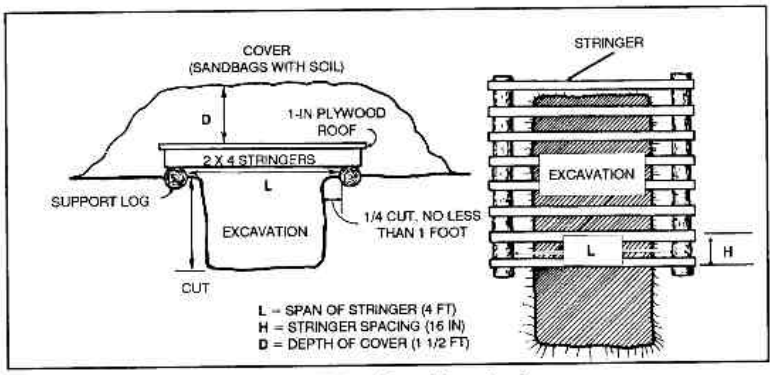

Figure 7-12. FDC position with overhead cover protection against fragments from a 120-mm mortar.

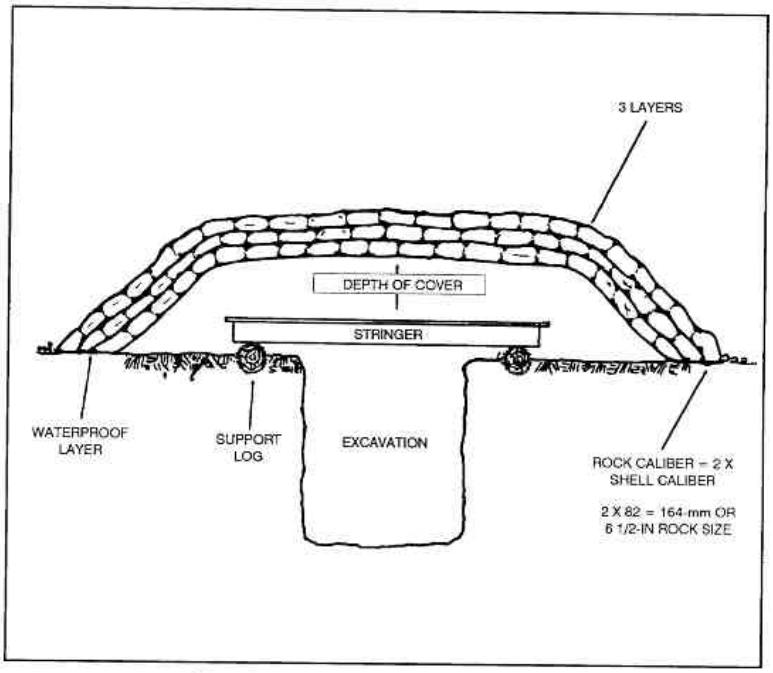

Figure 7-13. Stone layer added to overhead cover to defeat the delay fuze burst from an 82-mm mortar.

a. When constructing FDC bunkers, *always* do the following:

(1) Ensure adequate shoring material is used.

(2) Dig down as much as possible.

(3) Maintain, repair, and improve positions continuously.

(4) Inspect the safety of bunkers daily-after a heavy rain and after receiving enemy fires.

(5) Revet excavations in sandy soil.

(6) Interlock sandbags for double-wall construction and corners.

(7) Fill sandbags to 75 percent.

(8) Construct to proper engineering standards.

b. When constructing FDC bunkers, *never* do the following:

(1) Fail to supervise construction.

(2) Use sand or sandbags for structural support.

(3) Forget to camouflage.

(4) Drive vehicles within 6 feet of an excavation.

(5) Overfill sandbags.

(6) Omit lateral bracing on stringers.

(7) Take shortcuts in construction safety.

(8) Build above ground unless absolutely necessary.

