Part Four. Special Mining Operations

CHAPTER 12
SPECIAL MINING OPERATIONS

EXPEDIENT MINES

Expedient mines are constructed in the field with locally available material. They are employed against vehicles or personnel in the same manner as conventional mines. In addition, expedient mines accomplish the following special tasks:

- Supplement a unit's low supply of conventional mines.
- Hinder reconnaissance, clearance, and neutralization of minefield.
- Create enemy attitudes of uncertainty and suspicion, which lowers morale and slows movement.

Authorization

Because expedient mines have nonstandard design and functioning, take special precautions to protect friendly forces. Consider neutralization, disarming requirements, and adequate marking procedures. The commander who authorizes expedient mine employment is also the employment authority for the type of minefield being emplaced. For example, if expedient mines are to be used in a hasty protective minefield, the employment authorization comes from the brigade commander. The brigade commander can delegate the authority down to battalion or company level. Booby traps are normally employed as interdiction devices, and their use is authorized by the corps commander.

Employment and Construction Techniques

If conventional issue mines are not readily available on the battlefield, expedient mines are manufactured in the field. Mine construction varies based on available materials and the ingenuity of personnel fabricating the mines. Expedient mines pose a potential safety hazard to friendly forces—both to those who are constructing them and to those who may later encounter them. Construction should be performed by personnel who are familiar with the materials being used. Innovative designs are checked and tested before arming and emplacing mines. As a minimum, test the fuzing mechanism separately to ensure that it functions as designed. Improper fuze operation is the most common cause of malfunction. Also, test the fuze and firing chain (base charge, blasting cap, and detonating cord) without the main charge to ensure proper operation. Emplace the mine after satisfactory performance of the firing mechanism. First, emplace heavy items, such as artillery shells, used as the main charge. Later, add the firing mechanism. Take care when moving or emplacing expedient mines because their nonstandard manufacture and potentially faulty construction make them highly sensitive to jars and shocks. Construct mines at the emplacement site whenever possible. Detailed instructions on the manufacture and use of booby traps are found in Chapter 13.

Expedient mines are prepared in the field using standard US firing devices, detonators, and demolition materials. While all mines discussed in this chapter can be made to function electrically or nonelectrically, most examples show nonelectric firing systems. Electric firing systems allow a mine to be command-detonated. In order to change from a nonelectric to an electric firing system, substitute an electric cap and power source for the nonelectric system.

High Explosive Artillery Shell Antitank Mine

The HE artillery shell (Figure 12-1) is readily adapted to expedient mining. Remove the artillery fuze and replace it with a standard firing device, length of detonating cord, priming adapter, and nonelectric blasting cap. A properly assembled destructor may also be used. If a destructor is not available, firmly pack the detonating cord and nonelectric blasting cap into the fuze well with C4 explosive.

The mine can be activated by a variety of methods depending on the type of firing device used. Firing devices with nonelectric blasting caps that are activated by pressure or a trip wire are the most likely means. The mine can also be adapted to function electrically by adding an electric cap and power source.

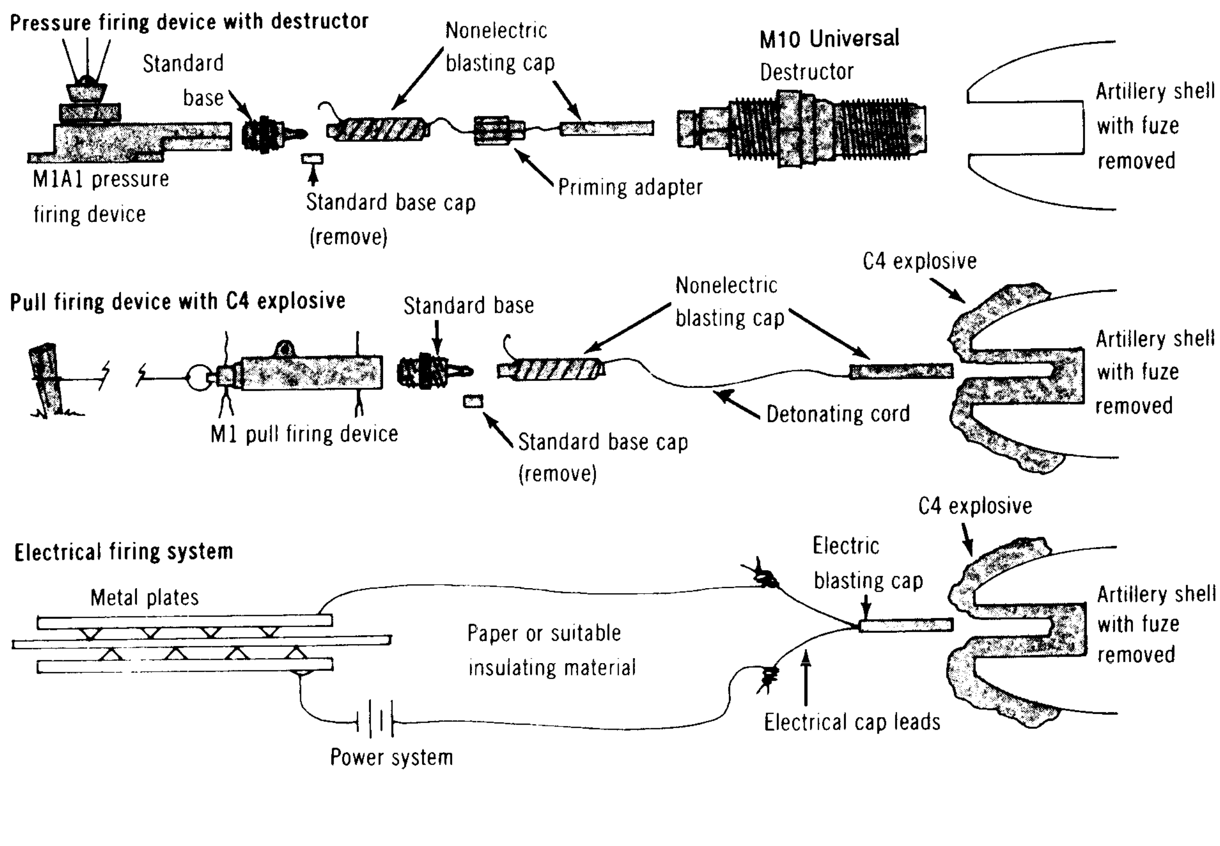


Figure 12-1. HE artillery shell antitank mine

Platter Charge

The platter charge (Figure 12-2) consists of a suitable container filled with explosive that is packed uniformly behind a platter. The platter is metal (preferably round but square is satisfactory) and weighs 2 to 6 pounds. The explosive required is equal to the weight of the platter. A container is not necessary if the explosive can be held firmly against the platter (tape can be used). The charge is primed from the exact rear center. The blasting cap is completely covered with a small amount of C4 explosive to ensure detonation.

The charge is aimed at the direct center of the target. The effective range (primarily a matter of aim) is approximately 35 meters for a small target. With practice, experienced personnel can hit a 55-gallon drum (a relatively small target) at 25 meters with 90-percent accuracy. The platter charge can be used as an AT or AP mine. It can be command-detonated (electric], or target-detonated (nonelectric).

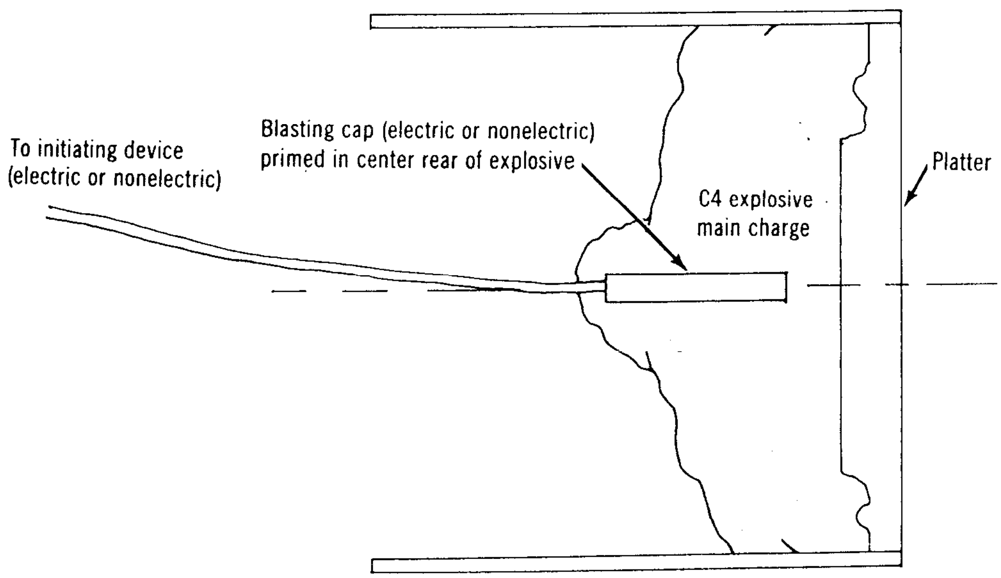


Figure 12-2. Platter charge

Improvised Claymore

For the improvised Claymore (Figure 12-3) a layer of plastic explosive is attached to the convex side of a suitably dense, curved base (such as wood or metal). A hole is made in the exact rear of the base. A blasting cap is placed in the hole to prime the mine. Shrapnel is fixed to the explosive with cloth, tape, or mesh screen.

The mine can be command- or target-detonated. Command detonation is best achieved by electrical priming. A blasting device is attached to the electric cap via firing wires laid at least 50 meters from the mine. Ensure firing personnel have adequate cover when detonating the mine. The mine can also be target-detonated by using nonelectric caps, detonating cord, and a suitable firing device (usually pull or tension release).

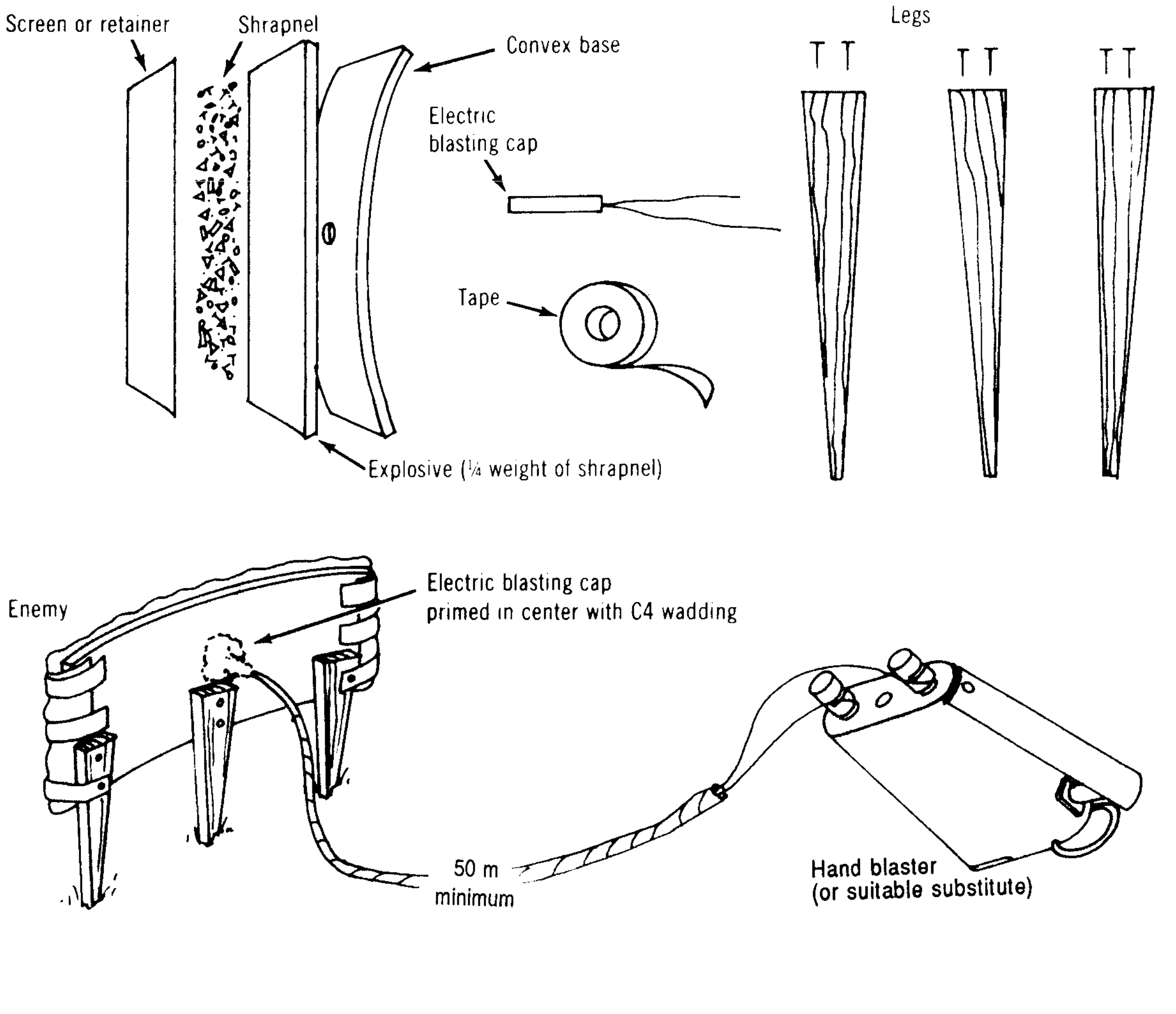


Figure 12-3. Improvised Claymore mine

Grapeshot Antipersonnel Mine

For a grapeshot AP mine (Figure 12-4), shrapnel is placed in the bottom of a cylindrical container. The shrapnel is tamped and held in place by a suitable separator (wadding). Explosive is then packed to a uniform density behind the wadding and is approximately one-fourth the weight of the shrapnel. The mine is primed in the center of the explosive with an electric or nonelectric cap.

