CHAPTER 3

Countermobility

THREAT OFFENSE

Crossing Capabilities and Characteristics

Table 3-1. Threat equipment obstacle crossing capabilities and characteristics

CHARACTERISTICS	MEDIUM TANK			LIGHT ARMOR (TRACKED)				LIGHT ARMOR (WHEEL)		LIGHT TANKS AND ASSAULT GUNS	
Speed KMPH (MPH)	60 (38)			80 (55)				100 (63)		40 (25)	
Trench Crossing M (ft)	2.8 (9)			2.8 (9.2)				2.0 (6.6)		2.8 (9.2)	
Vertical Step M (ft)	.8 (2.6)			1.1 (3.6)				.4 (1.6)		1.1 (3.6)	
Gradeability ( )	30			38				30		38	
Fording M (ft)	1.4 (4.6)			Amphibious				Amphibious		1.2/Amphibious	
Fording w/Kit M (ft)	5.5 (18)										
Height M (ft)	2.3 (7.5)			1.77 (5.8)				1.90 (6.2)		1.4 (4.6)	
VEHICLE	T54/55	T62/64	T72/80	BTR	BMP	BMD	MT-LB	BRDM/2	BTR60/70	ASU57	PT76/ ASU85
Weight (MT)	36	38	41	14.2	13.5	7.5	9.7	5.6/7	10.2/11	3.3	14
Width M (ft)	3.1 (10.2)	3.4 (11.2)	3.6 (11.8)	2.55 (8.4)				2.17 (7.1)		2.0 (6.6)	2.20 (7.2)
ARMAMENT	CALIBER		EFFECTIVE RANGE METERS	CALIBER		EFFECTIVE RANGE METERS		CALIBER	EFFECTIVE RANGE METERS	CALIBER	EFFECTIVE RANGE METERS
Main	125		2.000	73/12.7		800/1.500		14.5 KPVT	2.000	85	900
Secondary	7.62 PKT		1.000	7.62		1.000		7.62 PKT	1.000	7.62 PKT	1.000
Auxiliary	12.7 NSV		1.500	AT3 Sagger		3.000		AT3 Sagger	3.000	12.7 DSHK	1.500

Breaching Equipment

See Table 3-2 and Table 2-1 (page 2-3)

Table 3-2. Threat obstacle breaching equipment

BRIDGES AND RAFTS						
NOMENCLATURE	TYPE	LOAD CARRYING CAPACITY	TREADWAY WIDTH M (FT)	MAX GAP M (FT)	ASSY TIME METER (MINUTE)	ALLOCATION
PMP	Heavy pontoon	60/170 [2]	6.5 (21)	Per set 115 (377)	7	18 bays per MRD/TD
TMM	Truck mounted	60	3.8 (12.6)	Per span 10.5 (34)	3.5	4 per MRR/TR 8 per MRD/TD
T54-MTU	Tank mounted	50	3.2 (10.6)	11 (36)	3 [1]	3 per TR 1 per MRR
MTU-20	Tank mounted	50	3.3 (10.8)	18 (59)	5 [1]	1 per MRR 3 per TR

NOTES: 1. Emplacement time
2. Class 60 for bridge and up to Class 70 for raft.

AMPHIBIANS AND FERRY							
NOMENCLATURE	TYPE	LOAD CARRYING CAPACITY (Kg)	PERSONNEL LOAD (SOLDIERS)	WIDTH M (FT)	HEIGHT M (FT)	SPEED KMPH (MPH)	ALLOCATION
K61	Amphibian track	5,000	50	3.2 (10)	2.1 (7)	36 (22)	12 per MRD/TD
PTS-M	Amphibian track	15,000	50	3.5 (11.5)	3.4 (11.2)	40 (25)	
PKP	Trailer	5,000	—	2.8 (9)	2.2 (7)	—	3 per MRD/TD
GSP	Ferry	50,000	—	21.5 (71)	3.2 (10.6)	7.7 (5)	6 per MRD/TD

MINE DETECTORS/CLEARER					
		SWEEPING/CLEARING			
NOMENCLATURE	TYPE	SPEED KMPH	WIDTH M (FT)	DEPTH CM	ALLOCATION
UAZ69 DIM	Truck mounted mine detector	10	22 (72)	25	3 per MRD/TD
KMT 4/6	Tank mounted mine plow	10	2X.8 (2.5)	10	9 per MRR 27 per TR
KMT 5	Tank mounted plow/roller combination	10	2X.8 (2.5)	10	3 per MRR 9 per TR
BTR 50 PK UR 67	APC with line charge	—	2 @ 7 x 50 (22 x 160)	—	2 per MRD/TD

OBSTACLES

Countermobility Planning

The basic principles of obstacle employment are —

- Support the maneuver commander's plan.
- Integrate with observed fires, existing obstacles, and other reinforcing obstacles.
- Employ in-depth and for surprise.

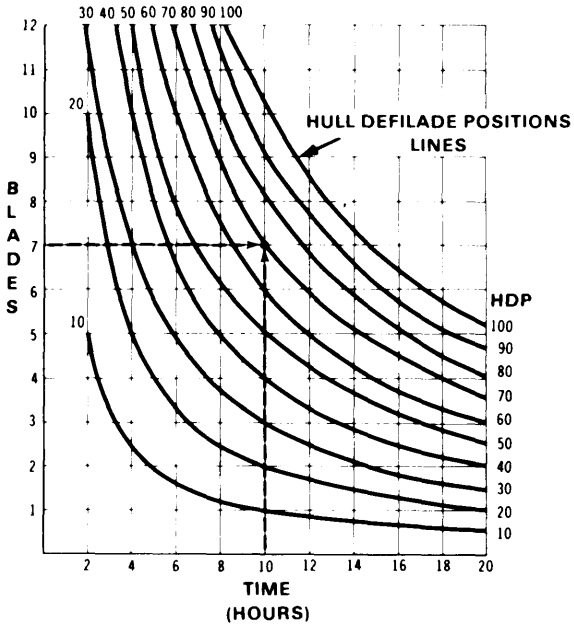
The supported commander must decide the effort to be used for countermobility and survivability tasks. Use Figure 3-1 to determine time and/or blade requirements for antitank ditches versus defilade positions. The following ratios are used in conjunction with Figure 3-1.

Ratio: $ATD = \frac{HDP}{40}$ and TDP = ATD (23.5)

Where: ATD = antitank ditch in kilometers
TDP = number of turret defilade positions
HDP = number of hull defilade positions

Example 1: You have seven blades and 10 hours of construction time. Your task force commander needs 20 turret defilade positions (TDP) and 2,000 meters of antitank ditch. The commander wants to know if you can do the job, and if not, give your recommendation.

Step 1. Enter Figure 3-1 with the number of blades and time. Find the number of hull defilade positions by reading the appropriate line (interpolate between lines): HDP = 70 (see dotted line Figure 3-1).



NOTES: 1. A 20 percent factor for travel time is included.
2. If blades or hours exceeds the graph, see example 2.
3. For NBC environment see Table 1-9 (page 1-26) for degradation.
4. Digging rates are considered conservative, change the graph value IAW on site sample digging.

Figure 3-1. Hull defilade positions graph

Step 2. Using the ratios, convert HDP to ATD and TDP.

$$ATD = \frac{HDP}{40} = \frac{70}{40} = 1.75 \text{ km}$$

TDP = ATD (23.5) = 1.75(23.5) = 41.1 —> 41 positions

Step 3. Using values obtained in steps 1 and 2, construct the following graph (Figure 3-2).

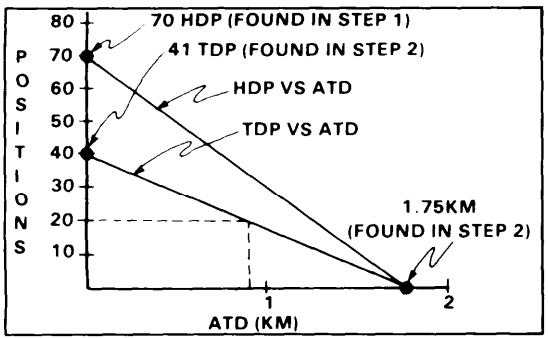


Figure 3-2. Example

Step 4. On the constructed graph, enter 20 (number of TDPs needed) and move horizontally to the TDP versus ATD line. Now move down to find out how many meters of ditch you can construct (see dotted lines on sample graph, Figure 3-2): .9 km = 900M.

Step 5. Inform the task force commander that you can construct the 20 TDPs, but only 900 meters of ATD. To construct the additional 1,100 meters of ATD, you need five more blades or 7 more working hours.

NOTE: Here is a simple method to obtain the additional time or blades required as stated above.

Additional time needed:

1.1 km (requirement) $\frac{HDP}{40}$ —> HDP = 40(1.1) = 44 positions

Enter Figure 3.1 with seven blades and move horizontally until the 44 HDP is found (between HDP 40 and 50) read down for additional time = 6.5 —> 7 hours.

Additional blades needed:

Enter 10 hours (time constraint) on chart. Move up until the 44 HPD is found (interpolation required) read number of blades needed on left = 4.5 —> 5 blades.

Example 2: You have 20 blades and 10 hours. How many hull defilade positions can you construct?

Step 1. Since the number of blades exceed graph range, divide the blades by any number. For the example use 5.

New number of blades = $\frac{20}{5}$ = 4 blades

Step 2. Enter 10 hours and the new number of blades in step 1 (4 blades) on the chart to obtain HDP.

HDP = 40 positions

Step 3. Multiply the HDP found in step 2 (40 HDP) by number used to divide blades in step 1 (5).

HDP = 40 x 5 = 200 positions

Step 4. You may proceed with step 2 in Example 1 as required.