7-7. MOUNTED MORTARS

Even though tracked mortar carriers provide protection against small-arms weapons and most shell fragments, they can be penetrated by heavy shellfire. To protect them, they should also be dug-in.

a. A protective position for a tracked mortar carrier is too large to be dug by hand; engineer equipment is normally required. Some work with hand tools is needed to finish the position.

b. A bulldozer or an SEE can build a hasty fighting position for a mortar carrier in about 25 minutes. This position must be 20 feet long, with entrance ways on both ends. It must be 10 feet wide and 6 feet deep. The carrier must be able to back into the position. The spoil should be spread out to avoid a distinct hump of fresh dirt, and the floor of the position should be level (Figure 7-14).

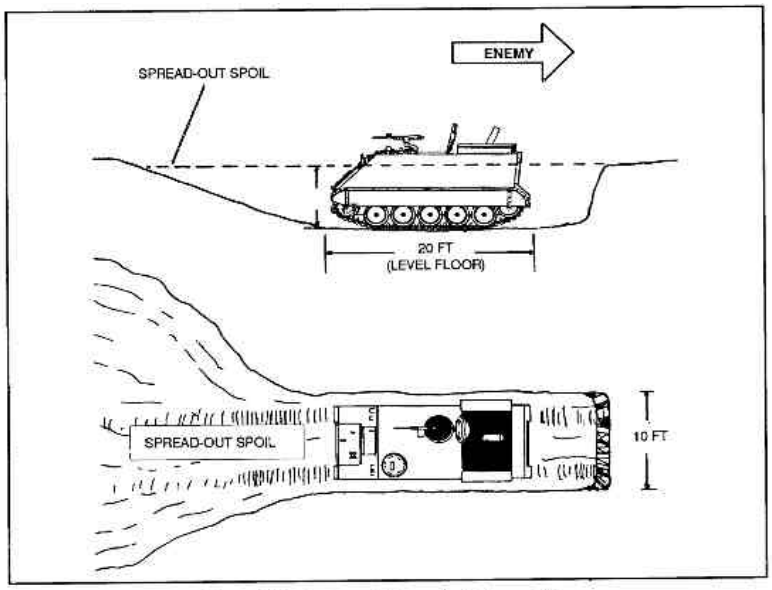

Figure 7-14. Hasty tracked mortar firing position.

c. As time permits, this hasty firing position can be improved. The sides can be widened slightly to allow movement around the track to perform maintenance. An ammunition bunker can be dug into one side of the position to store additional ammunition. In loose, sandy soil, the sides of the position must be revetted to prevent a cave-in.

7-8. MORTAR POSITIONS IN A STRONGPOINT

A strongpoint is a battle position fortified as strongly as possible to withstand direct assaults by dismounted infantry supported by heavy indirect fire. Mortars in a strongpoint must continue to provide close and continuous fires, even when under attack. All mortar positions must be completed to STAGE III. The FDC must be protected by earth and overhead cover. Ammunition storage areas, communications trenches, and wire lines must all be protected.

a. Even if the enemy masses fires against a strongpoint, mortars can survive and continue to fight if they are properly dug-in.

(1) In 1976, the German Infantry School fired artillery and mortars, with the intensity set by Soviet doctrine, on various field positions in which infantrymen were represented by mannequins. Results showed that troops prone in the open would suffer 100 percent casualties. Those in open fighting positions without overhead cover would suffer 30 percent casualties. Troops dug-in with overhead cover would expect fewer than 10 percent casualties, mostly by direct hits.

(2) During the entire month of February 1968, an average 1,100 rounds of enemy indirect fire fell daily on the USMC combat base at Khe Sahn, South Vietnam. This fire included 82-mm and 120-mm mortars, 100-mm and 130-mm field guns, 122-mm and 152-mm howitzers, and 122-mm rockets. The marines reported that this fire had little effect once they had prepared proper field fortifications. One rifle company reported that from 350 to 500 82-mm mortar rounds hit its position within two hours with only moderate damage.

b. From this recent combat experience against common weapons and from tests conducted by the US Army, some guidelines on protection levels have been developed:

(1) A minimum of 18 inches of earth is required to protect a position from fragmentation. This is not enough to protect against direct hits or near-misses.