This mine can be command- or target-detonated by an electric or non-electric firing system. The explosive propels the shrapnel outward from the container. This mine is very effective against personnel targets.

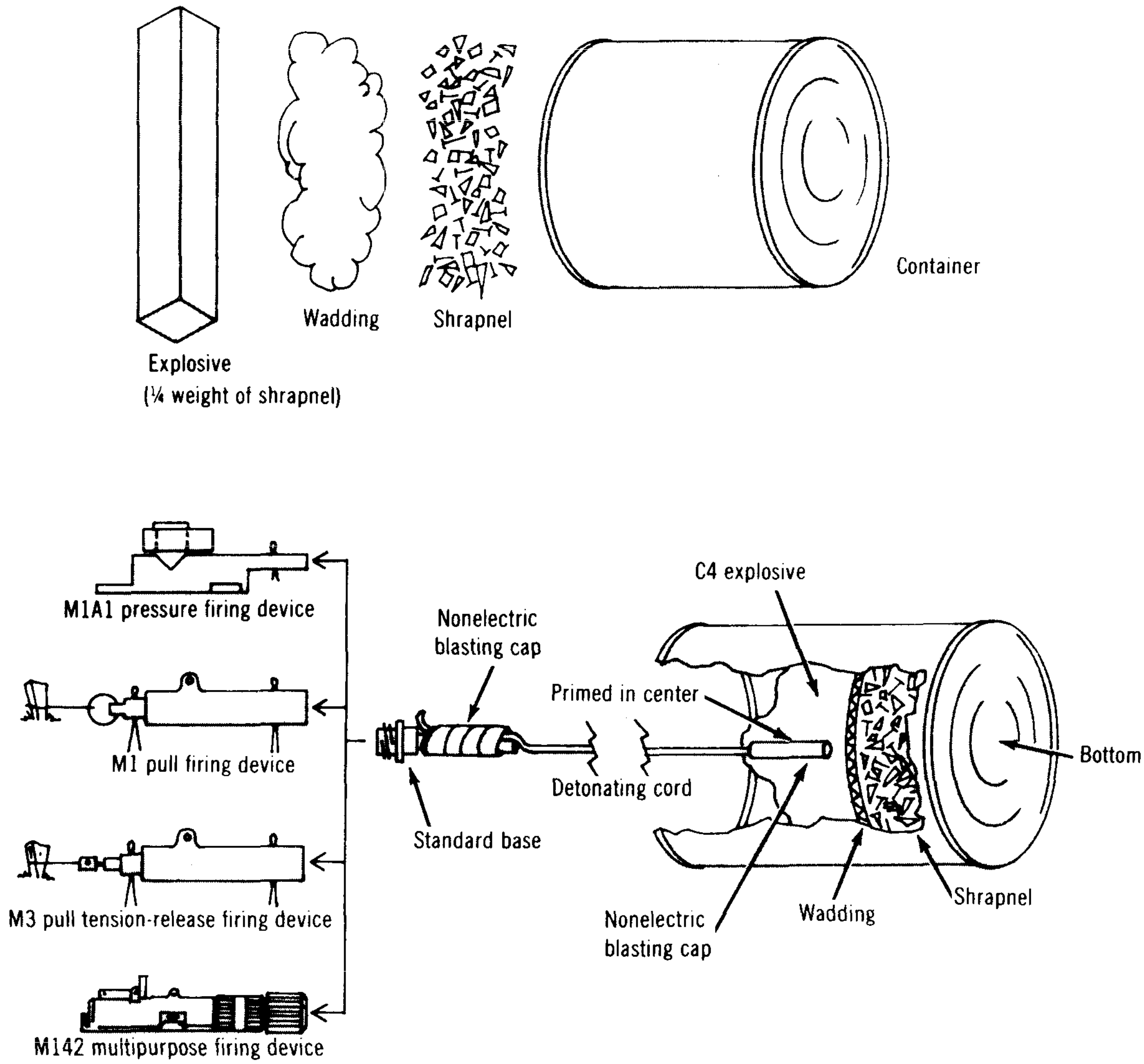


Figure 12-4. Grapeshot antipersonnel mine

Barbwire, Antipersonnel, Fragmentation Mine

One roll of standard barbwire is placed into position, and one block of Composition C4 is placed in the center of the roll and primed.

This mine can be made directional by placing the wire against an embankment or fixed object. This causes the force of the explosion to expel the barbwire fragments in the desired direction. (See Figure 12-5.)

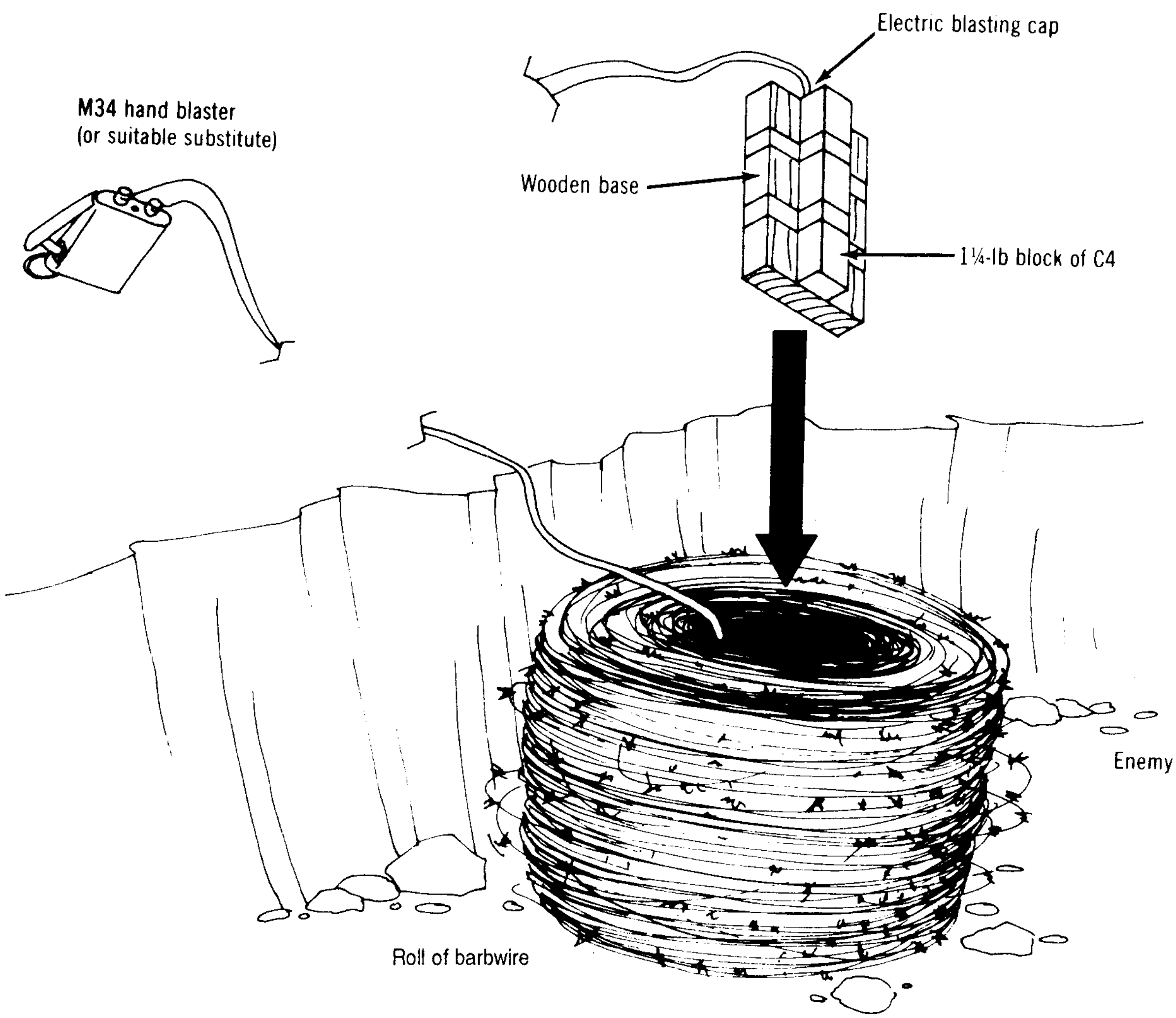


Figure 12-5. Barbwire antipersonnel mine

Fragmentation Grenade

Any fragmentation grenade (M67, M26, or M33) can be used to prepare this mine. Attach the grenade securely to a fixed object (tree, branch, rock, or stake). Remove the safety pin and replace it with a smaller, straight, metal pin. The replacement pin should pull out easily without the frictional resistance of the original safety pin. A paper clip with a loop in the end is ideal because a trip wire can be attached, and the paper clip can be easily withdrawn from the grenade.

Attach a trip wire (ideally, a clear, monofilament fishline) to the replacement pin. Then stretch the trip wire across a suspected enemy approach and securely tie the other end. Pull or tension on the trip wire removes the pin and detonates the grenade. (See Figure 12-6.)

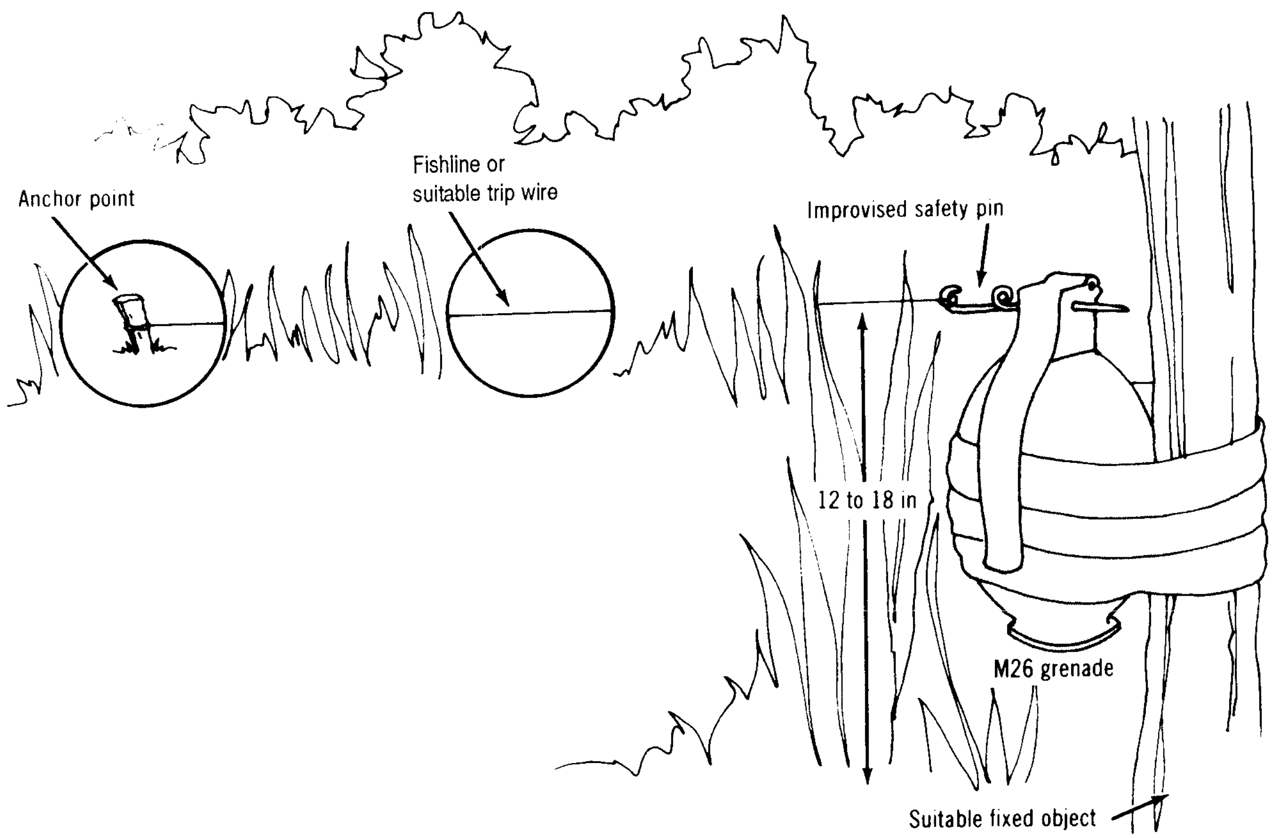


Figure 12-6. Fragmentation grenade

Improvised Flame Mine

Exploding flame devices and flame fougasses employed for target or command detonation are considered improvised flame mines. These mines normally consist of a container, an incendiary fuel (usually thickened gasoline), and a firing system to scatter and ignite the fuel. The size of the covered area depends on the container size and firing system. The mine may be detonated by an M4 incendiary burster or by another available explosive. Preferably, the white phosphorous (WP) hand grenade serves as an igniter. Variations and adaptations of the basic flame field expedients are limited only by the imagination and initiative of the combat personnel preparing them. (See Figure 12-7.)