Barbed wire and concertina

Whenever U-shaped pickets are used, the open end of the U must face toward the enemy

Table 3-3. Wire and tape entanglement material

MATERIALS	APPROX WEIGHT, KG	APPROX LENGTH, M	NO. CARRIED BY ONE SOLDIER	APPROX WEIGHT OF MAN-LOAD KG
Barbed wire reel	41.5	400	--	21
Bobbin	3.5—4.0	30	4—6	14.5—24.5
Barbed tape dispenser	0.77	0.45	20	15.5
Barbed tape carrying case	14.5	300	1	14.5
Standard barbed tape concertina	14	15.2	1	14
Standard barbed wire concertina	25.4	15.2	1	25
General purpose barbed tape obstacle				
Hand	15.8	20	1	15.8
Vehicular	117.9	140	25	29.5
U-shaped pickets				
Long	4.5	1.5	4	18.1
Medium	2.7	0.81	6	16.3
Short	1.8	0.61	8	14.5

Table 3-4. Material and labor requirements for 300-meter sections of various wire entanglements

TYPE OF ENTANGLEMENT	PICKETS LONG	PICKETS MED	PICKETS SHORT	REELS OF BARBED WIRE [1]	NO. OF GPBTO	NO. OF CONCERTINAS	STAPLES	MAN-HOURS TO ERECT [3]	KG OF MATERIALS PER LIN M OF ENTANGLEMENT [2]
Double-apron, 4- and 2-pace	100		200	15-16 (19) [4]				71	4.6 (3.5) [5]
Double-apron, 6- and 3-pace	66		132	15-17 (18) [4]				59	3.6 (2.6) [5]
High wire (less guy wires)	198			19-21 (24) [4]				95	5.3 (4.0) [5]
Low wires, 4- and 2-pace		100	200	11				59	3.6 (2.8) [5]
4-strand fence	100		2	6-7 (7) [4]				24	2.2 (1.8) [5]
Triple standard concertina	160		4	3 (4) [4]		59	317	30	8.2 (7.3) [5]
General purpose barbed tape obstacle (GPBTO)					(8) [6]			(1) [6]	2.7

NOTES: 1. Lower number of reels applies when U-shaped pickets are used; higher number if wooden pickets are used. If only one number, use for both pickets.

2. Average weight when any issue metal pickets are used (1 truckload = 2,268 kg).
3. Man-hours are based on the use of driven pickets. Multiply these figures by .67 if experienced troops are being used, and by 1.5 for night work.
4. Number of barbed tape carrying cases required if barbed tape is used in place of barbed wire.
5. Kilograms of material required per linear meter of entanglement if barbed tape is used in place of barbed wire and barbed tape concertina is used in place of standard barbed wire concertina.
6. Based on vehicular emplaced obstacles installed in triple belts.

Entanglements. Entanglements are classified according to their use. The quantity of concertina required can be estimated using the following rules of thumb:

- Conventional deployment along forward edge of battle area (FEBA)(Figure 3-3).
  - -Tactical wire = (front) x (1.25) x (number of belts).
  - -Protective wire = (front) x (5) x (number of belts).
  - -Supplementary wire:
    - Forward of FEBA (front) x (1.25) x (number of belts).
    - Rear of FEBA = (2.5) x (unit depth) x (number of belts).

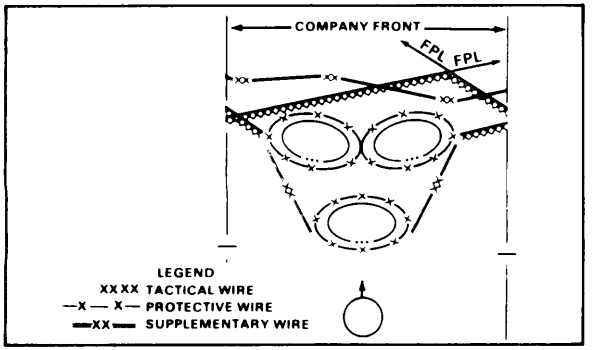


Figure 3-3. Schematic layout of barbed wire entanglements in a defensive area

- Base camp defense along perimeter (Figure 3-4).
  - -Tactical wire = (mean perimeter) x (1.25) x (number of belts).
  - -Protective wire = (perimeter) x (1.10) x (number of belts).
  - -Supplementary wire = (mean perimeter) x (1.25) x (number of belts).

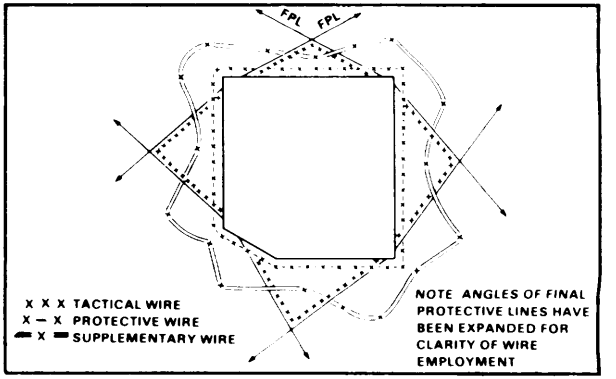


Figure 3-4. Perimeter defense wire

- Ensure job site security.
- Organize work party into three equal crews.
- First two crews lay out pickets and third crew installs pickets (open end of U toward enemy).
- Reorganize party into crews of two to four soldiers.
- Install wire in numerical order as shown in Figure 3-5.
- Avoid having any soldier cut off between the enemy and the fence.
- Ensure that wires are properly secured and tight.

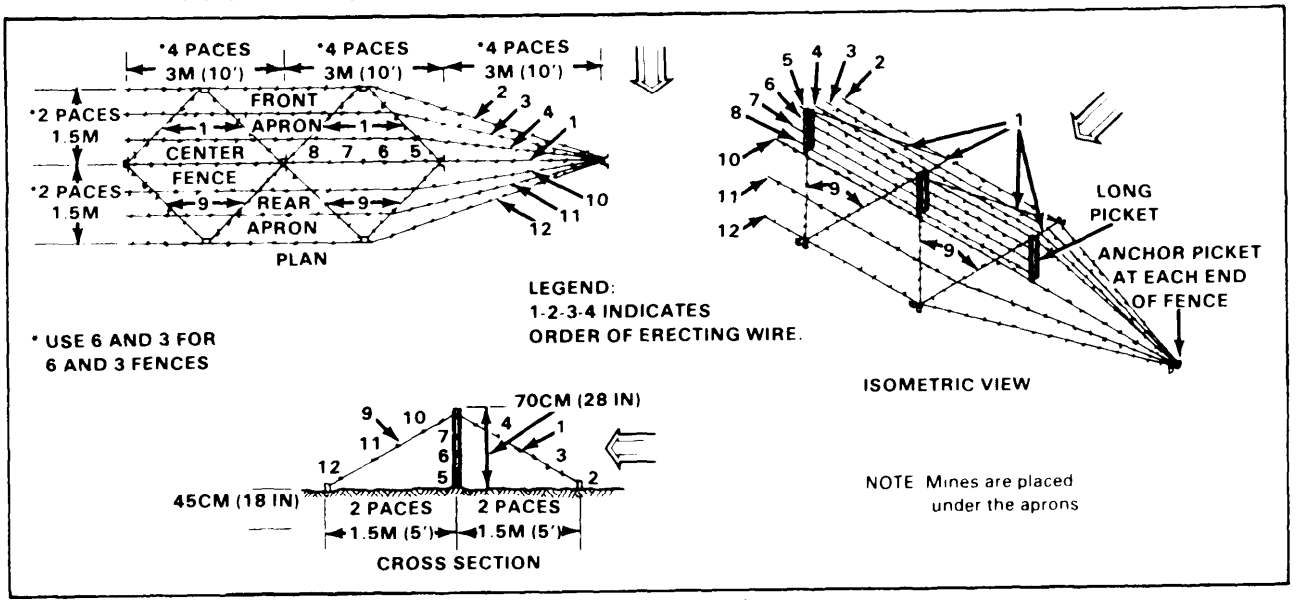


Figure 3-5. Double apron fence

Triple standard concertina. See Figures 3-6 through 3-8.

- Ensure job site security.
- Organize work party into three crews.
- First crew lays pickets (Figure 3-6).
- Second crew lays out concertina. Place one roll on enemy side at every third picket and two rolls on friendly side at every third picket.
- Third crew installs all pickets.
- Reorganize party into four-soldier crews.
- Install concertina (Figures 3-7 and 3-8).
- Ensure concertina is properly tied and all horizontal wire properly installed.