(2) One strip of pierced steel planking (PSP) and three layers of well-compacted sandbags will protect against a direct hit from an 82-mm mortar round with a PD fuze.

(3) One layer of PSP and eight layers of well-compacted sandbags can protect against a direct hit from a 120-mm mortar round with a PD fuze.

(4) No reasonable amount of sandbags and PSP can protect a bunker against a direct hit by a 120-mm mortar round with a delay fuze. Heavy bunkers with timber supports and carefully constructed shielding material can minimize the damage done by a direct hit. They can also protect the occupants from fragments and near-misses.

(5) Without concrete or steel, no field fortifications can be built to withstand a direct hit from a 122-mm rocket or a 152-mm HE round with PD fuze. Even dud 152-mm rounds will penetrate about 4 feet of solid earth. However, properly constructed bunkers will protect against fragments and near-misses. (See FM 5-103 and FM 5-34 for more detailed information on constructing protective bunkers for the mortar FDC.)

7-9. HIGH-SURVIVABILITY MORTAR POSITION

With the exception of strongpoints, AirLand Battle doctrine does not envision remaining in static defensive positions and engaging in massive exchanges of indirect fire. However, battles during low- and mid-intensity conflicts in the past have resulted in just

such an exchange. During the Korean War, a high-survivability mortar position was developed and used successfully. This position protected a heavy mortar squad and allowed it to continue to fight, even during intense enemy countermortar fire.

a. The high-survivability mortar position requires from 150 to 300 man-hours to complete by hand, depending on the soil. If an SEE is used, this time is reduced greatly. If timbers are not available, dimensioned lumber or engineer U-shaped pickets can be used. (Refer to FM 5-103 for beam spacing and shoring guidance.)

b. Each high-survivability mortar position consists of two bunkers with a circular pit between them (Figure 7-15). The crew bunker holds the squad leader, the gunner and assistant gunner, and equipment for communication to the FDC and to platoon headquarters. The ammunition bunker holds the ammunition bearer and the ammunition. The gun pit and bunkers are sited so that the long axis of the emplacement is perpendicular to the primary direction of fire.

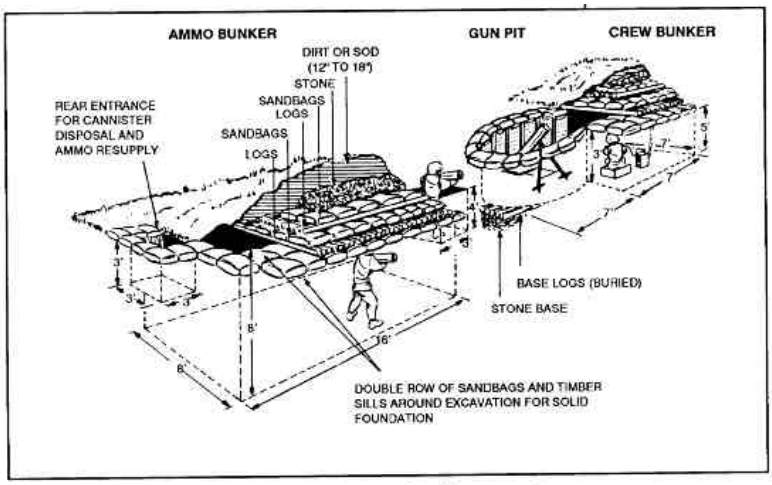

Figure 7-15. Cutaway view of heavy mortar, high-survivability position.

c. Material for construction is limited only by the ingenuity of the mortar crew and the items found in the surrounding area. Such items that can be used are logs, railroad rails or ties, planking, corrugated iron roofing, doors, woven straw mats, rice bags, sandbags, and stones. The gun pit is circular with a diameter of 8 feet. The pit is about 3 feet deep with a parapet around it. Beneath the baseplate, several layers of rock and logs are placed to ensure stability of the mortar during sustained fire and to prevent the baseplate's sinking.