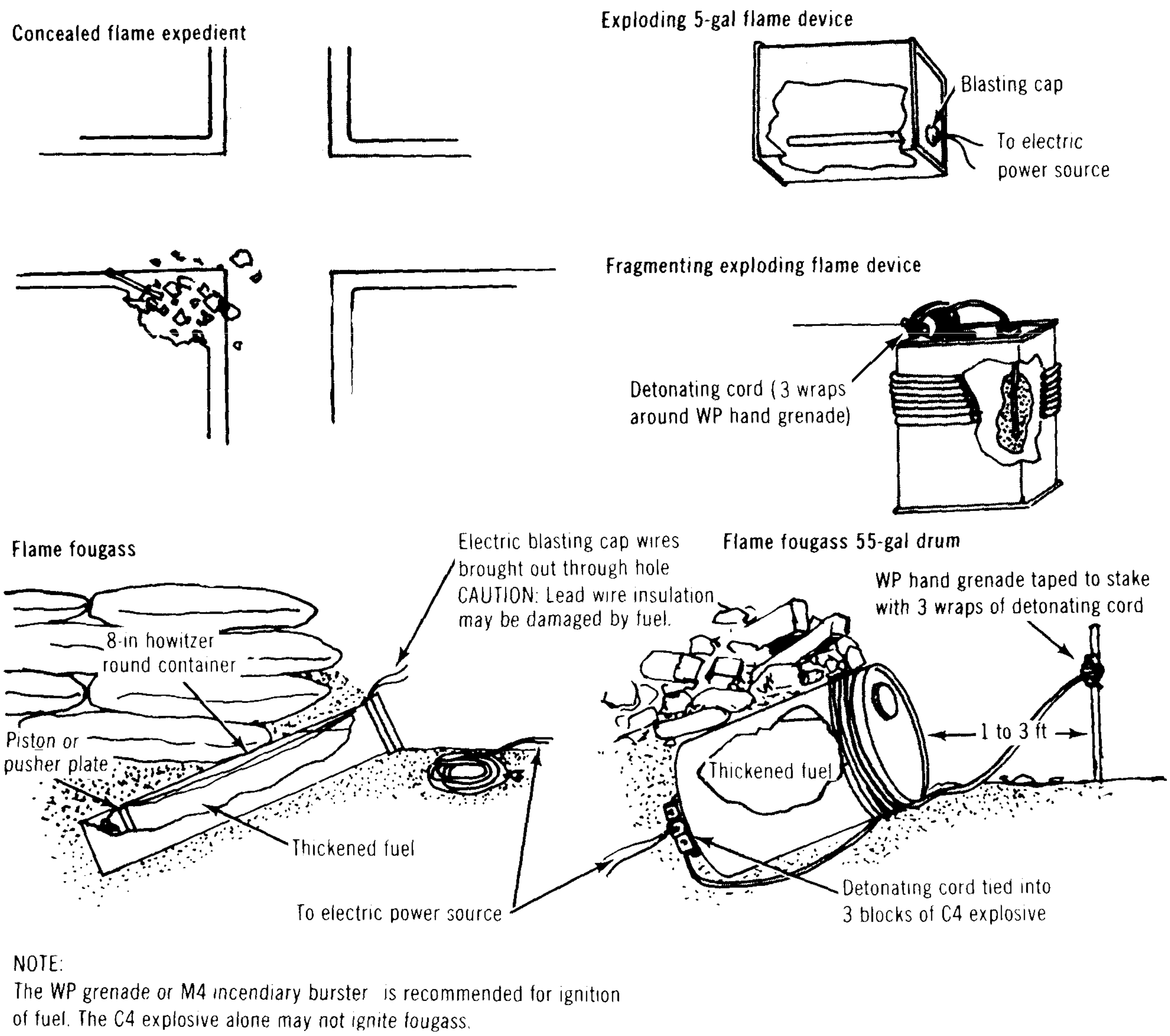


Figure 12-7. Improvised flame mine

CHEMICAL MINES

Employment

Chemical land mines are AP mines with target- or command-detonated fuzes. They are filled with a persistent chemical (nerve or blister) agent. National policy, as announced by the theater commander, governs the use of chemical mines in the theater area of operations. When authorized, chemical mines are normally used in defense and retrograde operations. They are mixed with HE mines to form an HE chemical minefield. Chemical mines can be used in tactical or nuisance minefield but cannot be used in protective minefield. When an integrated HE chemical minefield is laid, it serves the following purposes:

- Chemical mines discourage the use of explosive, rapid mine clearing devices because they create a chemical hazard in the area.
- HE mines reduce the speed of enemy forces crossing the minefield. Speed is further reduced by forcing the enemy to use protective clothing and masks.

Emplacement

Adding chemical mines to existing HE minefield is done by laying additional strips of chemical mines in a random pattern or by adding HE chemical strips or rows to the front or rear of existing fields. (See Figure 12-8.)

WARNING

Do not reenter the existing minefield in order to lay chemical mines.

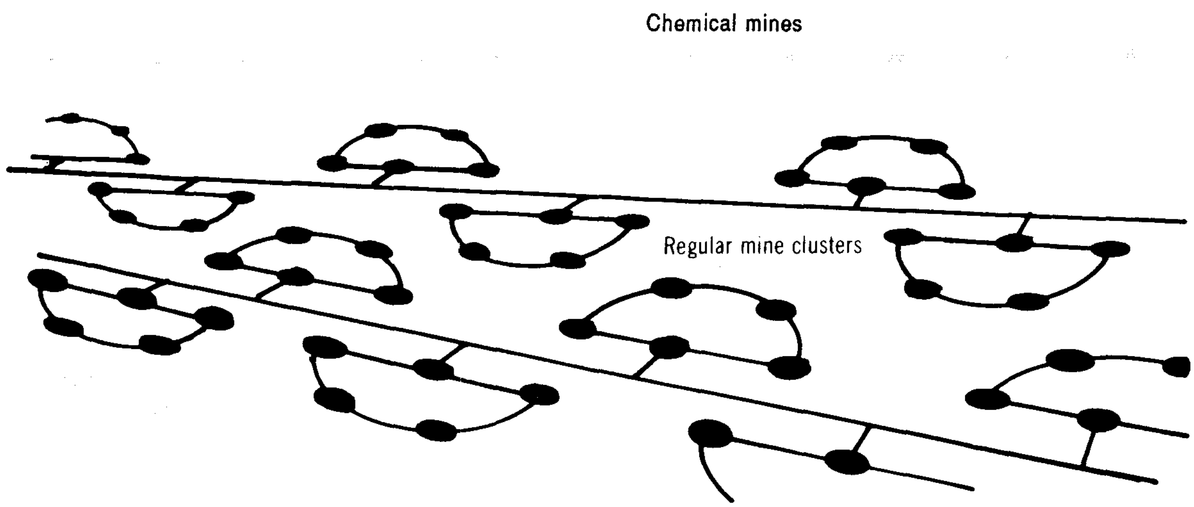


Figure 12-8. Chemical mine placement

No particular branch is responsible for emplacing and clearing chemical mines. Planning chemical mine-warfare operations is a corps-level responsibility. Actual authorization for employment must come from the President of the United States. Once use is authorized, request advice from the staff chemical officer and other principal staff members as needed. When using chemical mines, consider prevailing and expected wind conditions. The responsible commander must ensure friendly troops are protected when chemical agents are released. Release of chemical agents occurs as a result of enemy fire or enemy breaching attempts. Contact-actuated chemical mines are not likely to create a major downwind hazard because only single mines or small groups of mines can be set off at one time. Artillery or aircraft is used to add chemical agents to a minefield as an alternate way of establishing a contaminated obstacle.

M23 Chemical Agent Mine, VX

The M23 chemical mine is prefilled and used to disperse a nerve agent (VX). It can be fuzed for contact or remote detonation and is used as an AP mine. The mine is similar in size and shape to the M15 AT mine. It is distinguished by sight and touch from the M15 AT mine by four pairs of raised projections spaced at 90-degree intervals around the top periphery. An M603 fuze is used for primary fuzing. To equip the mine with AHDs, insert an M 1 activator and firing device in the secondary fuze wells located in the bottom or side of the mine. The mine is 5 inches high and 13 inches in diameter. It weighs 22.75 pounds unfuzed, of which 11.5 pounds (2 gallons) is the chemical agent. (See Figure 12-9.)

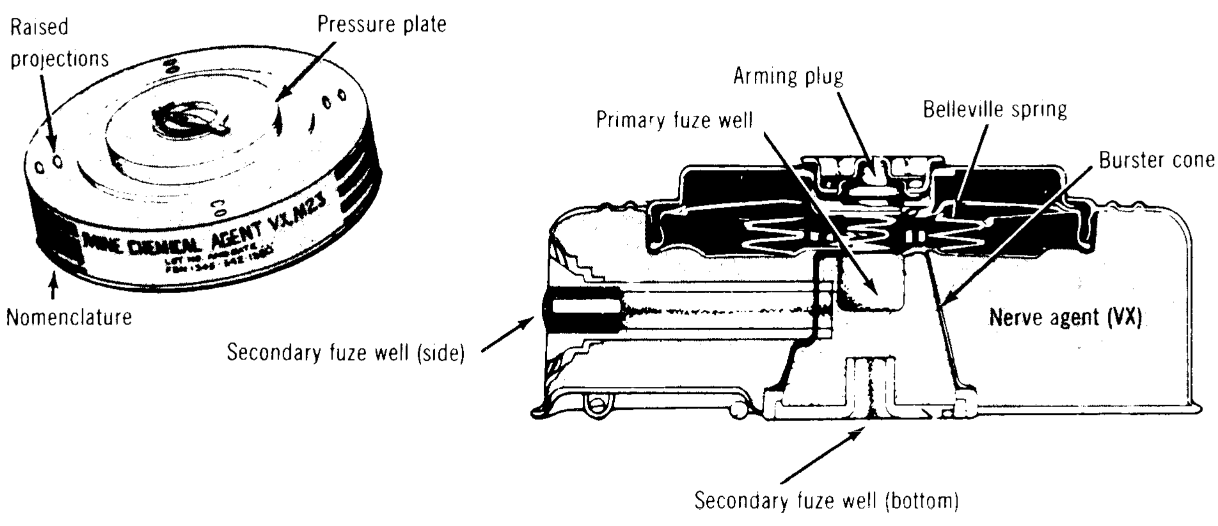


Figure 12-9. M23 chemical agent mine

Chemical Land Mine, 1-Gallon

The 1 -gallon, chemical land mine may be filled with a chemical agent in the field. Chemical contents are dispersed by an added external charge of detonating cord secured to the side of the container with two copper wires soldered on one side. Authorized fillings are mustard (H) or distilled mustard (HD). Molasses residuum (MR) can be used for training purposes. (See Figure 12- 10.)