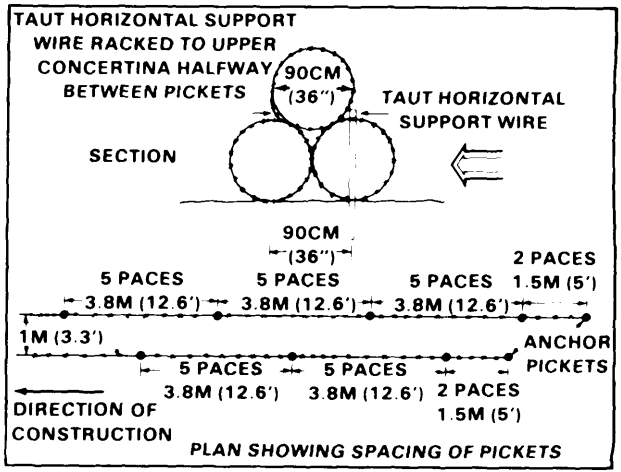


Figure 3-6. Triple standard concertina fence

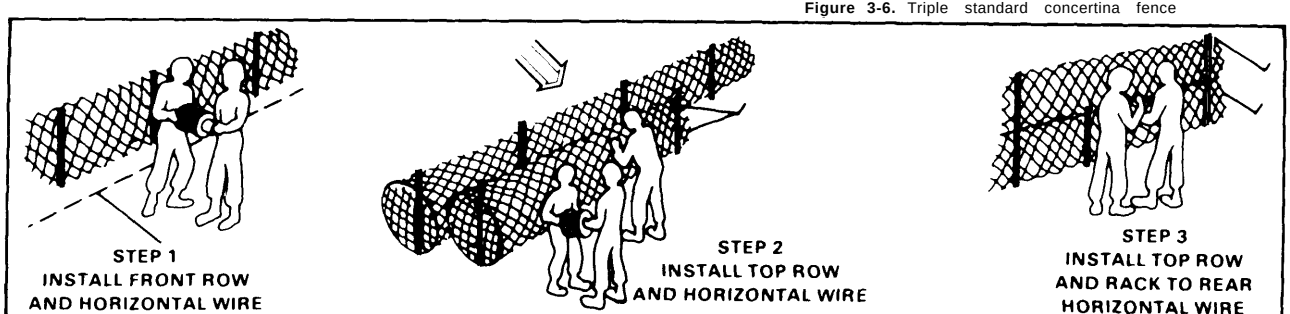


Figure 3-7. Installing concertina

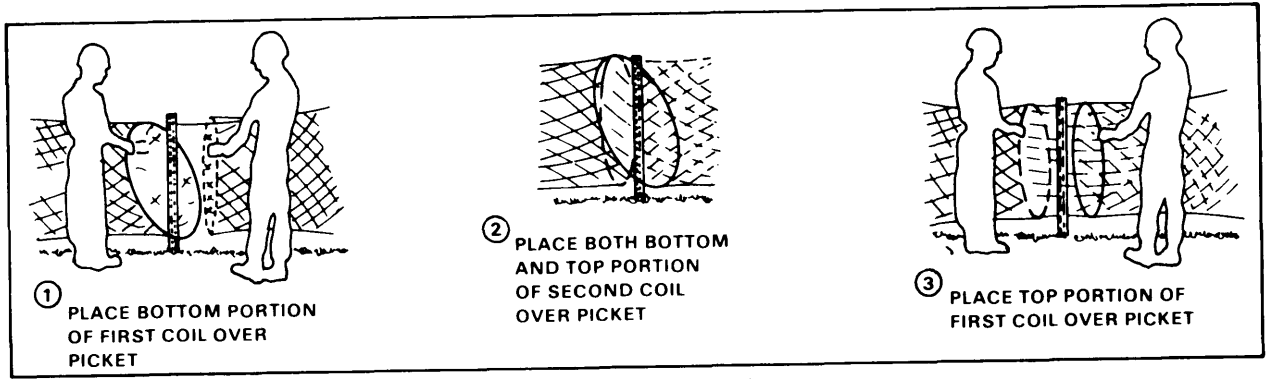


Figure 3-8. Joining concentina

Four-strand cattle fence. See Figure 3-9.

- Ensure job site security.
- Organize work party into four soldier crews.
- First crew lays out long pickets 3 meters (10 feet) apart and second crew installs pickets.
- Reorganize party into two-soldier teams, one team carries the reel and the other team makes the ties.

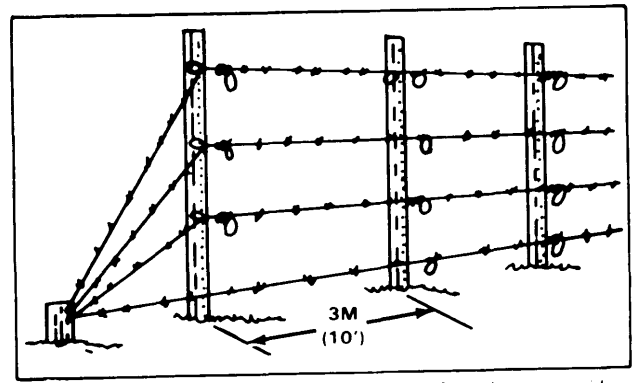


Figure 3-9. Four-strand cattle fence as viewed from the enemy side

General purpose barbed tape obstacle (GPBTO). The barbed tape (Figure 3-10) comes in seven modules (20 meters per module) per package. One package contains 140 meters of barbed tape (single belt). The GPBTO may be installed by vehicle or by individual soldier. It should be installed in three-band belts. Anchor one end and carry the package along installation path. Gloves **should not** be worn during installation since barbs will easily penetrate them.

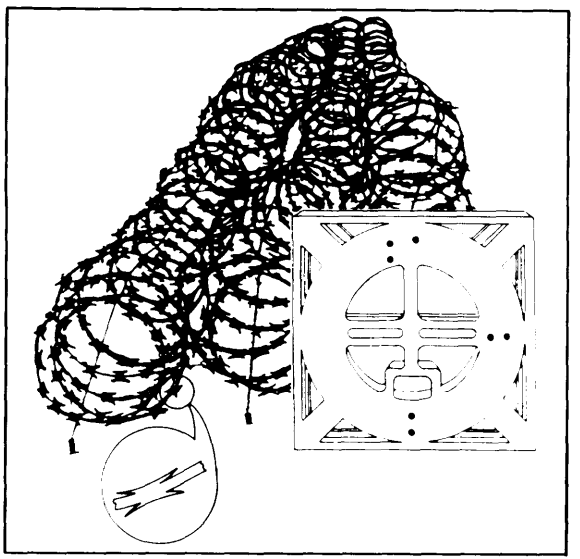


Figure 3-10. General purpose barbed tape obstacle

Other wire obstacles. Construction sequence for other wire obstacles should be from enemy to friendly and from bottom up (Figures 3-11 through 3-14).

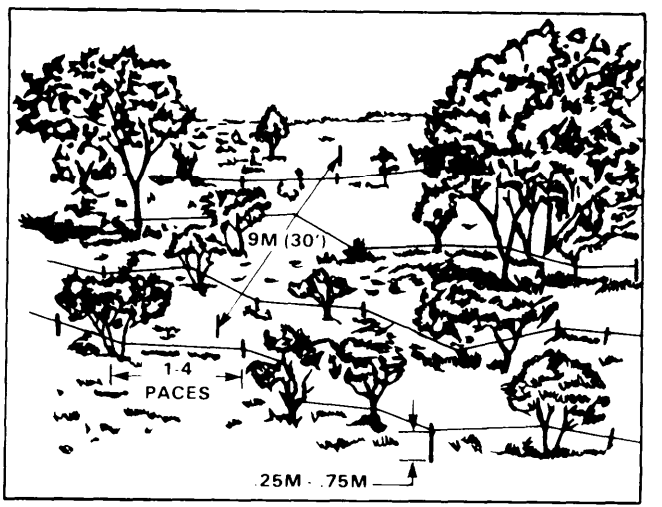


Figure 3-11. Tanglefoot

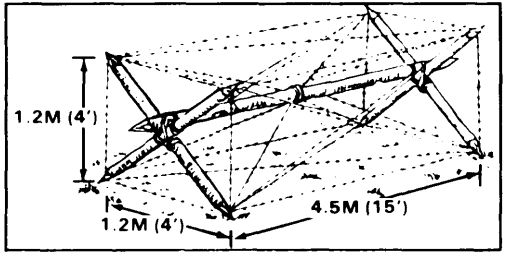


Figure 3-12. Knife rest

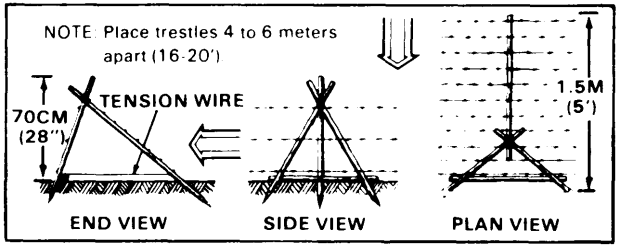


Figure 3-13. Trestle apron fence

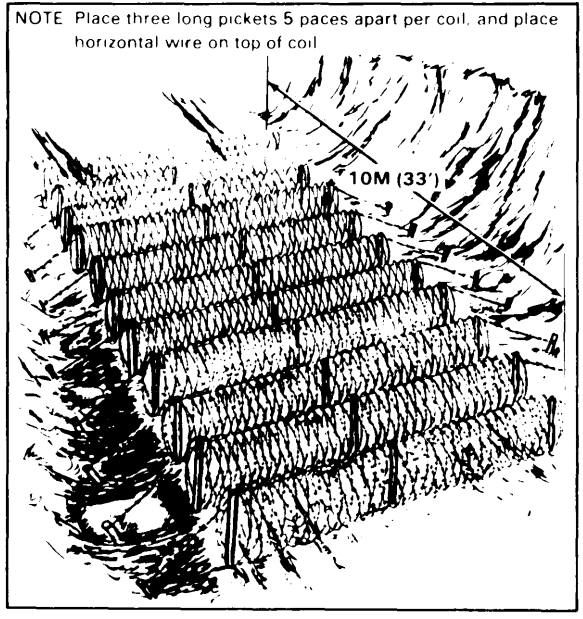


Figure 3-14. Concentina roadblock

Antivehicular obstacles

Antitank ditches and road craters. See Figure 3-15. Refer to Chapter 6 for specific details and construction of road craters.

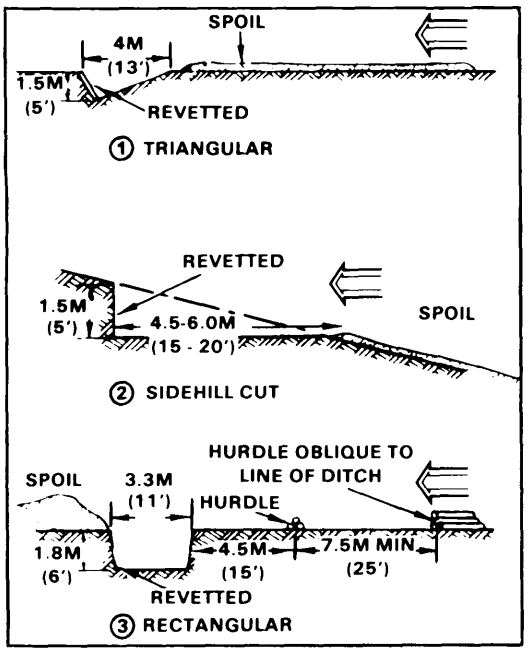


Figure 3-15. Antitank ditches

Log cribs. See Figures 3-16 and 3-17 and Table 3-5.