d. The 180 degrees of the gun pit, facing the primary azimuth of fire, has logs 6 to 8 inches in diameter placed vertically behind the baseplate. This prevents the baseplate

from digging in or skidding back during prolonged firing. The sides of the pit can be strengthened with woven wire or branches. The gun pit has no overhead cover. However, a camouflage net can be draped on poles over the pit and removed before firing.

e. The crew bunker, a trapezoid about 7 feet long and 5 feet deep, is also the squad CP. It connects directly with the gun pit. The bunker widens out at the rear to provide space for the crew. This shape gives maximum protection. Telephone communication and some system of lighting for night firing are needed.

f. The rectangular ammunition bunker, larger than the crew bunker, measures 16 feet long. This bunker has a fire step with a 21/2-foot wide parapet between it and the gun pit. This allows the ammunition bearer to remain within the bunker, set charges and fuzes, and yet be able to pass the round to the assistant gunner for firing. The opening over the fire step is not covered, allowing the ammunition bearer to work freely between the gun pit and bunker. There is an entrance for ammunition and removal of empty ammunition containers at the rear of the bunker. Ammunition should be laid on dunnage and a sump dug if the position is wet or the drainage poor.

g. A minimum of 3 feet of logs, stone, and solidly compacted earth forms the overhead cover of a heavy-mortar, high-survivability position. No more than 4 feet of overhead cover can be used if the mortar is to have mask clearance when traversed to the right or left of its primary azimuth (Figure 7-16).

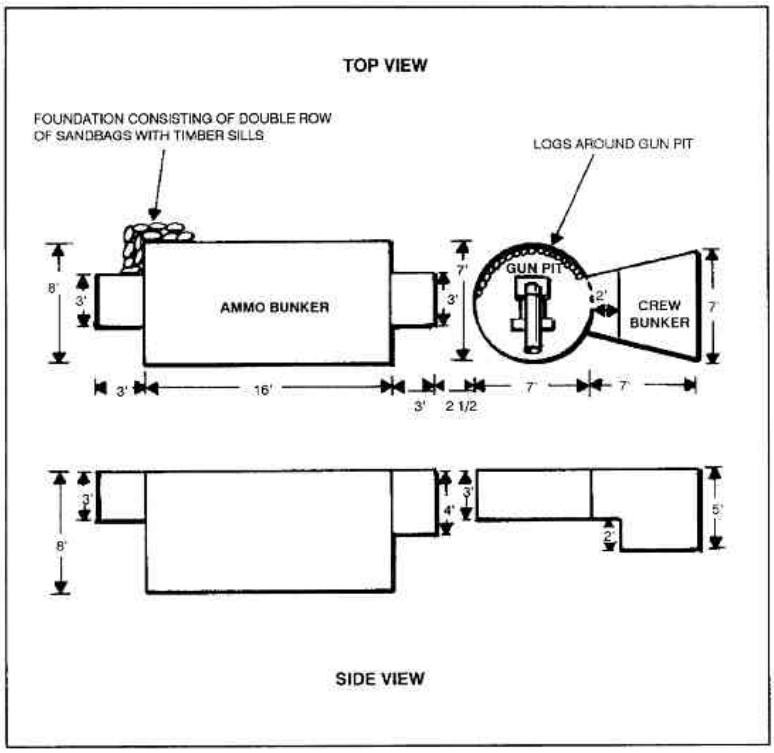

Figure 7-16. Dimensional drawing of heavy-mortar high-survivability position.

(1) The *first layer* consists of logs about 8 inches in diameter, laid closely together on a timber sill, and extending at least 18 inches beyond each side of the hole.