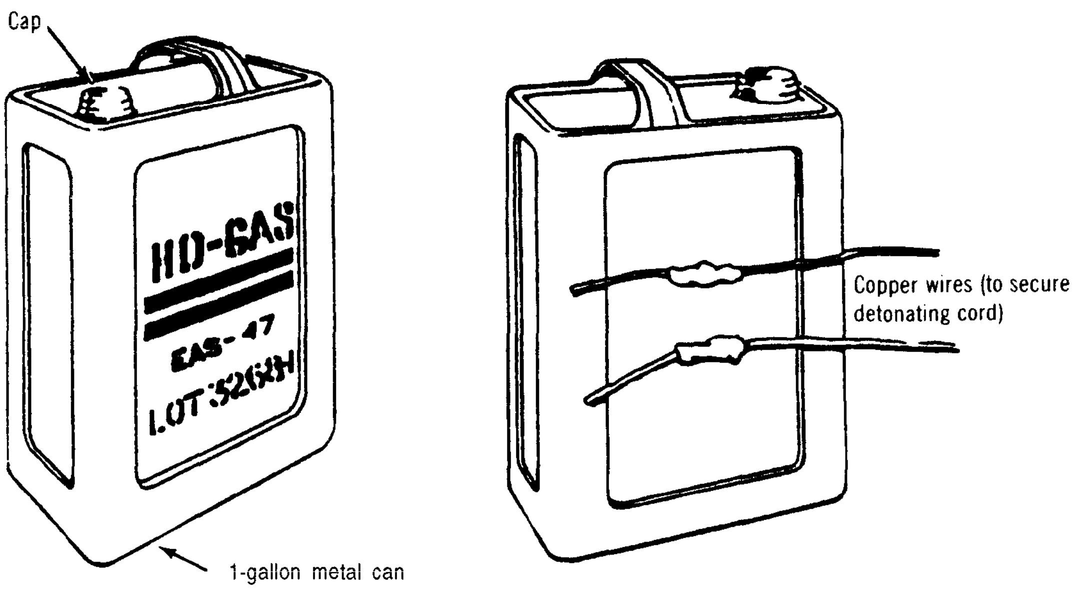


Figure 12-10. Chemical land mine, 1-gallon

STREAMBED AND RIVER MINING

AT mines are much more effective in water than on land because water transmits the shock effect better than air. Vehicle support members, tracks, and wheels are damaged by a mine blast. Small vehicles are overturned and almost completely destroyed. Because water amplifies and transmits shock waves, mines equipped with pressure-actuated fuzes are subject to sympathetic detonation at greater distances in water than on land. To avoid sympathetic detonation, M 19 and M 15 AT mines must be at least 14 meters apart in water less than 2 feet deep, and at least 25 meters apart in water 2 feet deep and deeper. The M21 AT mine is not recommended for underwater use. Mined areas are chosen to take advantage of stream and adjacent area characteristics. Water depth within the minefield should not exceed 4 feet because it is difficult to work in deeper water, and pressure-actuated fuzes are usually ineffective against waterborne vehicles. Because it is difficult to maintain footage and balance in rapidly flowing water, current velocity should not exceed 5 feet per second. Since sand in inland waters continuously moves downstream, it is difficult to locate and remove mines planted on or downstream from sandbars. If the site has a muddy bottom, the mud depth should not exceed 18 inches and there must be a hard base underneath. The enemy is unlikely to choose a fording point where vehicles mire easily. If underwater obstacles (gravel, rock, or stumps) are bigger than the mine, the area cannot be easily mined. If such areas must be used, place mines so they are exposed to vehicle wheels or tracks. Armored vehicles usually enter and exit streams at points where the incline is less than 45 percent. After entering a stream, vehicles often travel upstream or downstream before exiting. Carefully examine riverbank formations and underwater obstacles to predict the trail a vehicle will use to ford the stream.

Emplacement

When emplacing mines in streams and rivers, always work in pairs. Prepare the mine on land near the emplacement site. Coat fuze threads and wells with silicone grease (a waterproof lubricant) or heavy grease to minimize the chances of water leaking into the mine. Also, waterproof joints between the pressure plate and mine case. Use the following outrigger techniques to stabilize the mine:

- Materials needed to construct field-improvised outriggers are—
  - Two green tree limbs, approximately 1 inch in diameter and 3 feet long. (Steel pickets, signposts, fence rails, or similar items with proper dimensions can also be used.) Green limbs are recommended because they are stronger and less likely to float than dried, dead limbs.
  - Two pieces of rope, clothesline, twine, or similar material, approximately 3 feet long.
- Fasten limbs to the bottom of the mine perpendicular to each other and secure them with rope.
- Approach the emplacement position from the downstream side. To prevent dragging the outrigger or contacting objects in the stream, carry the mine by grasping its sides, not by its carrying handle.
- Place the mine and outrigger on the stream bottom, place sandbags or large rocks on outriggers for better anchorage, and arm the fuze by moving the knob clockwise from the S (safe) position to the A (armed) position. (See Figure 12- 11.)

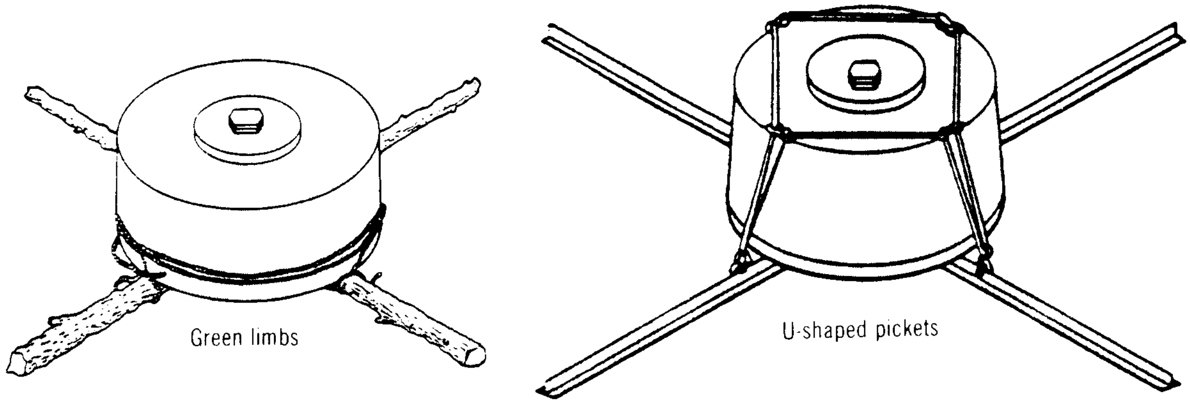


Figure 12-11. Outrigger techniques

Recovery

> **WARNING**
> **Mines may have drifted downstream and/or been tampered with by enemy forces. Removal by methods other than explosive breaching (refer to TM 9-1375-213- 12) is extremely hazardous and is not recommended. If the situation demands recovery by hand, proceed with utmost caution.**

Use the following procedures when recovering mines by hand:

- A two-person recovery team proceeds slowly 2 meters downstream from where the mine was emplaced and carefully probes for the mine.
- Once the mine is located, remove any foreign material from the top of the mine. Disarm the mine by turning the knob counterclockwise to the S position.
- Carry the mine ashore and remove the fuze and detonator.

The mine can be reused if it or the fuze show no evidence of damage or deterioration.

Recording

The minefield is recorded on DA Form 1355 (Figures 12-12a and 12-12b, pages 12-14 and 12-15).

Safety

In addition to normal water safety measures, underwater mining requires evaluation of the tactical situation and application of special safety techniques. Water turbidity, velocity, depth, and bottom conditions require laying party personnel who can swim. Prolonged immersion of personnel, especially in cold temperatures, must be avoided. Sudden drop-offs, rocks, and other objects can cause personnel to lose their footing. Other safety measures include the following–

- Work in pairs.
- Emplace mines from upstream to downstream to prevent personnel and equipment from being swept into the mined area.
- Stay on the downstream side of the mine when arming the fuze.
- Place the mine as flat as possible on the bottom to prevent drifting. Use green saplings or other nonbuoyant material for outriggers, or anchor the mine using pickets.
- Do not arm the mine before it is laid.
- Carry the mine horizontally or edgewise to the current to reduce water resistance on the mine's pressure plate.

URBAN TERRAIN MINING

Characteristics

Characteristics of urban areas (such as a high proportion of hard-surfaced roads) prohibit a simple transition from open- to urban-area mine deployment techniques and doctrine. The advantages of abundant cover and concealment, maneuver restrictions, and observation already possessed by the defender of an urban area can be significantly enhanced by the proper use of mines. Terrain modified through the process of urbanization provides a unique battle environment. The following characteristics of urban terrain are likely to impact on mine warfare:

- Multistoricd buildings add a vertical dimension to the battle. Basements and floors become part of the battle scene. Combat vehicle vulnerability increases because attack from above or below is likely.
- Fighting is done at close range, often face-to-face, and seldom exceeds 50 meters. Some weapons, particularly large-caliber weapons, are unsuitable at short range.

SAMPLE ~~SECRET~~ (when completed)

MINEFIELD - RECORD

1 AUTHORITY: CG 2nd INF DIV
LAYING UNIT: B Co 2nd ENGR BN 3rd PL
OFFICER IN CHARGE: LT T.P. SMITH 987-65-4321

2 DATE AND TIME — START: 090630Z JAN 90; COMPLETION: 091200Z JAN 90
RECORDER: SSG K.I YATES 863-21-1342

3 Copy No. 1 of 3 Sheet No 1 of 1

4 MINEFIELD NUMBER: 2XX(INF)3-E

5 MAP: SERIES, NO. AND SCALE: H754 1:50 000
SHEET NO. (OR NAME): NJ 2015 MUNSAN

6 LANDMARKS

NO.	COORDINATES	DESCRIPTION
1	UT 45877236	WEST CORNER ROAD JUNCTION
2	UT 46137367	U-SHAPED PICKET 3" ABOVE GROUND
3		
4		

7 INTERMEDIATE MARKERS

NO.	DESCRIPTION
1	
2	
3	
4	

8 DESCRIPTION OF BOUNDARY FENCE OR MARKING: STANDARD ON BANK / NAVIGATION LIGHTS IN WATER

9 NO. OF STRIPS/ROWS: ....
DESCRIPTION OF STRIP/ROW MARKERS: NONE

10 LANES

NO.	WIDTH	HOW MARKED	METHOD OF CLOSING
1			
2			
3			

11 MINES — TACTICAL MINEFIELD / NUISANCE MINEFIELD / PHONEY MINEFIELD

		AT TYPE: M19	AT TYPE	AT TYPE	AT TYPE	AT TYPE	AT TYPE	TOTAL AT MINES	ANTI-LIFT DEV	AP TYPE	AP TYPE	AP TYPE	TOTAL AP MINES
		NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
~~BURIED~~ UNDER WATER AND SURFACE LAID	10E												
	A	270						270					
	B												
	C												
	D												
~~IN STRIPS~~ ~~IN ROWS~~ W/O PATTERN	E												
	F												
	G												
	H												
	J												
TOTAL		270						270					

12 NOTES

1. MINE CLUSTERS AT ....METRES/PACE SPACING
2. MINES LAID FROM BOAT IN WATER, 120 MINES
3. MINES SURFACE LAID ON BANK, 150 MINES
4. NO AHD'S USED.
5. RIVER NAVIGABLE BY SHIPS (NOT RECOGNIZED AS A SEA GOING SHIPPING ROUTE)
6. CORNER POINTS
   Point 1 - UT 45767383
   Point 2 - UT 46207381
   Point 3 - UT 46117400 (NAVIGATION MARKER)
   Point 4 - UT 45797396 (NAVIGATION MARKER)
7. ALL MINES RANDOM LAID WITHIN BOUNDARIES

SIGNATURE (OFFICER IN CHARGE): Terry P. Smith LT DATE: 9 Jan 90

DA FORM 1355, MAR 87 EDITION OF JUL 67 IS OBSOLETE

SAMPLE ~~SECRET~~ (when completed)

Figure 12-12a. River mining - sample DA Form 1355 (front side)