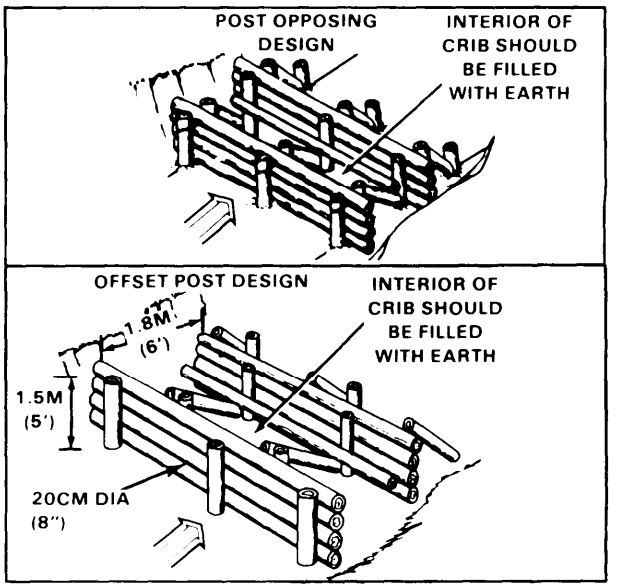


Figure 3-16. Retangular log cribs design

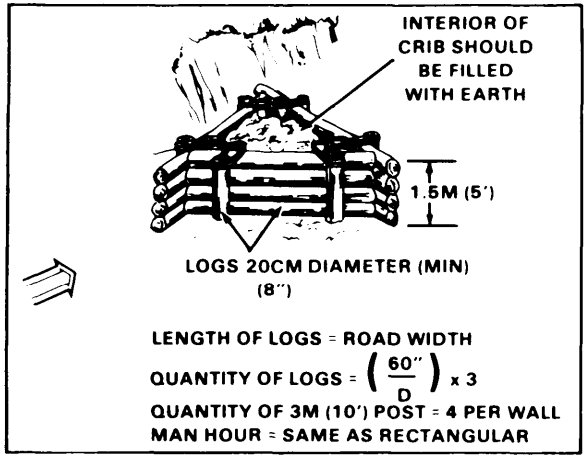


Figure 3-17. Triangular log crib

Wall logs requirement - Length = roadway width

Quantity = $\frac{120}{D} + 1$

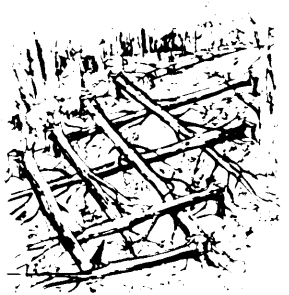
D = log diameter in inches

Manpower requirement - A 20-foot wide road requires 4 to 8 engineer platoon hours when equipped with hand-tools.

Table 3-5. Post requirement (post opposing/offset post)

ROAD WIDTH METERS (FEET) / POSTS	1.8 (6)	2.1 - 3.6 (7 - 12)	3.9 - 5.4 (13 - 18)	5.8 - 7.3 (19 - 24)	7.6 - 9.1 (25 - 30)	9.4 - 10.9 (31 - 36)	11.3 - 12.8 (37 - 42)	13.1 - 14.6 (43 - 48)
Long. 3 (10)	8 / 6	12 / 10	16 / 14	20 / 18	24 / 22	28 / 26	32 / 30	36 / 34
Short. 2.1 (7)	2 / 2	3 / 3	4 / 4	5 / 5	6 / 6	7 / 7	8 / 8	9 / 9
Braces. 2.1 (7)	4 / 3	6 / 5	8 / 7	10 / 9	12 / 11	14 / 13	16 / 15	18 / 17

Abatis.



- MINIMUM DEPTH: 75M (246')
- TREE DIAMETER: 64 CM (2')
- TREE HEIGHT: 6M (20')
- DROP TREE 45° TOWARD ENEMY
- TREE SHOULD REMAIN ATTACHED TO STUMP
- LB (TNT) = $\frac{D^2}{50}$
- USE TEST SHOT TO DETERMINE ACTUAL DEMOLITION NEEDED
- WORK RATE: 75M (246') 8 PLATOON HR

Figure 3-18. Abatis

Log hurdles. Log hurdles should be sited at steepest part of slope (Figure 3-19).

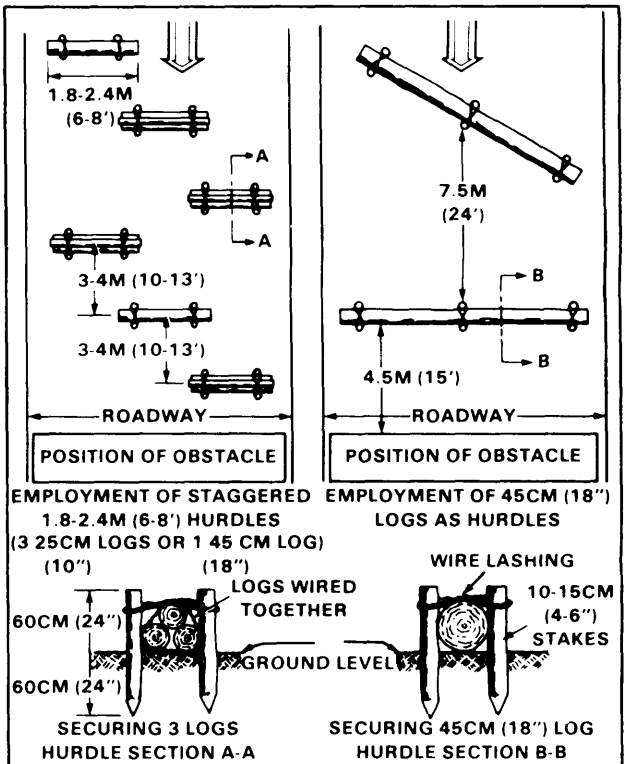


Figure 3-19. Types of log hurdles

Log/steel post obstacle.

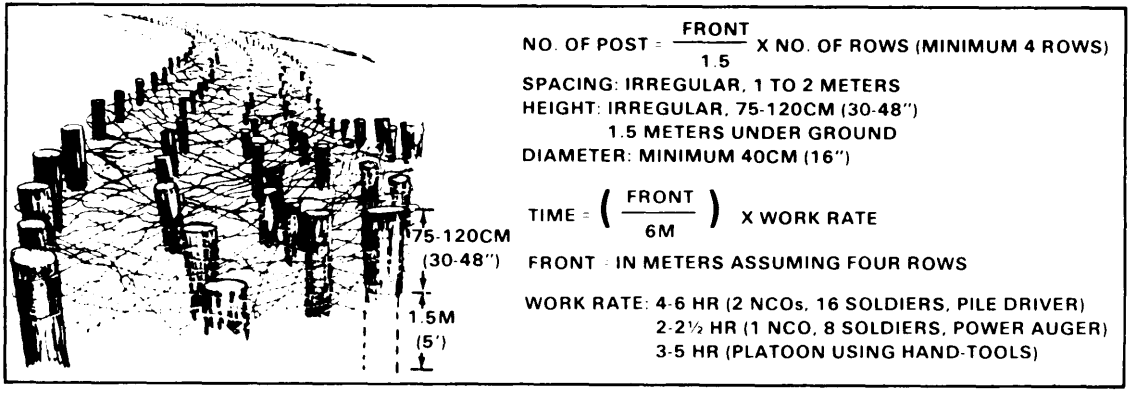


Figure 3-20. Post obstacles

Hedgehog and tetrahedrons.

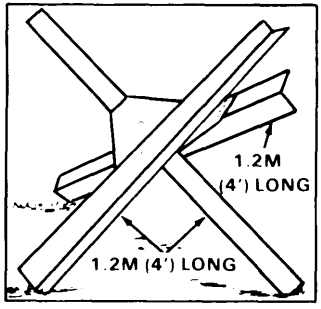


Figure 3-21. Steel hedgehog

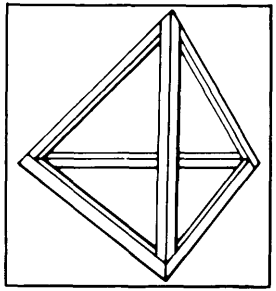


Figure 3-22. Steel tetrahedron

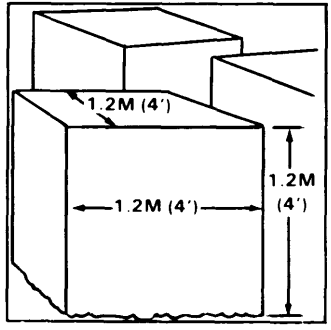


Figure 3-23. Concrete cubes

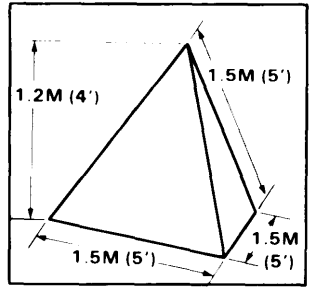


Figure 3-24. Concrete tetrahedron

Minefield Type and Development

Table 3-6. Minefields types and characteristics

TYPE	DESCRIPTION	TACTICAL USE	REPORTS REQUIRED	RECORDS REQUIRED	MINES USED			AUTHORITY (DELEGATED TO)
					AP	AT	SCAT	
Hasty Protective	Above ground Random pattern No antihandling devices	Aids in unit local close in protection of defensive perimeter	Intention Initiation Completion Change/ Removal	DA Form 1355-1-R to parent unit	X	X	X	Bde Cmdr (Bn Co Cmdr)
Deliberate Protective	Standard pattern Fenced and marked		As above sent to authorizing HQ	DA Form 1355 to authorizing HQ	X	X		Div Cmdr (Inst Cmdr)
Tactical	Standard or random pattern Scatterable	As part of obstacle plan	As above	DA Form 1355 to authorizing HQ	X	X	X	Div Cmdr (Bde Cmdr)
Point	Random pattern Surface or buried	Enhance obstacles Hinder use of key areas	As above	As above	X	X	X	Bde Cmdr (Bn Cmdr)
Interdiction	Placed on or behind enemy location	Separate de stroy and dis rupt enemy	As above	As above after execution			X	Corps Cmdr (Div Cmdr)
Phony	Same as live minefield being simulated	Simulate other minefield	Same as simulated	Same as simulated				Same as simulated

NOTES: 1. Corps Commander is the initial employment authority for all scatterable minefields.
- Long self-destruct (≥ 24 hrs) may be delegated to division and brigade level.
- Short self-destruct (< 24 hrs) may be delegated to battalion/task force level.