(2) The *second layer* consists of closely aligned and interlocked sandbags or mats, or any other covering such as dirt. More logs are then laid crosswise to the first layer of logs. Another layer of sandbags or earth is put on followed by a layer of stone. The top layer is packed earth with a layer of stone just beneath the surface. The entire position is covered with sod or other camouflage.

7-10. ADDITIONAL INDIVIDUAL PROTECTION

In addition to building protective positions, mortar leaders can increase the individual protection of platoon members.

a. Properly selected defilade firing positions protect troops from enemy ground-mounted laser weapon systems. During movement, and anytime the mortar squad is exposed to the enemy, soldiers should wear their ballistic laser protective spectacles. The spectacles should not be used as a substitute for sunglasses. Excessive exposure to the sun's rays reduce their laser protective feature. Spectacles not only protect the eyes against laser light, but also protect them against small fragments that could blind soldiers. Most eye injuries are caused by small fragments of enemy shells, rocks, or debris thrown out by the explosion.

b. The mortar leader must carefully consider the NBC threat and monitor the designated MOPP level. Protective garments and masks must be kept close to individuals, even though the bulk and weight of garments and masks make this inconvenient.

c. Mortar squad and FDC members should always wear the Kevlar helmet and protective vest. The helmet and vest provide excellent protection from shell fragments. Although they cannot protect soldiers against flechettes, they reduce fragmentation casualties by 50 percent over unprotected troops. Those soldiers who are wounded while wearing the protective vest and helmet often suffer less serious injuries than they might have otherwise.

d. The mortar platoon seldom has an aidman and ambulance attached. Therefore, all mortarmen should be taught to administer buddy aid to the seriously injured. An extra supply of compresses, cravats, air splints, and intravenous bags should be kept in the platoon to treat injured soldiers until evacuation.

e. One of the greatest causes of casualties among mortar crews, after enemy counterfire, is burns from flaming ammunition propellant. Mortar propellant charges burn rapidly with extreme heat. All excess charges that accumulate in mortar positions must be stored Ammunition that is prepared for firing should containers to reduce the spread of fire.

Section III. OTHER SURVIVABILITY TECHNIQUES

To support the commander's intent for mortar fires, the mortar section must survive the enemy's efforts to eliminate it. Survival requires the mortars to avoid detection as long as possible, confuse the enemy as to their true location and to defend themselves against enemy attacks.

7-11. SHOOT AND HIDE POSITIONS

Shoot positions are positions from which the mortars fire. *Hide* positions are located in a covered and concealed area and are occupied by the mortar crews when crews are not firing. The use of shoot and hide positions is an effective technique when covered and concealed firing positions are not available or when enemy counterfires are anticipated. For example, if the only place mortars can shoot from is on a roadway, a hide position adjacent to the road and under some trees, the position could be occupied by the crew

until receipt of a fire mission. Baseplates can be left in the shoot position, or stakes can be used to mark positions. Aiming posts and the aiming circle may be left set up.

7-12. CAMOUFLAGE

Camouflaging the position is accomplished during all stages of construction. Erecting camouflage netting, when available, should be accomplished before beginning construction to conceal the work effort.

7-13. FIRING LOWEST CHARGE AND ELEVATION

Firing the lowest charge and elevation reduces the chance of mortar rounds being detected by radar because of trajectory and time in flight. Also, responsiveness of fires is increased by reducing time of flight. Target effects must be considered since lower trajectories also mean less lethal area coverage (see Appendix B).

7-14. FREQUENT DISPLACEMENT

Frequent displacement enhances survivability from enemy counterfire but can degrade the ability of mortars to provide immediate massed fires. To aid continuous fire support, employment and displacement by section may be needed. The timing and number of moves are key to survival and should be based on the commander's guidance, the tactical situation, and the enemy target acquisition and counterfire Threat. Frequent displacement reduces the time available to properly prepare positions and increases crew fatigue.