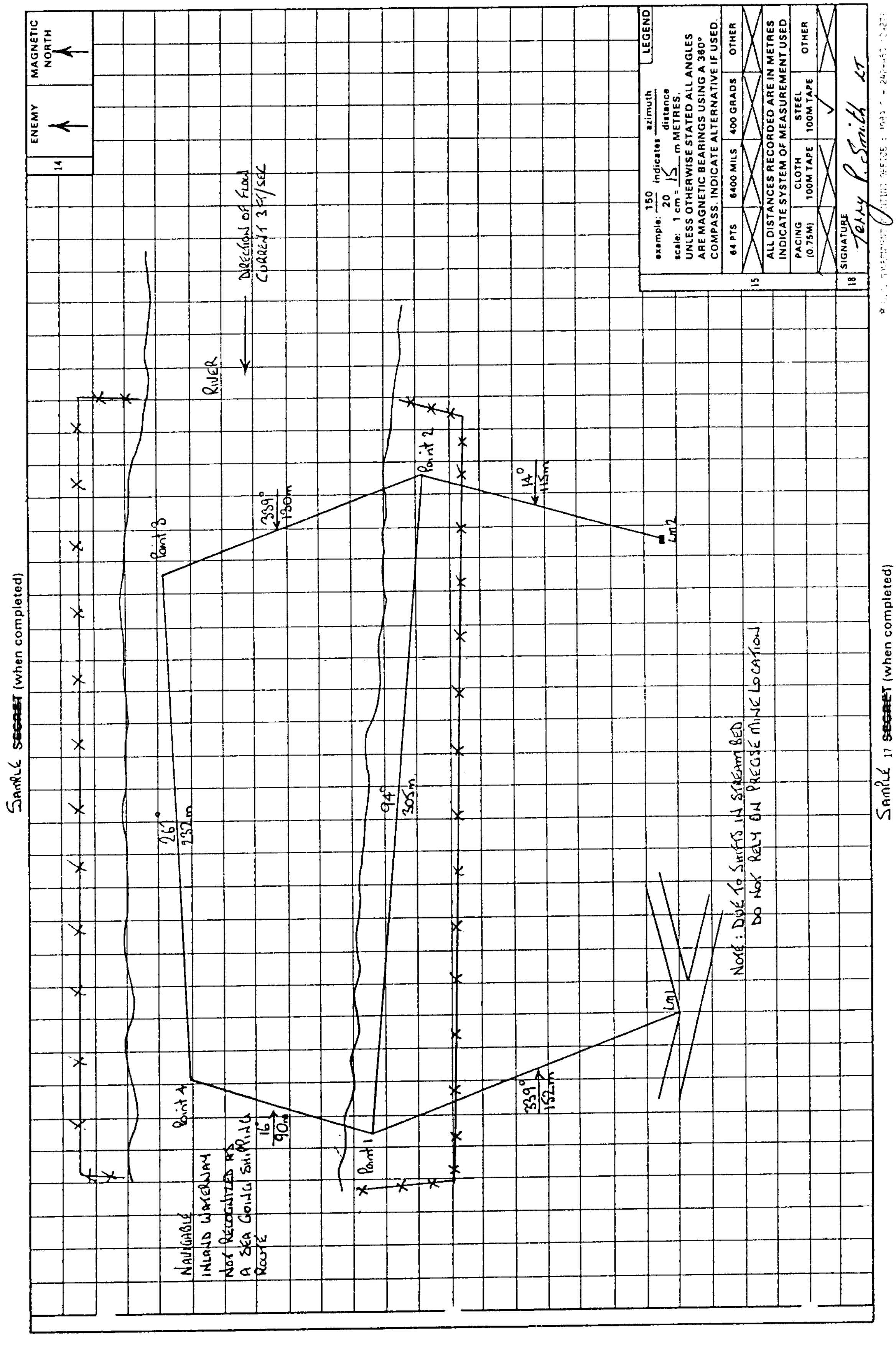


Figure 12-12b. River mining - sample DA Form 1355 (inside)

- Sewers, subways, and tunnels provide covered and concealed passageways for movement of troops on both sides. Detailed knowledge of the location and status of these tunnels is needed to successfully wage an urban battle.

- Streets and parking lots are modified to withstand continuous use by vehicles. Major routes and lots are paved. A high density and complex pattern of streets provide numerous avenues of advance. Burying mines is extremely difficult. Most mines are surface-laid and camouflaged with rubble and debris to avoid detection.

- Movement by vehicle is difficult. Streets are littered by rubble and cratered if the city has been bombed or subjected to artillery attack. Bridges and overpasses are likely to be destroyed or blocked. Traffic flow is highly channelized.

- Extensive map and chart data is needed by the commander. For example, the commander should know the location of telephone, electric, gas, water, and sewer connections; substations; and generating and pumping stations.

Conventional Antipersonnel Mines

AP mines are emplaced to block infantry approaches through or over underground passageways; open spaces; street, roof, and building obstacles; and dead spaces.

Underground passageways. Subways, sewers, cellars, and utility tunnels provide protected movement routes for large numbers of troops. In large cities where underground systems are numerous and complex, limited manpower resources dictate that careful consideration be given to designating key passageways for blocking with wire and AP mines. (See Figure 12- 13.)

Open spaces. Open spaces include gaps between buildings, courtyards, residential yards, gardens, parks, and parking lots. They are found in all urban areas. In some cases, mines can be concealed in rubble or buried. However, characteristics of most terrain surfaces, coupled with limited time and resources, dictate that mines be surface-laid. (See Figure 12-14.)

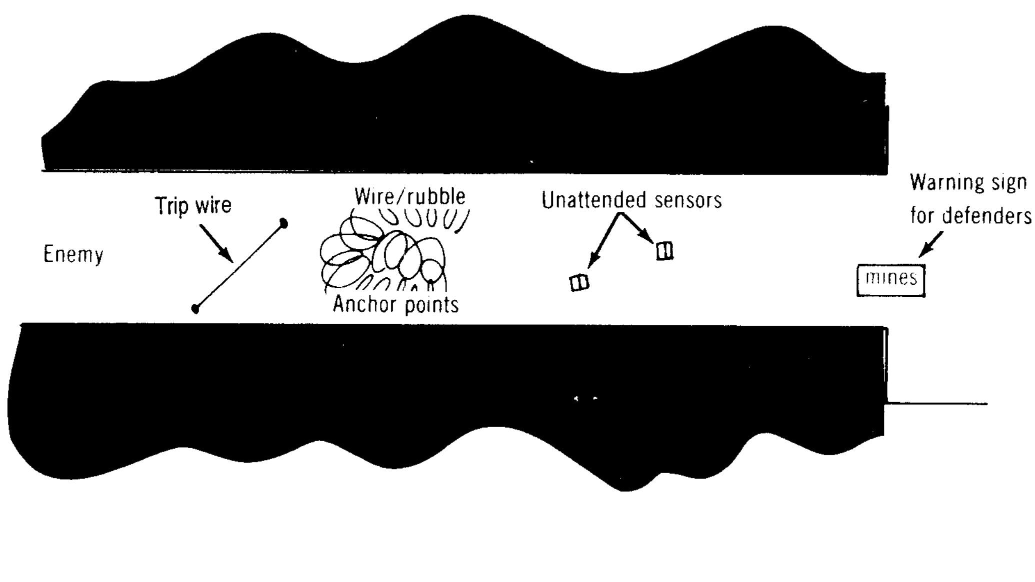


Figure 12-13. Underground passageway

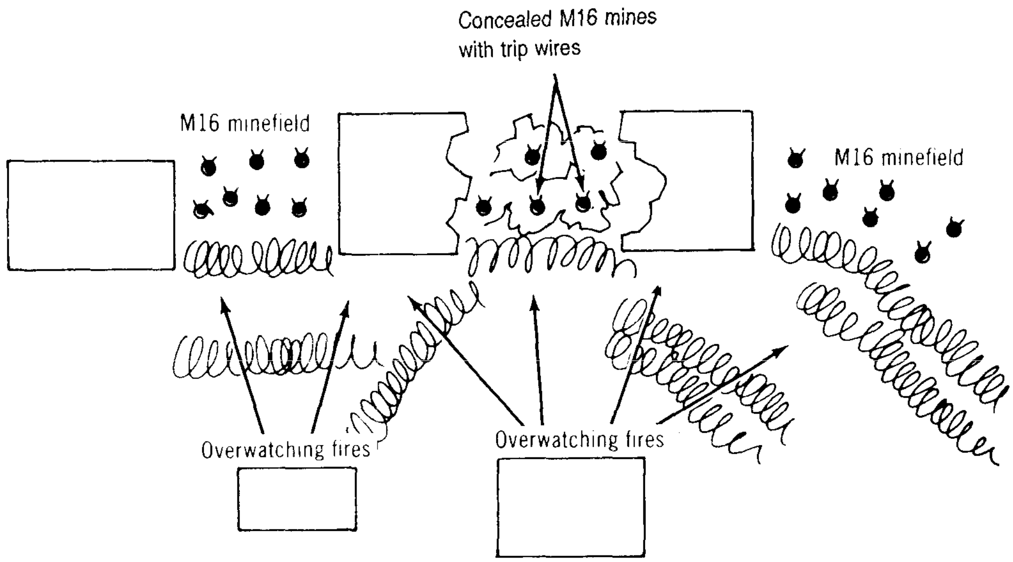


Figure 12-14. Open spaces

Street obstacles. In addition to hand-emplaced AP mines on street surfaces, railroad lines and areas along shallow waterways offer good mine concealment and are likely enemy avenues of advance. (See Figure 12- 15.)

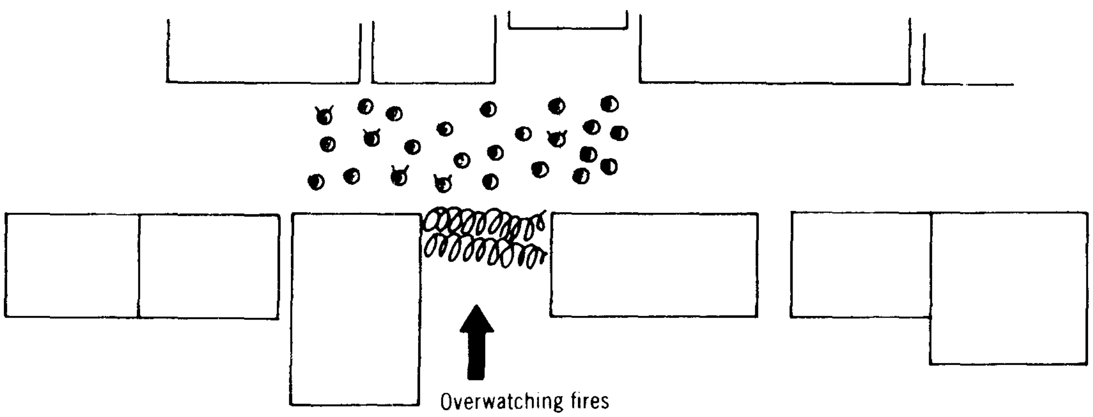


Figure 12-15. Street obstacles

Roof obstacles. Mines and booby traps supplement wire obstacles to deny enemy operations that require air assaults onto rooftops. They also prevent enemy occupation on roofs that afford good observation points and fields of fire. (See Figure 12- 16.)

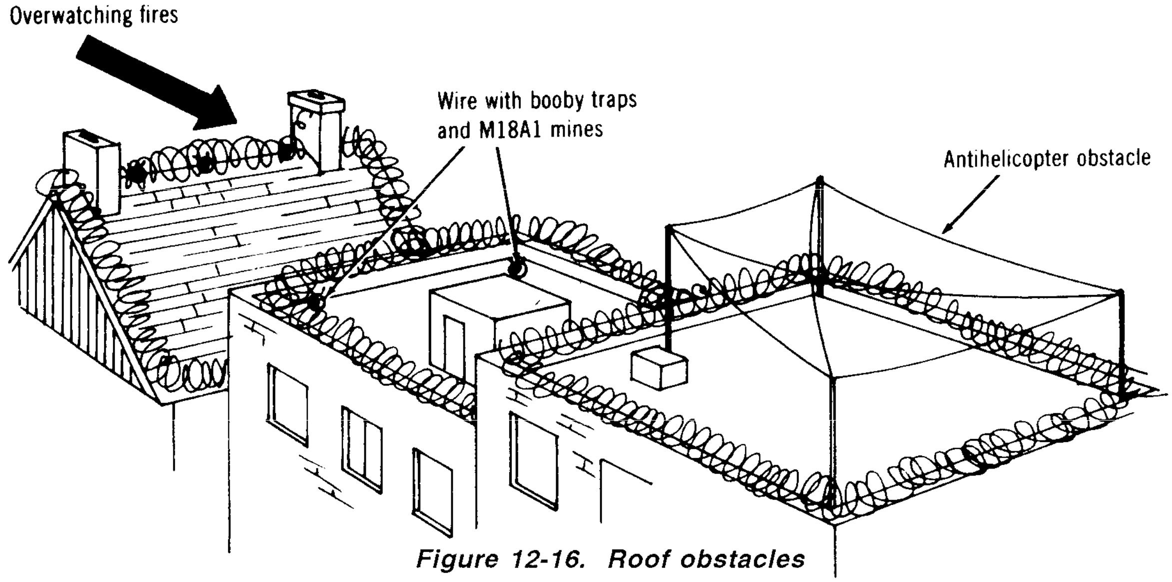


Figure 12-16. Roof obstacles

Building obstacles. Building obstacles include areas within and adjacent to buildings. Mines are laid in conjunction with wire obstacles to deny enemy infantry covered routes or weapon positions in the proximity of defensive positions (Figure 12- 17). Mines are recorded on DA Form 1355 (Figure 12-18).