2. Use scatterable minefield report and records for all scatterable minefields.

Conventional Minefields

Reports

All minefields are reported by the fastest secure means available and are classified SECRET when completed. Exact format may be specified by local command SOP.

Intention to lay.

Table 3-7. Report of intention to lay with example

EXPLANATION	LETTER DESIGNATION	EXAMPLE
Tactical objectives (temporary security roadblock or other)	ALFA	Bridge work site security
Type of minefield	BRAVO	Hasty protective
Estimated number and types of mines and whether surface laid mines or mines with antihandling devices	CHARLIE	10 each M18A1 No. AHD
Location of minefield by coordinates	DELTA	UT 0976
Location and width of minefield lanes and gaps	ECHO	Rt. 67 No.— south approach to bridge
Estimated starting and completion date-time group	FOXTROT	Start 190700 May 87 Completion 190800 May 87

Initiation.

Table 3-8. Report of initiation with example

EXPLANATION	LETTER DESIGNATION	EXAMPLE
Location of minefield by coordinates	DELTA	UT 0976
Estimated starting and completion date-time group	FOXTROT	Start 190700 May 87 Completion 190800 May 87

Progress.

Table 3-9. Report of progress with example

EXPLANATION	LETTER DESIGNATION	EXAMPLE
Location of minefield by coordinates, 25%, 50%, 75%, or 100% completed	DELTA	UT 0976, 25% completed

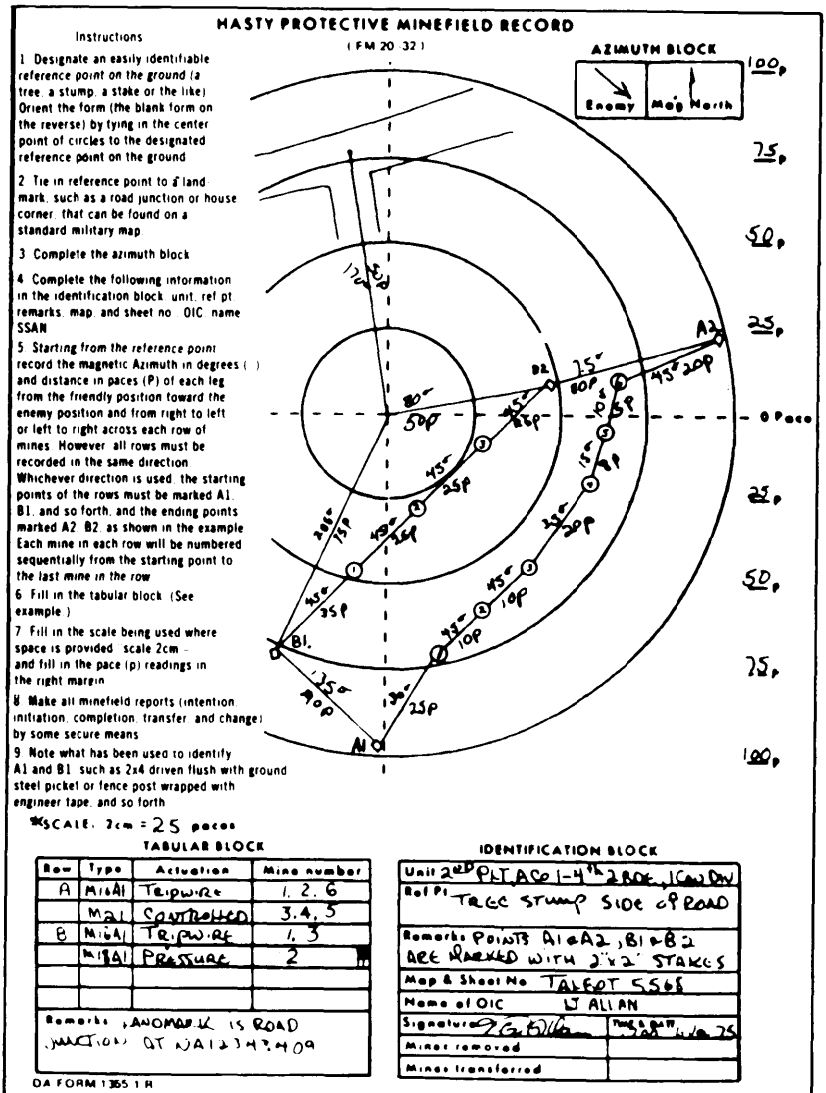
Completion. See Table 3-10. A completion report should be followed by a minefield record.

Table 3-10. Report of completion of minefield with example

EXPLANATION	LETTER DESIGNATION	EXAMPLE
Changes in information submitted in intention to lay report	ALFA	None
Total number and type of AT and AP mines laid	BRAVO	M15—299 M26—865 M14—601
Date and time of completion	CHARLIE	231800 Mar 87
Method of laying mines (buried by hand or by machine)	DELTA	Buried by hand
Details of lanes and gaps including marking	ECHO	WD1 wire on ℄ AZ 270° Ent and Ex marked with 2U pickets
Details of perimeter marking	FOXTROT	Standard fence
Overlay showing perimeter, lanes, and gaps	GOLF	NA
Laying unit and signature of individual authorizing laying of of the field	HOTEL	2d Plt, Co A, 546th Engr Bn (C)

Transfer. A transfer report is used when minefield responsibility istransferred between commanders. It must be signed by both commanders and include a certificate stating that receiving commander was shown or informed of all mines within the zone of responsibility and that the receiving commander takes full responsibility for all the mines within the zone. The report is sent to the higher commander who has authority over both relieved and relieving commanders.

Change. A change report is submitted when any alterations are made to a minefield for which a completion report and record have been submitted.



3-19

*Scale = (Distance from RP to farthest point in field + 10 paces)/4

Example = (90 paces and + 10 paces)/4 = 25 paces/ring

Figure 3-25. Hasty protective minefield record

Row minefield

Development. See Figure 3-26.

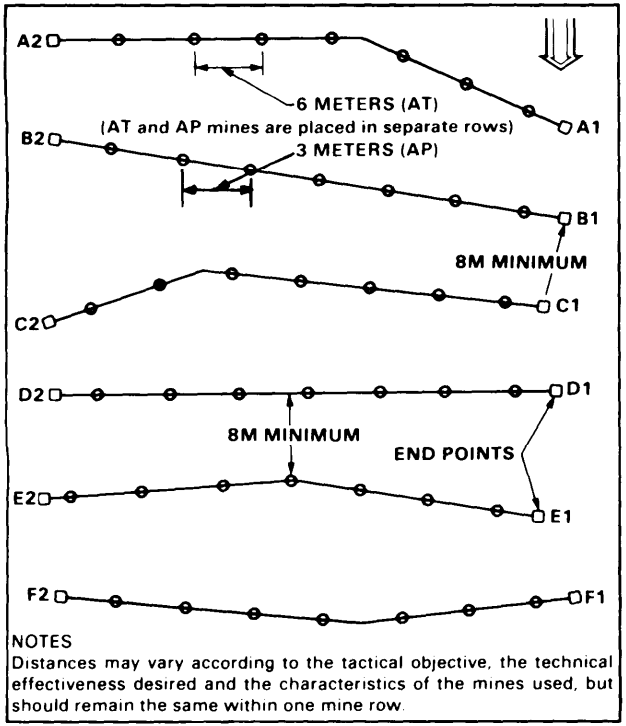


Figure 3-26. Row pattern minefield

Logistical requirements.

NUMBER OF MINES AND MINEFIELD ROWS

Step 1. The number of mines required is equal to the desired density times the minefield front. A 10 percent excess factor is included by multiplying by 1.10.

Density Front

0.5 x 400 x 1.10 = 220 AT

Step 2. The number of AT mines per row is determined by dividing the minefield front by the spacing interval between AT mines (normally 6 meters between mines).

400 meters ÷ 6 meters = 66.6 AT mines per row

NOTE: The resulting number is rounded DOWN to the nearest whole number.

66.6 becomes 66 AT mines per row

Step 3. The number of rows needed in the minefield is equal to the number of AT mines required (step 1) divided by the number of AT mines per row (step 2). The resulting number is rounded UP to the nearest whole number.

220 AT mines ÷ 66 AT mines per row = 3.3 rounded UP to 4 rows

NUMBER OF TRUCKLOADS

The number of truckloads required for minefield emplacement depends on the type and quantity of mines and vehicular carrying capacity. See Table 3-13 (page 3-26).

The number of truckloads required is equal to the total number of AT mines divided by the truck's capacity. In this example, 5-ton dump trucks are used.

220 ÷ 204 = 1.08, rounded UP to the next higher whole number = 2 truckloads

Recording. See Figures 3-32 through 3-37 (pages 3-27 througth 3-32).

Standard pattern minefields

Development. See Figures 3-27 througth 3-31 (pages 3-21 through 3-24).