7-15. OFFSET REGISTRATION

Offset registration reduces the vulnerability of the primary position when one mortar fires adjustment rounds (easily acquired) from offset locations. It requires accurate map spots or common survey control between the offset and primary locations to ensure accurate fires. It also increases command and control problems and relies on radio communications to transmit firing data.

7-16. ROVING GUN

A roving gun can conduct registrations and fire missions from a number of supplementary positions. This assists in concealing the platoon's primary position and in confusing the enemy as to the number of mortar sections or tubes employed. The platoon vacates deceptive firing positions upon completion of a specific mission, thus locations can be used that are easily identified on a map. This enhances the use of survey-accurate data without use of surveying assets, and it does not degrade the ability to mass fires from the primary position. However, any errors in location or direction can affect the FFE accuracy for the nonadjusting mortars.

7-17. ADJUSTING ROUNDS

Platoons can increase accuracy and reduce adjusting rounds in several ways. All reduce the threat from enemy target acquisition. A few of the means are as follows:

- Position-location devices such as a GPS or PADS.
- Registrations (abbreviated, regular).
- Computation of meteorological data corrections.
- Hasty survey from known points to eliminate map errors.
- Use of friendly artillery radar to accurately locate firing position (coordinate through fire support officer).

Although these techniques reduce vulnerability, increase effectiveness of fires, and conserve ammunition, they are time-consuming and may require support from artillery (survey teams, radar, MET data).

7-18. USE OF WIRE COMMUNICATIONS

Platoons can use wire in a static situation and when time allows; wire is recommended for all positions. It provides reliable communications while reducing the electronic signature that results from the use of radios. However, emplacing wire takes time and can be cut by enemy artillery, unless it is dug in.

7-19. MASSING FIRES

Massing the fires of several sections is a technique to overload enemy target acquisition means. It can also reduce the number of volleys needed on one target. Massing mortar fires can be difficult to control and may require increased radio communications. When possible, sections mass mortar fires by firing TOT missions.

7-20. TERRAIN MORTAR POSITIONING

To increase survivability on the battlefield, a mortar platoon must take full advantage of the natural cover and concealment afforded by the terrain and existing vegetation. When each mortar is positioned to fit the terrain without regard to standard formations, firing corrections are required to obtain a standard sheaf in the target area. These corrections compensate for the terrain positioning of the mortars. If each mortar fires the same deflection, charge, and elevation, the sheaf obtained would be a parallel sheaf. The corrections needed to achieve a standard sheaf are called terrain mortar position corrections (TMPC) (Figure 7-17).

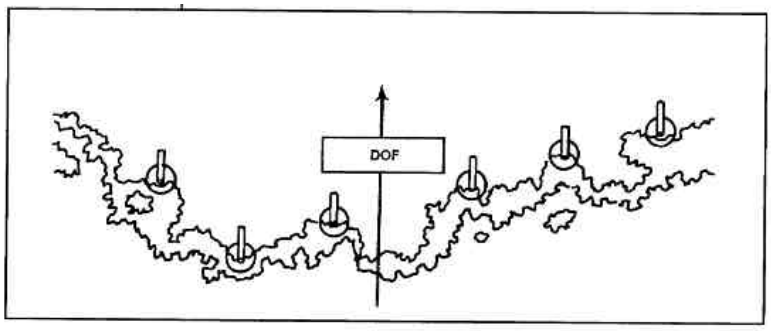

Figure 7-17. Positioning with respect to terrain.

a. **Piece Displacement.** To determine the position corrections for each mortar, the relative position of the mortars in the platoon area must be known. Piece displacement is the number of meters the piece is forward or behind and right or left of platoon center. It is measured on a line parallel (forward or behind) and perpendicular (right or left) to the azimuth of lay (Figure 7-18). Piece displacement can be determined by estimation, pacing, or hasty traverse.