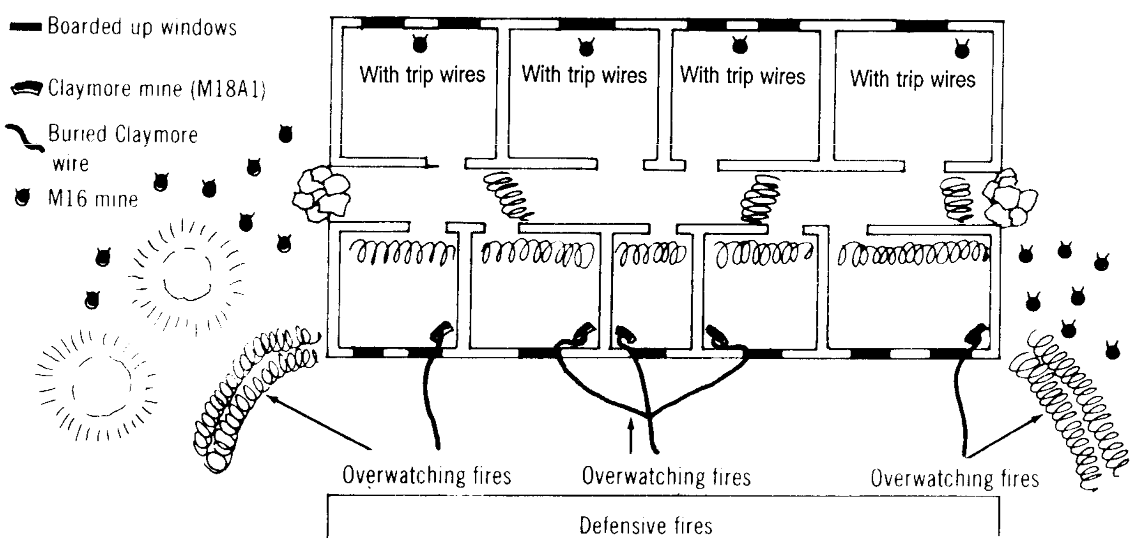
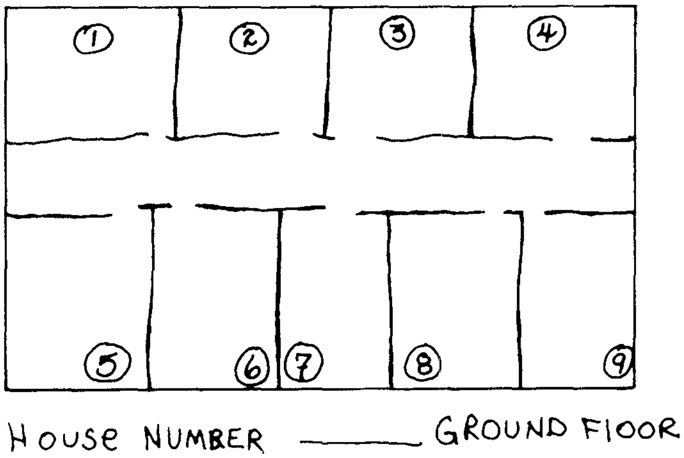


Figure 12-17. Building obstacles

Block 16



Block 12

MINE	LOC	TYPE	FIRING DEVICE
1	BETWEEN WINDOWS	M16	TRIP WIRE
2	UNDER WINDOW	M16	TRIP WIRE
3	BETWEEN WINDOW	M16	TRIP WIRE
4	Floor R.H. WINDOW	M16	TRIPWIRE
5	CORNER UNDER TABLE	M18A1	COMMAND
6	CORNER BEHIND/DRAPE	M18A1	COMMAND
7	CORNER IN WASTE	M18A1	COMMAND
8	CORNER IN WASTE	M18A1	COMMAND
9	CORNER IN SOFA	M18A1	COMMAND

Figure 12-18. Building sketch and mine plan (DA Form 1355)

Dead spaces. Mines and other obstacles must be emplaced to restrict enemy infantry movement in areas that cannot be observed and in those protected from direct fire.

The following AP mines are effective in urban terrain:

- M14. Its small size makes it ideal for obscure places, such as stairs and cellars. It can be used in conjunction with metallic AP and AT mines or with chemical mines to confuse and hinder breaching attempts. (See Figure 12-19, page 12-20.)
- M16. With trip-wire actuation, its large lethal radius covers large areas such as rooftops, backyards, parks, and cellars. An added advantage can be gained by attaching twine or wire to the release pin ring to expediently rig the mine for command detonation. (See Figure 12-20, page 12-21.)
- M18A1 (Claymore). Numerous innovative applacations of Claymore mine deployment can be found for defensive warfare in urban areas. With remote firing, a series of Claymore mines along a street establishes a highly effective ambush zone. Mines can also be employed on the sides of buildings, in abandoned vehicles, or in any other sturdy structure. Numerous opportunities exist for effectively sited, well-concealed mine employment above the terrain surface. The Claymores can be used to fill the dead space in the FPF of automatic weapons. They present a hazard when used in confined, built-up areas. Exercise caution when using them close to friendly forces because there is a danger of back blast. (See Figure 12-21, page 12-22.)

Conventional Antitank Mines

Enemy tanks, infantry fighting vehicles (IFVs), and direct fire support weapons are restricted to streets, railroad lines, and, in some instances, waterways. (See Figure 12-22, page 12-23.) M15, M19, and M21 mines are used primarily in tactical and nuisance minefield, but they are occasionally used in protective minefield. They should be employed with other obstacles

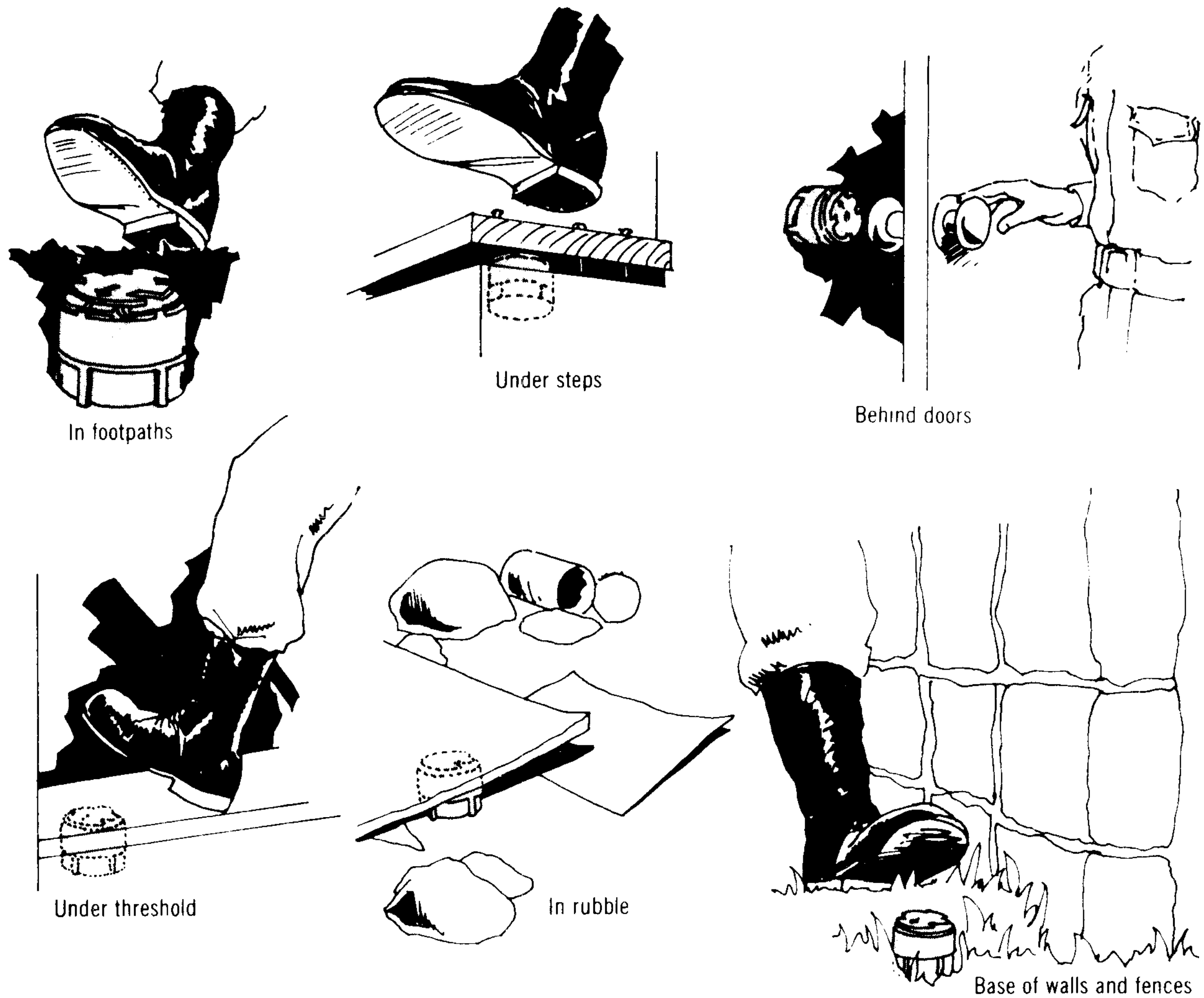


Figure 12-19. M14 antipersonnel mine placement

and covered by fire. Conventional AT mines emplaced in streets or alleys block routes of advance in narrow defiles. Concealing large AT mines is done by placing them in and around rubble and other obstacles. Extensive labor requirements generally prohibit burying mines in difficult terrain types. The MOPMS offers excellent urban area applications similar in nature to the AP application of the Claymore mine.

In dispersed residential areas, obstacles are required to reduce enemy infantry mobility through and between houses and in open areas. They also prevent armored vehicles from moving between houses and along streets. AT minefield patterns should extend outward from streets and incorporate open areas between buildings and streets in order to prevent easy bypass. As in urban terrain, AT mines supplement other street obstacles.

Significant labor and materials are required to deploy conventional mines between widely spaced buildings, in high-rise construction, and in industrial and transportation areas.