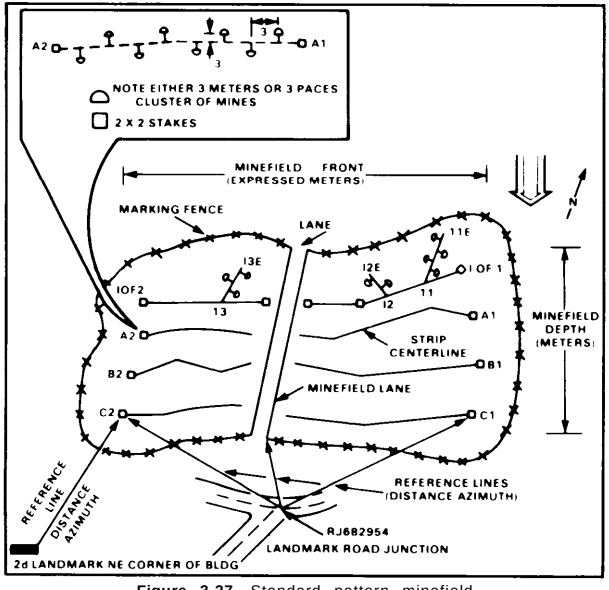


Figure 3-27. Standard pattern minefield

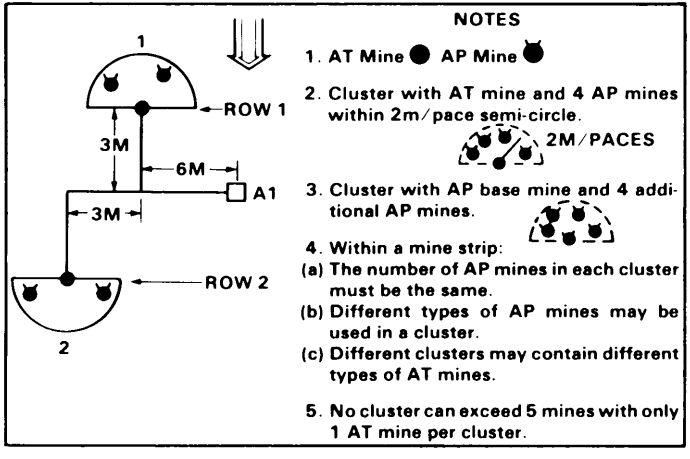
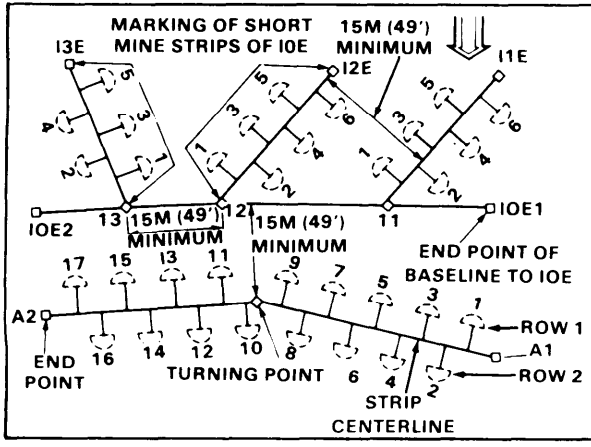


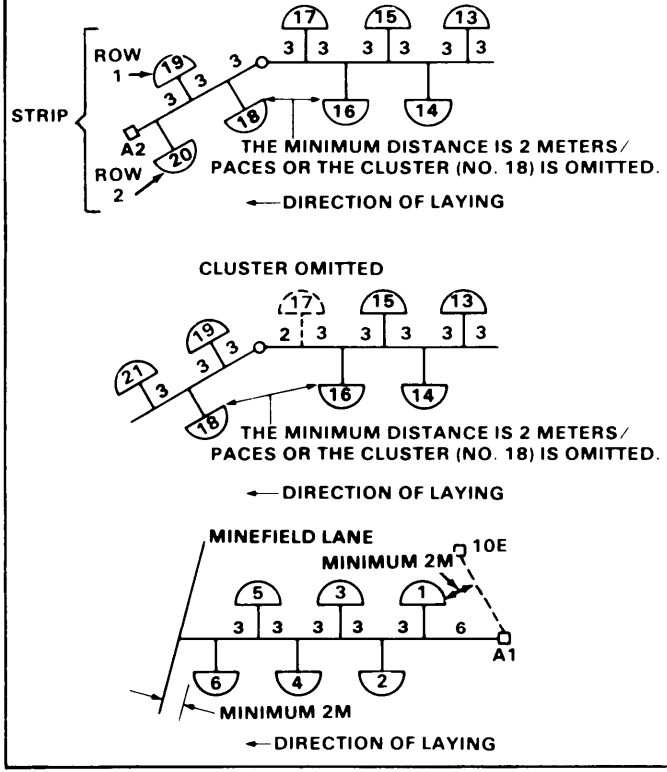
Figure 3-28. Mine cluster characteristics



NOTES:

1. Marking of end points with A1 and A2, for example, will indicate laying direction of a minefield.
2. Laying will always begin at point No. 1.
3. Odd numbers on enemy side of the strip.
4. Strip start and end points, and turning points will be marked with a 2" x 2" wooden stake.
5. Distance between strip centerlines is 15 meters minimum.
6. Marking end point stakes should be driven flush with the ground and a nail driven on its center to aid detection with mine detector.

Figure 3-29. Irregular outer edge characteristics



The last cluster before and the first cluster after the turning point will have a distance of 3 meters/paces from the turning point and are laid on opposite sides of the strip centerline.

An omitted cluster is numbered when it is necessary to maintain the normal numbering sequence and omitted clusters so numbered must be noted in the "Notes" section of the minefield record (DA Form 1355).

If the distance is less than 3 meters/paces between the last possible cluster and the turning point, the cluster will not be omitted.

The first cluster after the turning point will be laid on the opposite side of strip centerline from the last laid cluster and 3 meters/paces from the turning point.

First cluster of strip will not be closer than 2 meters to the line joining the end points of mine strips.

Figure 3-30. Minefield row and strip characteristics

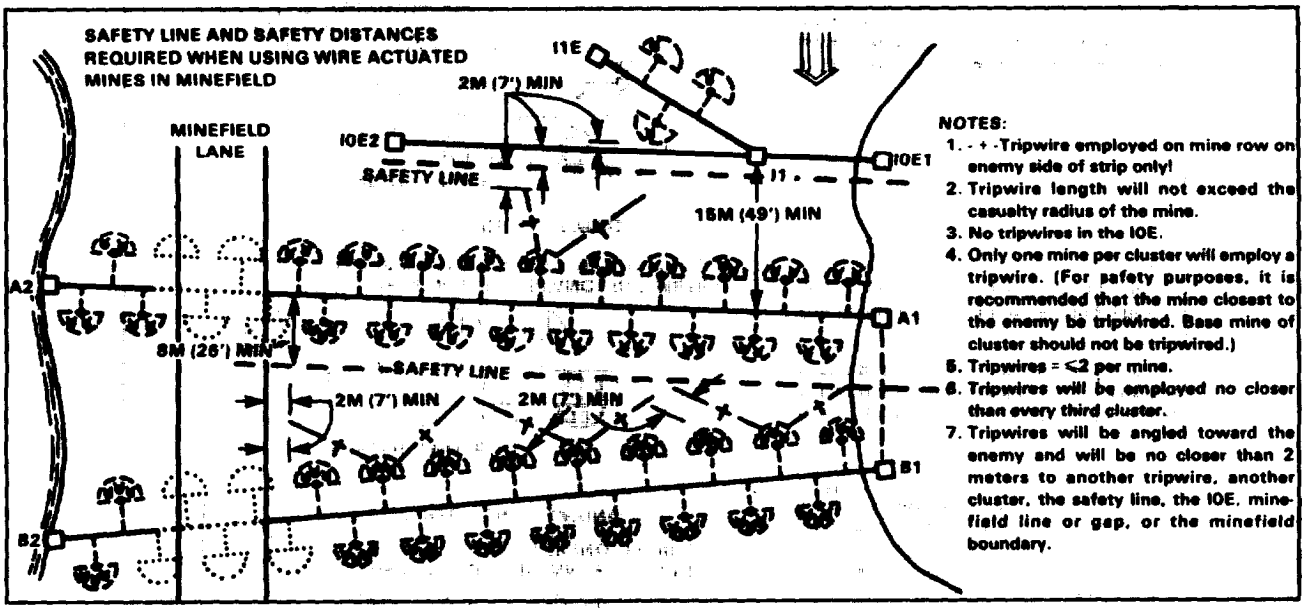


Figure 3-31. Tripwire employment

Organization.

Table 3-11. Platoon organization for standard pattern minefield

PERSONNEL	OFFICER	NCO	EM	EQUIPMENT
Supervisory personnel	1	1		Officer: Map, lensatic compass, notebook, and minefield record forms. NCO: Map, notebook, and lensatic compass.
Siting party		1	3	Stakes or pickets, sledgehammers, tracing tape on reels, and nails to peg tape.
Marking party		1	2	Barbed wire on reels, marking signs, lane signs, wire cutters, gloves, sledgehammers, and pickets.
Recording party		1	2	Sketching equipment, lensatic compass, minefield record forms, maps, and metric tape.
First laying party		1	6 to 8	Notebook for squad leader, picks, shovels, and sandbags.
Second laying party		1	6 to 8	Same as first laying party.
Third laying party		1	6 to 8	Same as first laying party.
Total	1	7	25 to 31	

NOTE: Organization may vary depending on terrain, soldiers, and materials available and the proximity of the enemy.

Logistical requirements. See Table 3-12 for barbed wire and picket requirements and Table 3-13 for truck capacity for carrying mines.

STANDARD OBSTACLE MFJ (CONVENTIONAL MINES)

Density	.5 - .5 - .0 mines per meter of front				
Type	J1	J2	J3	J4	J5
Length (meters)	100	200	300	400	500
Numer of mines					
AT	69	136	203	270	337
APF	69	136	203	270	337
Man-hours (experienced)	32	62	92	122	152
Man-hours (inexperienced)	48	93	138	183	228

STANDARD OBSTACLE MFK (CONVENTIONAL MINES)

Density	1 - 1 - 1 mines per meter of front				
Type	K1	K2	K3	K4	K5
Length (meters)	100	200	300	400	500
Numer of mines					
AT	124	246	368	490	612
APF	124	246	368	490	612
APB	124	246	368	490	612
Man-hours (experienced)	66	130	194	258	322
Man-hours (inexperienced)	99	195	291	387	483

NOTES: For MFJ and MFK standard obstacle minefields
1. Minefield is laid in a standard pattern with an irregular outer edge.
2. Minefield depth is 100 meters.

Table 3-12. Barbed wire and picket requirements for standard pattern minefields

FRONT	BARBED WIRE METERS [1]	PICKETS [3]	SIGNS [4]
100	1.568	53	16 79
200	2.128	71	22 107
300	2.688	90	27 134
400	3.248	109	33 162
500	3.808	127	39 191

NOTES: 1. Quantities are based on 100 meters of depth.
3. Based on 15-meter spacing.
4. Based on a 10- to 50-meter spacing.