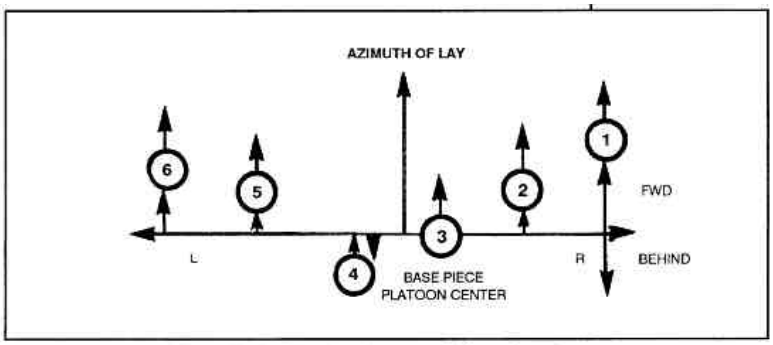

Figure 7-18. Piece displacement relative to base piece.

(1) The *estimation technique* is the least desirable method. Using this technique, the platoon leader or section chief estimates the displacement about the platoon center perpendicular to the azimuth of lay.

(2) The *pacing technique* provides accuracy in small open areas but is time-consuming. In using this technique, the platoon leader measures the lateral distance from the base piece and the distance forward or behind the base piece to each mortar.

(3) The *hasty traverse technique* is the most accurate and rapid technique for determining piece displacement. (See FM 23-91 for detailed discussion of the hasty traverse technique.)

b. **Terrain Mortar Position Corrections.** Mortar FDCs compute TMPCs before occupation of a position when possible, but TMPCs can be computed after occupation. TMPCs are applied to each mortar's firing data in order to achieve acceptable sheafs in the target area. They are computed and applied whenever a mortar platoon occupies a position that is wider than the width of the mortar system's standard sheaf or deeper than the bursting diameter of its HE ammunition.

c. **Hasty Terrain Mortar Positions.** When the advance party cannot conduct a reconnaissance of a mortar position due to time constraints or hasty occupation of a hip-shoot position, TMPCs cannot be computed before mortar crews occupy the position. Therefore, a modified technique of terrain mortar positioning can be used that still allows near-maximum use of the terrain. This provides cover and concealment for the platoon while placing acceptable sheaves on target (Figure 7-19).

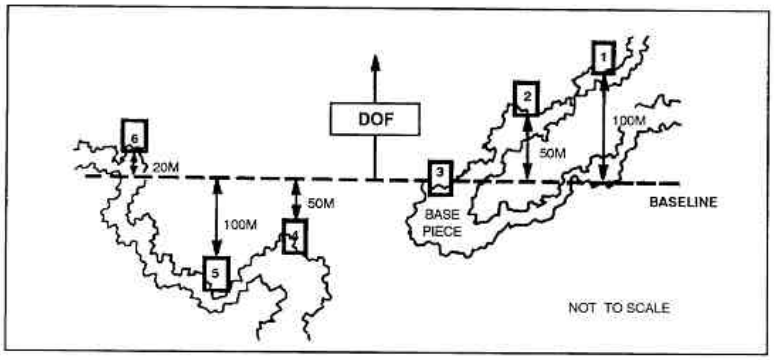

Figure 7-19. Hasty positioning with respect to terrain.

(1) To use the modified technique, the platoon occupies the position, conforming to the folds and treelines of the terrain. It maintains a lateral dispersion between mortars equal to the bursting diameter of an HE round of that mortar system.

(2) An imaginary line (baseline) is drawn through the base piece perpendicular to the direction of fire (azimuth of lay). From this line, the squad leader determines the distance to his mortar. Mortars, other than the base piece, will either be on line with, forward of, or behind the base piece. A squad member can measure the distance from the baseline while the squad leader lays or estimates the mortar. This distance is referred to as the *position range correction* and is recorded for future use by the squad leader. It is also given to the FDC for future use in computing TMPCs for the left and right sectors of fire. The squad leader applies

this position range correction to the command data. The FDC issues the correction for a fire mission in the same manner as described in applying normal TMPCs.