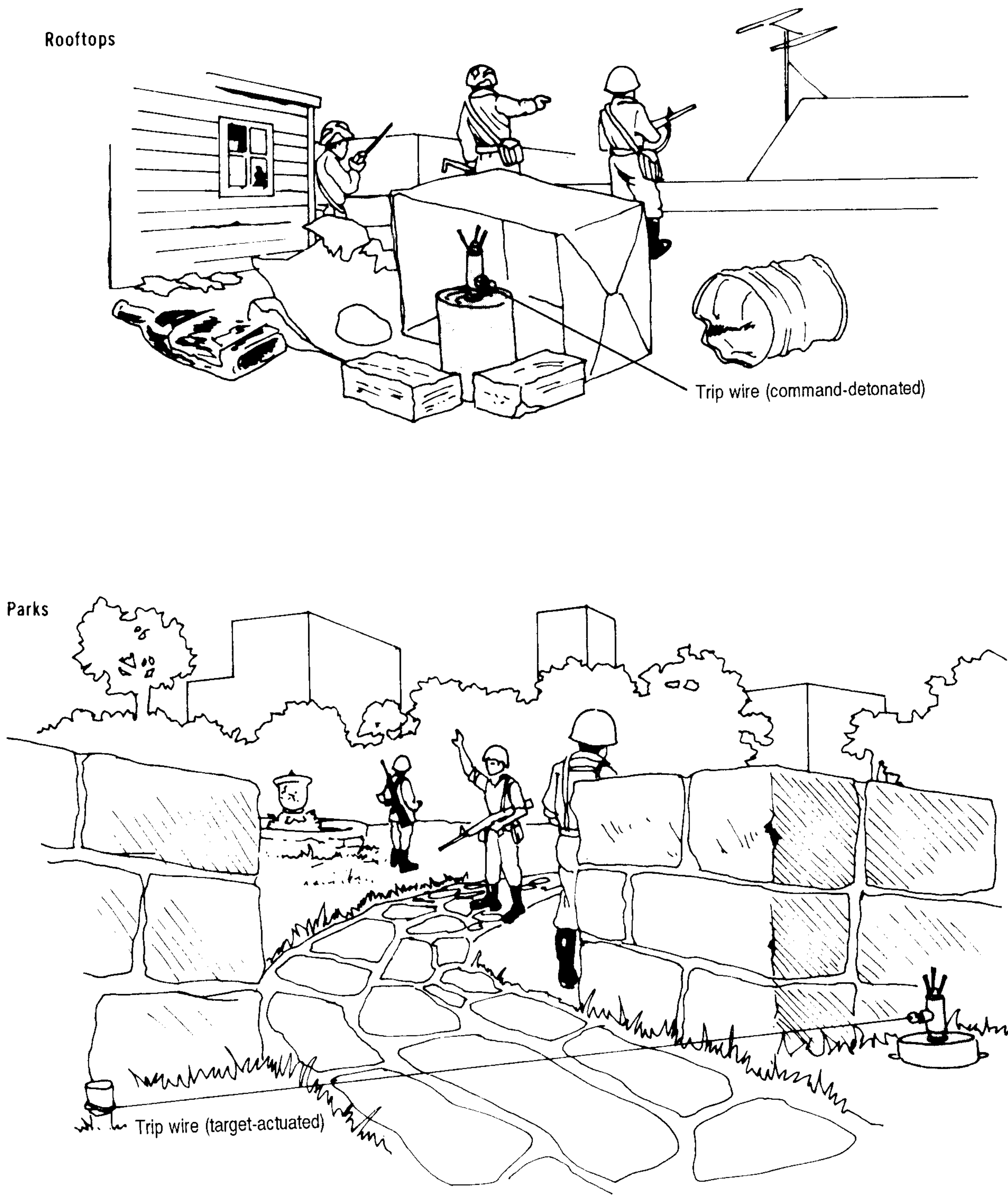


Figure 12-20. M16 antipersonnel mine placement

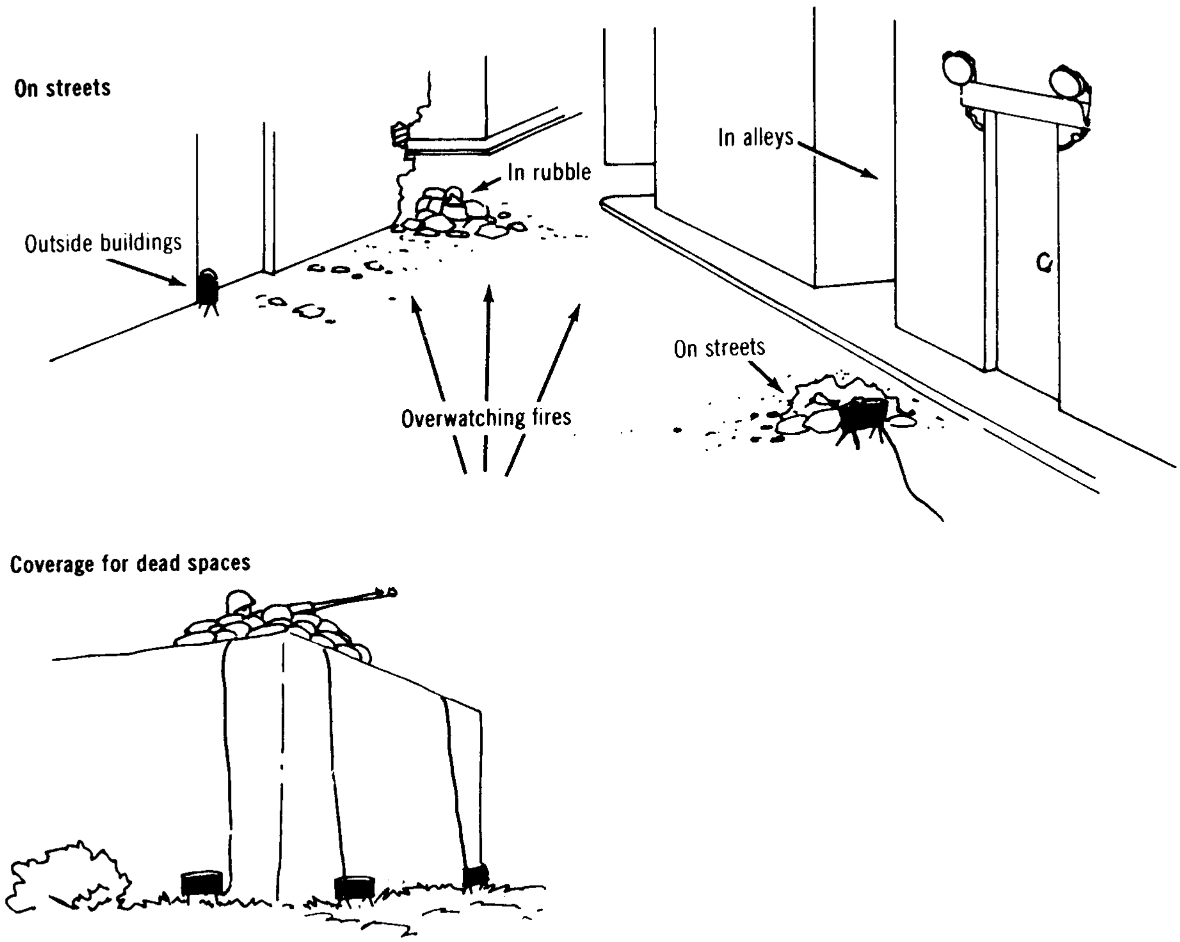


Figure 12-21. M18A1 (Claymore) antipersonnel mine emplacement

Therefore, scatterable mines should be seriously considered as viable alternatives to conventional mines. Some situations, such as the one depicted in Figure 12-23, provide opportunities for effective employment of conventional mines in tactical and nuisance minefield.

Deception Measures

Phony minefield can be established rapidly with negligible effort and cost. They have the distinct advantage of blocking the enemy but not the friendly forces. Although it is difficult to fake a surface-laid minefield, expedients such as soup pans, seat cushions, and cardboard boxes have historically proven effective in delaying and channelizing attacking forces. These objects, as well as other ones readily available in urban areas, can be used as phony minefield or used to cover real mines. A more realistic urban terrain phony minefield can be created with inert or training land mines.

Inadequate minefield camouflage in urban terrain is viewed as a critical constraint in deploying conventional and scatterable mines. Smoke can be deployed from various dispensers, but it must be dense and accurately employed and released.

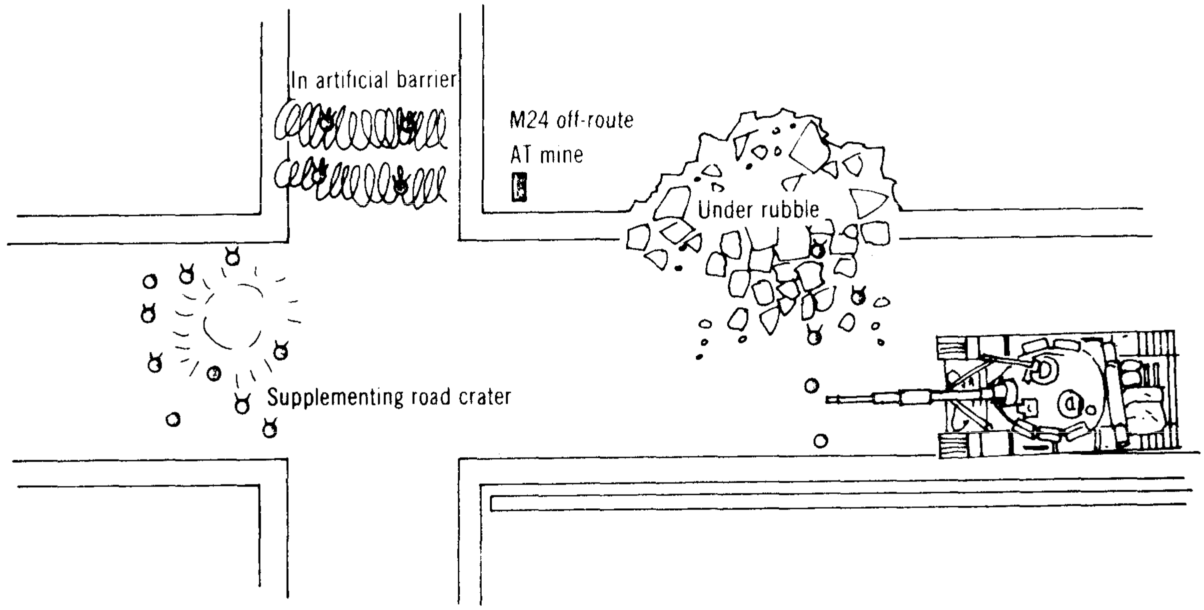


Figure 12-22. Conventional antitank mine emplacement - urban areas

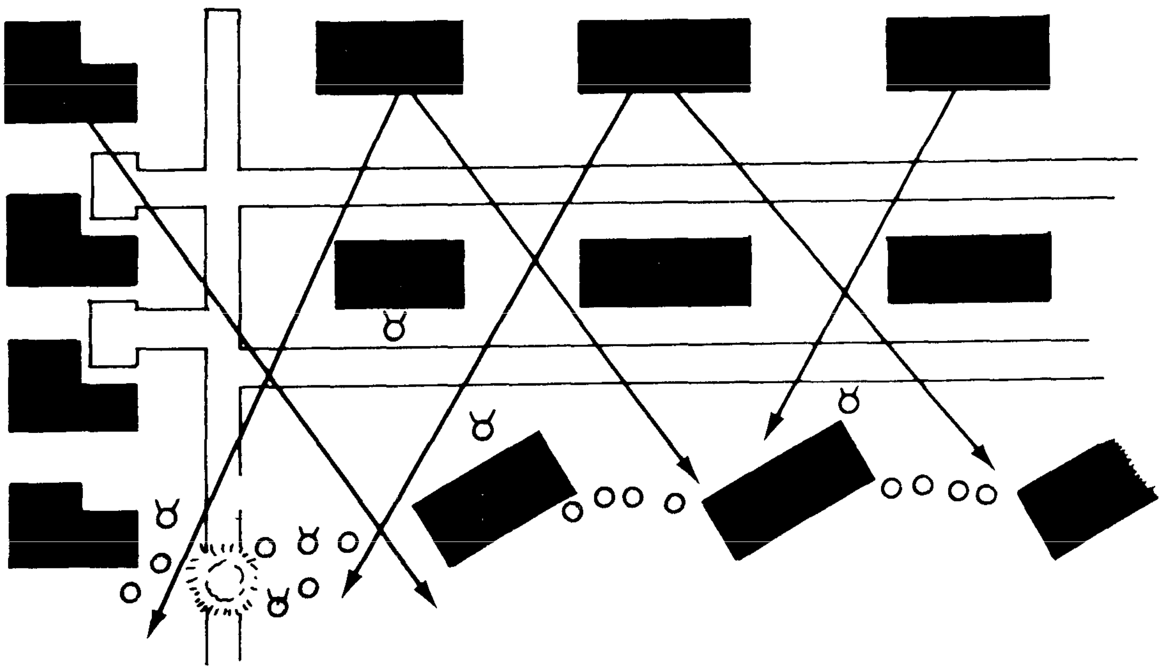


Figure 12-23. Conventional antitank mine emplacement - industrial and transportation areas

Scatterable Mine Systems

Area Denial Artillery Munition and Remote Antiarmor Mine.

in addition to advantages (such as reducing required resources and emplacement time) applicable to all scatterable mine systems, ADAM and RAAM have two specific advantages. As mentioned in Chapter 6, these are the most rapidly deployed scatterable systems. Preplanning artillery-delivered minefield increases the rate at which nuisance minefield can be emplaced. Secondly, these mines can be delivered under enemy fire. Employment of ADAM and RAAM is most effective when the enemy's intentions are known and when their forces are committed to an avenue of advance. (See Figure 12-24.)