Table 3-13. Truck capacity for carrying mines

VEHICLE	M15	M19	M21	M24	M14	M16A1/A2	M18A1
2½-ton cargo	102	69	55	90	113	111	94
5-ton dump	204	138	111	150	216	222	188
5-ton cargo	204	138	111	180	227	223	150
1½-ton trailer	61	41	33	50	68	66	54
Mines per case	1	4	4	2	90	4 (each type)	6

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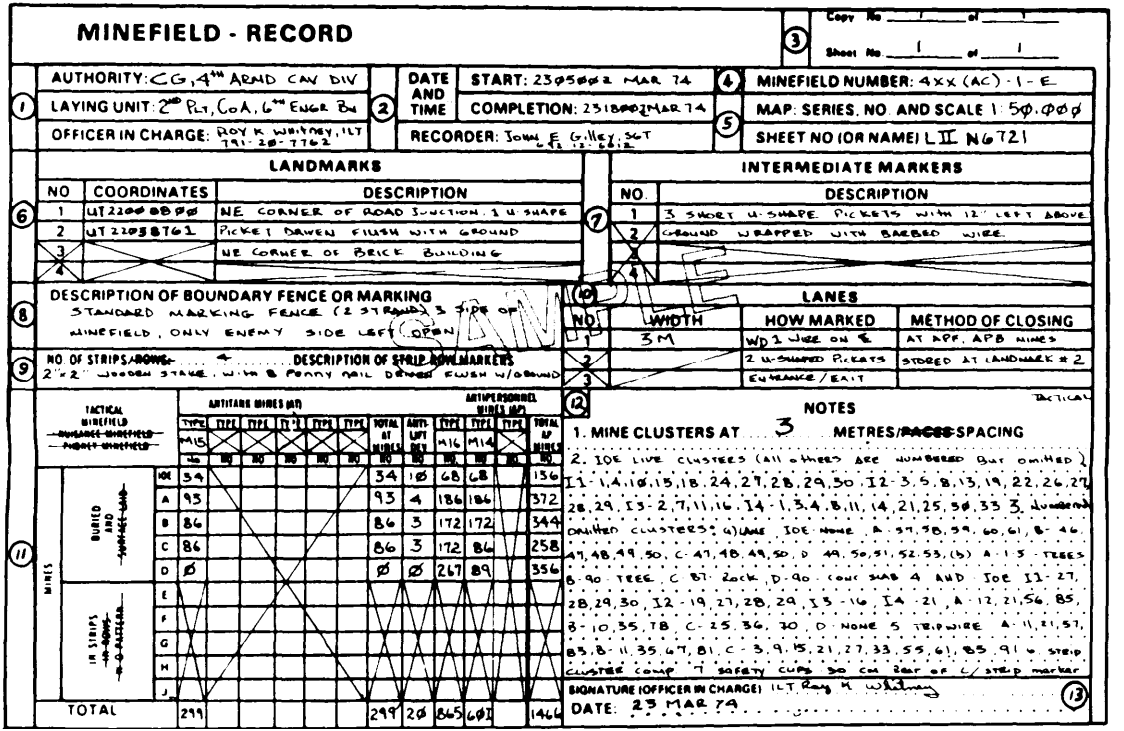
Recording The Department of the Army (DA) Form 1355 is used to record all conventional minefields except hasty protective minefields (Figures 3-32 through 3-37).



MINEFIELD - RECORD

Copy No 1 of 1 (3)
Sheet No 1 of 1

(1) AUTHORITY: CG, 4TH ARMD CAV DIV
LAYING UNIT: 2ND PLT, CO A, 6TH ENGR BN
OFFICER IN CHARGE: ROY K WHITNEY, 1LT 791-28-7762

(2) DATE AND TIME — START: 2305ØØZ MAR 74
COMPLETION: 2318ØØZ MAR 74
RECORDER: JOHN E GILLEY, SGT 612-60-12

(4) MINEFIELD NUMBER: 4XX (AC) - 1 - E

(5) MAP: SERIES, NO. AND SCALE 1:50,ØØØ
SHEET NO (OR NAME) LII N6721

LANDMARKS

NO	COORDINATES	DESCRIPTION
(6) 1	UT 2200 88 ØØ	NE CORNER OF ROAD JUNCTION. 1 U SHAPE
2	UT 2205 8761	PICKET BURIED FLUSH WITH GROUND
3		NE CORNER OF BRICK BUILDING
4		

INTERMEDIATE MARKERS

NO.	DESCRIPTION
(7) 1	3 SHORT U-SHAPE PICKETS WITH 12" LEFT ABOVE
2	GROUND WRAPPED WITH BARBED WIRE
3	
4	

(8) DESCRIPTION OF BOUNDARY FENCE OR MARKING
STANDARD MARKING FENCE (2 STRAND) 3 SIDES OF MINEFIELD, ONLY ENEMY SIDE LEFT OPEN

(9) NO OF STRIPS/ROWS 4 DESCRIPTION OF STRIP/ROW MARKERS
2"x2" WOODEN STAKE, WITH 8 PENNY NAIL DRIVEN FLUSH W/GROUND

(10) **LANES**

NO	WIDTH	HOW MARKED	METHOD OF CLOSING
1	3M	WD 1 WIRE ON E	AT APP, APB MINES
2		2 U-SHAPED PICKETS	STORED AT LANDMARK # 2
3		ENTRANCE / EXIT	

(11) TACTICAL MINEFIELD — ~~OUTLOOK MINEFIELD~~ ~~FIGHT MINEFIELD~~

MINES			ANTITANK MINES (AT) TYPE M15	TYPE	TYPE	TYPE	TYPE	TYPE	TOTAL AT MINES	ANTI-LIFT DEV M16	ANTIPERSONNEL MINES (AP) TYPE M16	TYPE M14	TYPE	TOTAL AP MINES
			NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
BURIED AND SURFACE LAID		XX	34						34	10	68	68		136
		A	93						93	4	186	186		372
		B	86						86	3	172	172		344
		C	86						86	3	172	86		258
		D	Ø						Ø	Ø	267	89		356
IN STRIPS ~~IN ROWS~~ ~~W/O PACKAGE~~		E												
		F												
		G												
		H												
		J												
TOTAL			299						299	20	865	601		1466

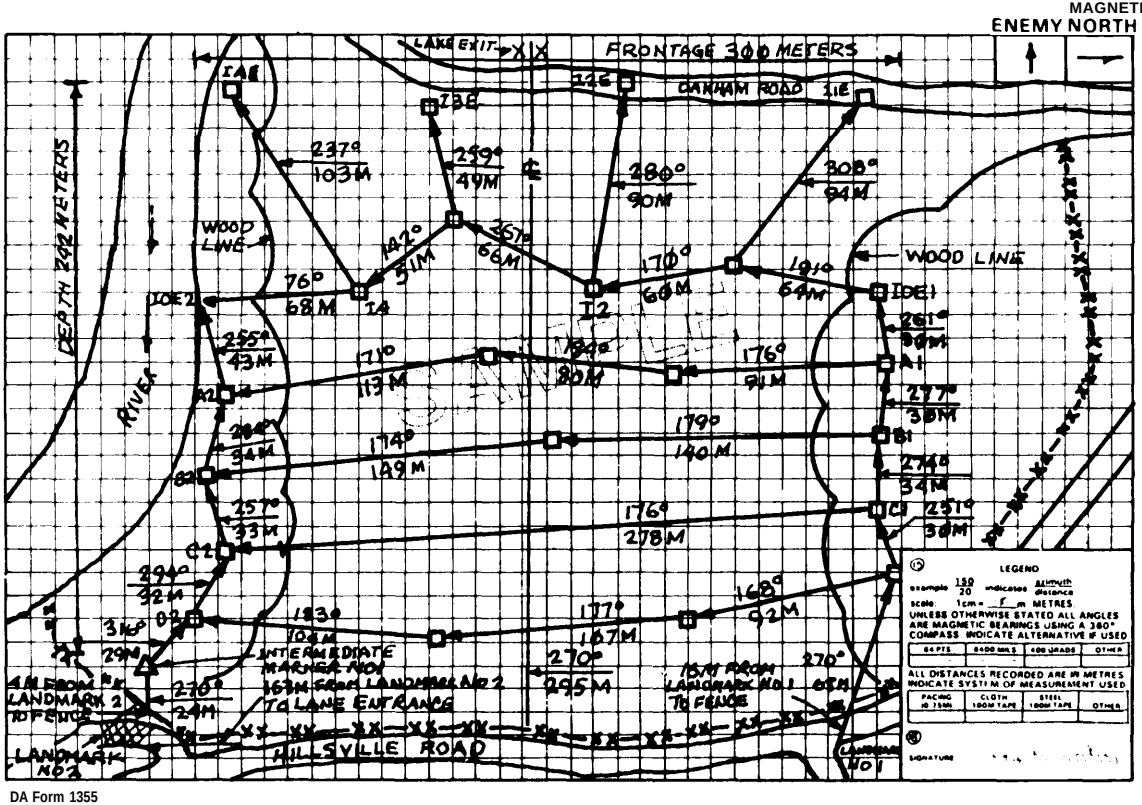
(12) **NOTES**

1. MINE CLUSTERS AT 3 METRES/~~PACES~~ SPACING
2. IOE LIVE CLUSTERS (ALL OTHERS ARE NUMBERED BUT OMITTED)
11 - 1, 4, 10, 15, 18, 24, 27, 28, 29, 50. 12 - 3, 5, 8, 13, 19, 22, 26, 27, 28, 29, 13 - 2, 7, 11, 16, 14 - 1, 3, 4, 8, 11, 14, 21, 25, 50, 33
3. NUMBERED CLUSTERS: (A) LANE IOE - NONE. A - 37, 38, 39, 60, 61, B - 46, 47, 48, 49, 50, C - 47, 48, 49, 50, D - 49, 50, 51, 52, 53, (B) A - 13 - TREES B - 90 TREE, C - BY ROCK, D - 90 COMP SWB & AND IOE 11 - 27, 28, 29, 30, 12 - 19, 27, 28, 29, 13 - 16, 14 - 21, A - 12, 21, 56, 85, B - 10, 35, 78, C - 25, 36, 70, D - NONE 5 TRIPWIRE A - 11, 21, 57, 83, B - 11, 35, 67, 81, C - 3, 9, 15, 21, 27, 33, 55, 61, 85, 91 & STRIP CLUSTER COMP - 7 SAFETY CUPS 30 CM REAR OF C/STRIP MARKER