7-21. GROUND DEFENSE PLAN

The platoon leader ensures that the mortar platoon dots everything possible for its own security. Regardless of where the mortar platoon, section, or squad is located, a defense of the position against a ground attack must be planned, organized, and implemented.

7-22. COORDINATION AND SECURITY PLAN

If necessary, the mortar platoon may have an infantry squad attached to enhance the mortar defense. Also, the mortar platoon can be positioned near a reserve company or nearby friendly forces that can assist in providing security. If the mortar platoon is positioned near a friendly company, it should be integrated into the defense. In this way, the company may be able to tailor security measures to assist the mortar platoon. Coordination includes the following:

- Location of primary, alternate, and supplementary positions.
- Sectors of fire.
- Location of dead space between the units and how to cover it.
- Visual and audible signals.
- Location of observation posts.
- Location and types of obstacles and how to cover them.
- Patrols to be conducted to include their size, type, time of departure and return, and routes.

7-23. DEFENSE PLAN

The mortar platoon leader's defense plan includes tasks that are accomplished based on a priority of work:

- Establish local security.
- Position and lay mortars.
- Establish FDC.
- Clear mask and overhead obstructions.
- Improve mortar positions.
- Emplace obstacles.

a. **Security Measures.** The platoon leader establishes security for his platoon so that the enemy cannot observe or surprise the platoon. He considers the company SOP, the orders received from his commander, the enemy situation, and terrain and visibility conditions.

(1) OPs are situated to provide early warning along enemy avenues of approach. They should be covered and concealed and have covered and concealed routes to

and from them. If available, the platoon employs sensors to provide early warning.

(2) The mortar platoon leader establishes security within the platoon's firing positions. This is accomplished by--

- Assigning sectors of observation and fire.
- Placing machine guns along most likely enemy approaches.
- Tying in with adjacent squads and other units, if applicable.
- Positioning observation posts.
- Emplacing obstacles.
- Conducting stand-to.

The mortar platoon leader must designate a set number of men to be alert at all times. The number will vary with the enemy situation, terrain, and visibility. Normally, at least one-fourth of the platoon should be alert at all times. When an attack is expected, the entire platoon is alert.

b. **Positioning of Mortar Squads.** When positioning mortars, the platoon leader ensures that mortars can provide effective indirect fire support. Normally, the mortar firing positions are also the positions from which squads defend. If time is available, squads can prepare supplementary positions to "round out" the defense. The platoon leader gives each squad primary and secondary sectors of fire, and the squad leader gives each individual primary and secondary sectors of fire. Sectors of fire should be planned so that adjacent sectors of fire are overlapping. Available machine guns and LAWs are included in the defense plan. Machine gun positions and sectors of fire should cover likely infantry avenues of approach and fire grazing fire across the platoon's front. Machine gun sectors of fire should overlap. Each machine gun is given primary and secondary sectors of fire. Its primary sector includes an FPL or a principal direction of fire.

c. **Dug-In Positions.** Platoons should always construct mortar positions. However, before the platoon leader decides to have his platoon dig positions, he must consider the trade-offs involved. When time and resources are devoted to digging positions, the ability to perform other tasks is reduced. For example, the mortar platoon cannot dig positions and displace frequently.

d. **Obstacles.** When time permits, the platoon improves the security of the mortar position by emplacing wire, other obstacles, and mines. The use of obstacles and mines must be authorized by, and coordinated with, the battalion TOC. (See FM 7-7 or FM 7-8.)

7-24. CONDUCT OF THE DEFENSE

By understanding the type of missions that the mortar platoon can be expected to perform and by knowing when and how the platoon may be attacked, the platoon leader can tailor

his defense based on his resources and the threat. During the defense, the platoon leader must--

- Supervise to ensure that security is maintained.
- Control and direct fire.
- Move soldiers within the position.
- Provide enough ammunition and equipment.
- Reorganize and reestablish the defense during lulls in battle.