The use of ADAM/RAAM in urban terrain involves five specific problem areas:

- Difficulty in precise minefield siting. Accurate siting is extremely critical due to the typically restrictive avenues of advance. It may be futile because it is difficult to adjust artillery rounds in an environment that obscures observation. Further, buildings tend to create unmined shadow zones.
- Uncertainty of ADAM and RAAM survivability upon impact with hard building and ground surfaces.
- Likely availability of artillery firing units for ADAM/RAAM. ADAM/RAAM emplacement may not be a priority of the maneuver commander, and available 155 mm FA units may not have enough ADAM/RAAM munitions on

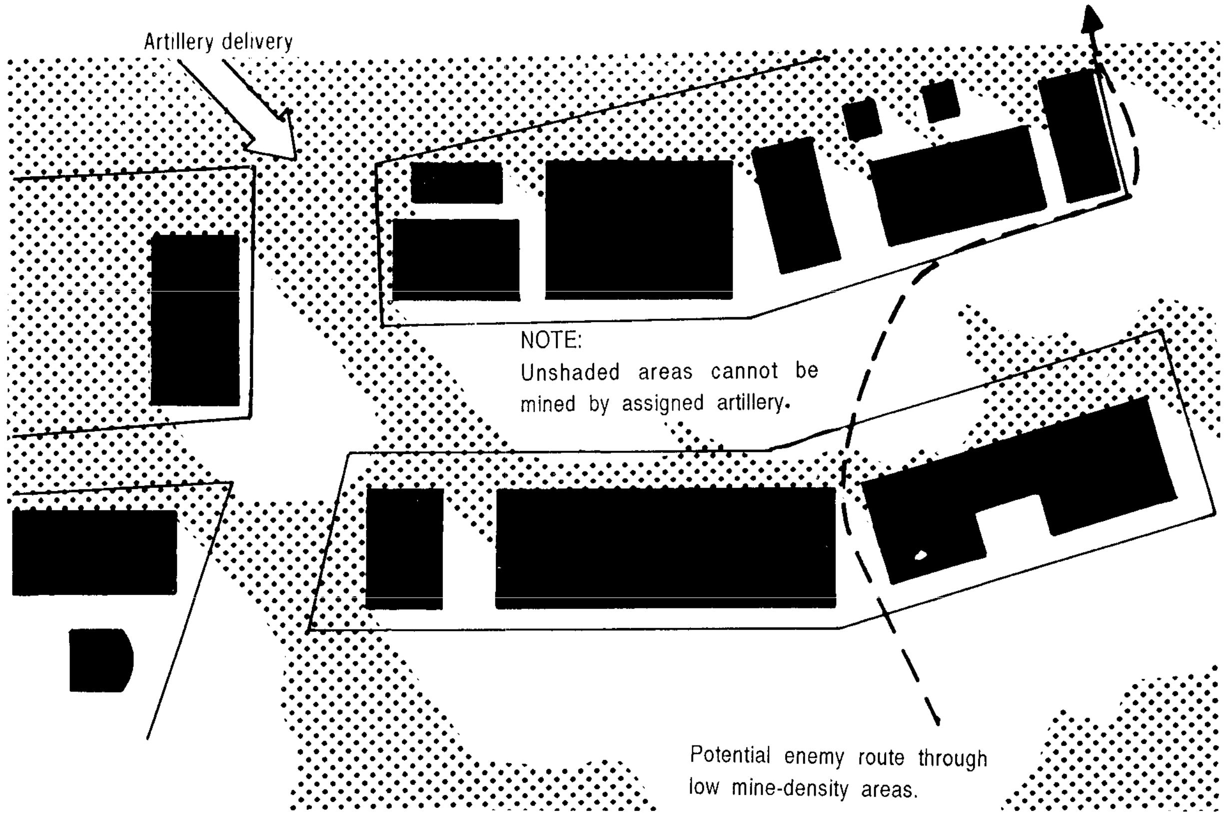


Figure 12-24. ADAM/RAAM employment

hand. Assuming the availability of artillery assets for this mission could prove disastrous for defending forces.

- High detectability of these mines on bare and lightly covered surfaces. This permits the enemy to seek out unmined passageways or pick through lightly seeded areas. If doctrinal guidelines are followed for emplacing artillery-delivered mines on top of the advancing enemy or immediately in front of them, the desired obstacle intent (disrupt, turn, fix, or block) and enhanced weapon systems fires are achieved.
- Difficulty in achieving a good random pattern. Hard surfaces cause mines to bounce and roll. Some mines (especially AT mines) land on top of buildings and are ineffective.

Air Volcano Mine Dispensing System.

The primary advantage of the Volcano system is its capability to site and emplace minefield accurately. This depends on the helicopter's maneuverability over selected minefield terrain and proper coordination between ground forces and aviation support. Disadvantages include vulnerability and the high cost of the helicopter. However, in view of the system's operational concept, employment in urban terrain (which provides little helicopter exposure) actually increases the practicality of deploying this system in urban areas, Another potential problem is the mine survival rate on impact with a hard surface. Finally, the Volcano system is not as responsive as other systems. Since Threat doctrine focuses on massive surprise attacks from the line of march, this last factor is particularly critical.

Ground-Emplaced Mine Scattering System /Flipper/ Ground Volcano.

Three aspects of GEMSS and ground Volcano further distinguish them from other scatterable mine systems.

- Dispenser is organic to supporting combat engineers, making it readily available to support the maneuver commander's defensive plan.
- Minefield delivery siting is accurately pinpointed to the ground.
- Better opportunities exist to record the presence of a minefield. In contrast to the artillery-delivered and air Volcano system, the GEMSS and ground Volcano are delivered by engineers who are normally located with and report directly to the maneuver commander.

Three primary factors may degrade GEMSS and ground Volcano deployment in urban terrain. Most significant Is probably the requirement to emplace minefield before an actual attack in order to reduce system vulnerability. This makes the minefield detectable and provides more reaction time for the enemy to alter their scheme of maneuver. The delivery of mines depends on terrain trafficability. The prime mover, towed dispenser, and launch vehicle must be able to negotiate the terrain where mines are dispensed. Logistical constraints on ammunition resupply into urban areas may limit the system's usefulness.

Modular Pack Mine System.

The MOPMS is ideally suited for employment in urban terrain. (See Figure 12-25, page 12-26.) The module can be hidden from enemy view, and mines can be dispensed after attackers are committed to a route of advance. Additionally, mines can be emplaced rapidly under enemy fire. Since the MOPMS has no delivery error, a commander might choose to detonate mines directly on top of the enemy, thus seriously disrupting the attack. In contrast to other scatterable mine systems, the commander controls when and where mines are dispensed and how they are detonated, regardless of the enemy situation.

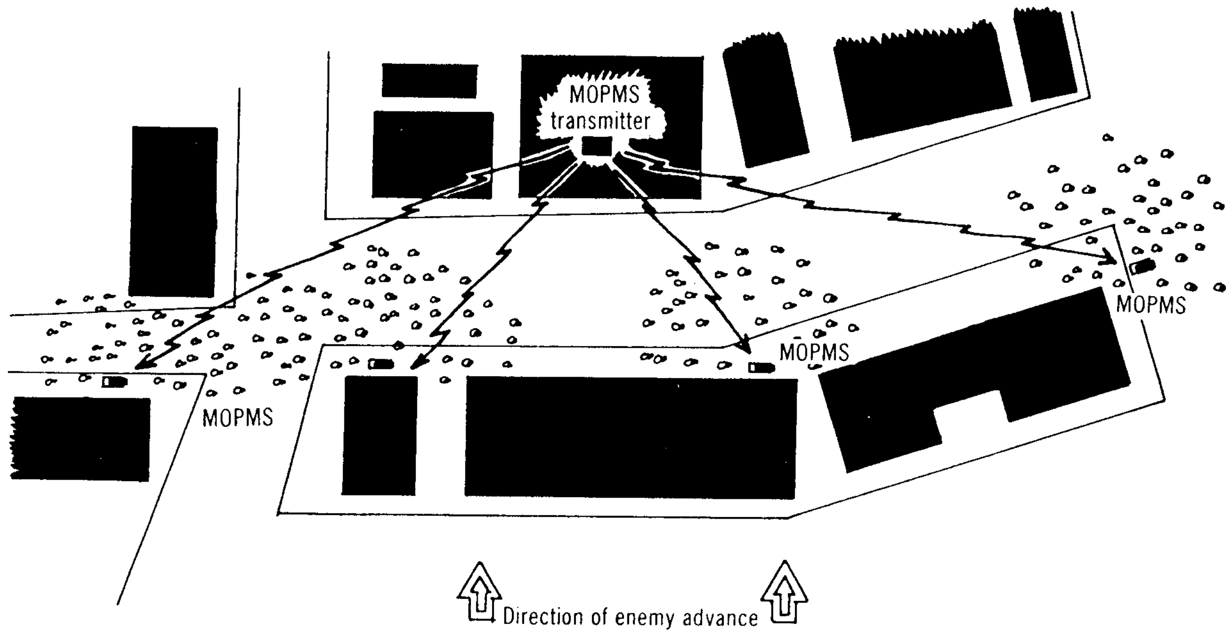


Figure 12-25. MOPMS employment

Gator.

When considered for deployment in urban area defenses, high-performance, aircraft-delivered mines encompass the same problems as artillery-delivered and air Volcano mine systems.

SPECIAL ENVIRONMENTS

Cold Regions

Mine employment in cold regions poses special problems-the principal one being emplacement. In cold regions, mine burial is extremely difficult because of frozen ground. The freezing water in soil causes it to have high strength and penetration resistance, so that digging times are greatly increased, if not impractical. However, there are several ways to overcome this problem. In some cases, a minefield can be laid out before the soil freezes. To do this, dig holes for each individual mine and insert a plug into the hole to protect its shape and to prevent it from being filled in. A wide variety of materials can be used for plugs. Ideally, the plug should be economical, easy to remove, and rigid enough to maintain the depth and shape of the hole. Plastic bags filled with sand or sawdust, logs, and sandbags make excellent plugs. If the minefield cannot be prechambered, mechanical means can be used to dig holes. When available, civilian construction equipment (particularly large earth augers) can be used to drill holes for mine emplacement.

To ensure detonation, buried, pressure-actuated mines are placed in a shallow hole so the pressure plate is clearly above ground. Covering spoil should be a maximum of 1 centimeter deep.

When burial is impossible, mines are placed on the surface. Heavy snow may reduce the effectiveness of buried and surface-laid mines by causing them to be bridged. Mines laid in deep snow should be placed as close as possible to the surface and supported by boards or compacted snow. Waterproof mines before emplacement in cold regions. Mines can also be placed in plastic bags before burial. In some cases, a layer of ice may form on top of the pressure plate. Although the load required to break the ice is slightly higher than that required to activate the fuze, thin layers of external ice have little effect on mine functioning. Tilt-rod actuated mines should be used in cold regions when possible, because they are less susceptible to ice and snow. Magnetic-fuzed mines are not significantly affected by snow conditions, although cold weather decreases battery life. When trip-wire actuated mines are employed in snow, the wire should be about 10 meters long with a slight amount of slack left in it. Trip wires should be supported approximately 46 centimeters above the ground to avoid degradation by snowfall.

Camouflaging minefield in cold regions is difficult. Paint mines white when snow is expected to remain on the ground for extended periods of time. Sweep away all tracks or make deliberate tracks to give the impression of a safe area.

Jungles

Fuzes and explosive components deteriorate very rapidly in jungle climates. As a result, mines and mine material require frequent, extensive maintenance and inspection. Waterproof mines that are employed in humid climates. The rapid growth of jungle vegetation hinders maintenance recovery and removal. Dense vegetation can cause mines to become inoperable or windblown foliage can detonate them, FM 90-5 provides detailed information on jungle operations.

Deserts

In desert climates, fuzes and explosive components do not deteriorate rapidly. The terrain and situation determine how mines are emplaced. Mine boards are normally required to provide support in soft, shifting sand. Mines emplaced in the desert have a tendency to shift position, and the spacing between mines and rows should be increased to prevent sympathetic detonation. Blowing sand causes exposure of buried mines or covers surface-laid mines. Sand may also cause mines to malfunction. ,It is difficult to accurately record minefield locations in vast, open desert areas void of recognizable terrain features. More mines are required for desert operations. Typically, desert minefield are much larger and have a lower density than those used in Europe or Korea. FM 90-3 provides detailed information on desert operations.