SIGNATURE (OFFICER IN CHARGE) 1LT Roy K Whitney (13)
DATE: 25 MAR 74

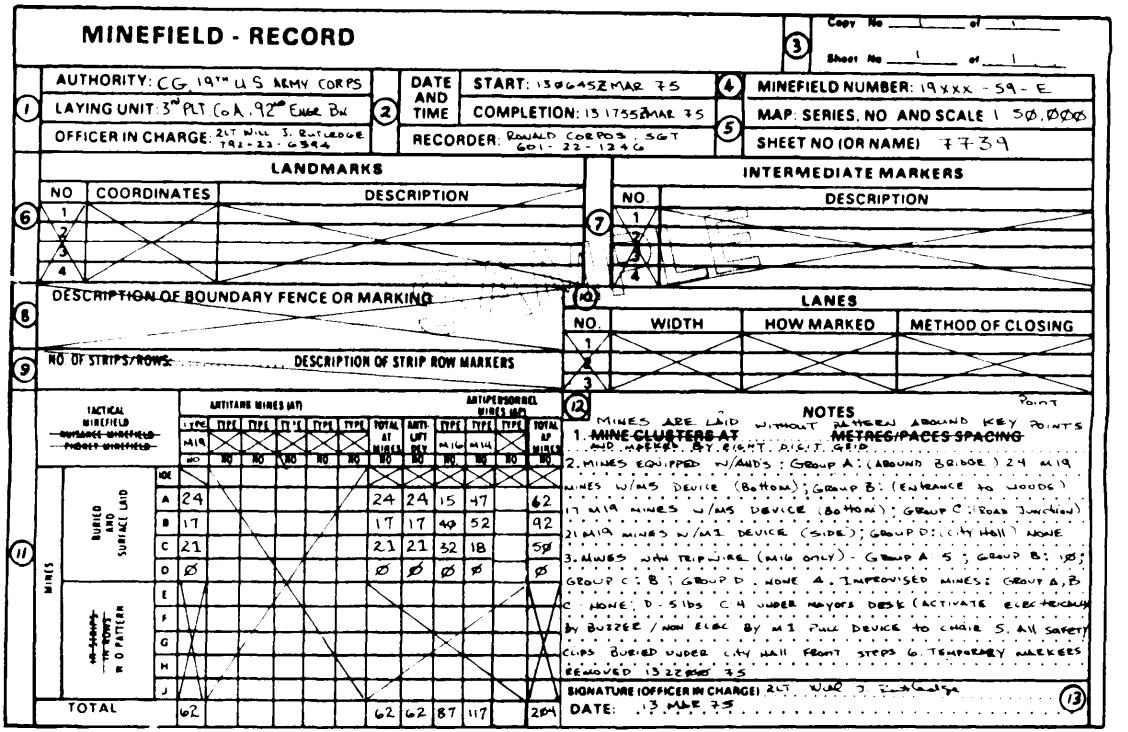
DA Form 1355

Figure 3-32. Standard detailed minefield record (DA Form 1355) (front)



DA Form 1355

Figure 3-33. Standard detailed minefield record (DA Form 1355) (back)



MINEFIELD - RECORD

Copy No 1 of 1
Sheet No 1 of 1

1 AUTHORITY: CG, 19TH U S ARMY CORPS
LAYING UNIT: 3RD PLT Co A, 92ND ENGR Bn
OFFICER IN CHARGE: 2LT WILL S. RUTLEDGE 792-22-6394

2 DATE AND TIME
START: 1300 45ZMAR 75
COMPLETION: 1317 55ZMAR 75
RECORDER: RONALD COFFOS, SGT 601-22-1246

4 MINEFIELD NUMBER: 19XXX - 59 - E
5 MAP: SERIES, NO AND SCALE 1 50,000
SHEET NO (OR NAME) 7739

6 LANDMARKS

NO	COORDINATES	DESCRIPTION
1		
2		
3		
4		

7 INTERMEDIATE MARKERS

NO	DESCRIPTION
1	
2	
3	
4	

8 DESCRIPTION OF BOUNDARY FENCE OR MARKING

9 NO OF STRIPS/ROWS: DESCRIPTION OF STRIP ROW MARKERS

10 LANES

NO	WIDTH	HOW MARKED	METHOD OF CLOSING
1			
2			
3			

11 MINES

TACTICAL MINEFIELD ~~SURFACE EMPLACED~~ ~~PROJECT EMPLACED~~

ARTITARE MINES (AT)

	TYPE M19 NO	TYPE NO	TYPE NO	TYPE NO	TYPE NO	TYPE NO	TOTAL AT MINES NO	ANTI-LIFT ONLY NO
XX								
A	24						24	24
B	17						17	17
C	21						21	21
D	Ø						Ø	Ø
E								
F								
G								
H								
J								
TOTAL	62						62	62

ANTIPERSONNEL MINES (AP)

	TYPE M16 NO	TYPE M14 NO	TYPE NO	TOTAL AP MINES NO
XX				
A	15	47		62
B	40	52		92
C	32	18		50
D	Ø	Ø		Ø
E				
F				
G				
H				
J				
TOTAL	87	117		204

BURIED AND SURFACE LAID

~~AS SHOWN IN SKETCH~~ IN NO PATTERN

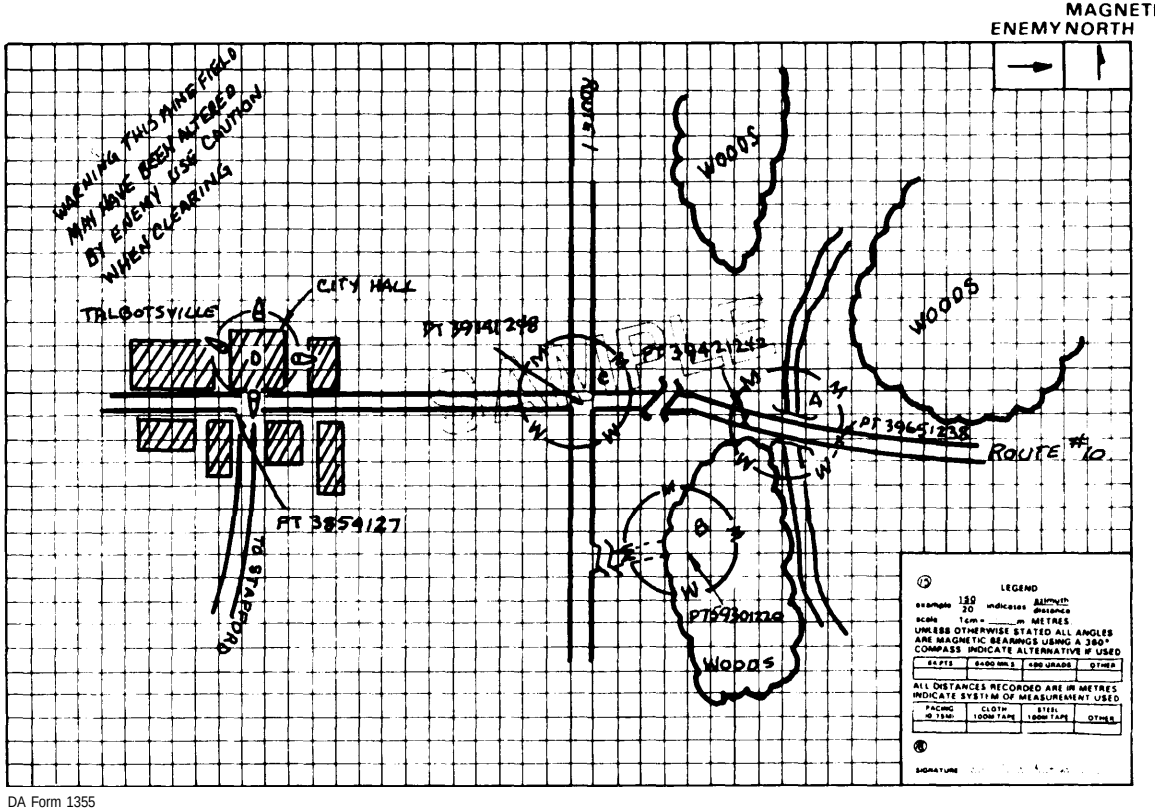
12 NOTES

1. MINES ARE LAID WITHOUT PATTERN AROUND KEY POINTS ~~MINE CLUSTERS AT~~ AND MARKED BY EIGHT DIGIT GRID ~~METREG/PACES SPACING~~
2. MINES EQUIPPED W/AMDS: GROUP A: (AROUND BRIDGE) 24 M19 MINES W/MS DEVICE (BOTTOM); GROUP B: (ENTRANCE TO WOODS) 17 M19 MINES W/MS DEVICE (BOTTOM); GROUP C: (ROAD JUNCTION) 21 M19 MINES W/M1 DEVICE (SIDE); GROUP D: (CITY HALL) NONE
3. MINES WITH TRIPWIRE (M16 ONLY) GROUP A 5; GROUP B: 10; GROUP C: 8; GROUP D: NONE 4. IMPROVISED MINES: GROUP A, B, C NONE; D - 5 lbs C4 UNDER MAYORS DESK (ACTIVATE ELECTRICALLY BY BUZZER / NON ELEC BY M1 PULL DEVICE TO CHAIR 5. ALL SAFETY CLIPS BURIED UNDER CITY HALL FRONT STEPS 6. TEMPORARY MARKERS REMOVED 1322ZMAR 75

13 SIGNATURE (OFFICER IN CHARGE) 2LT WILL S. RUTLEDGE
DATE: 13 MAR 75

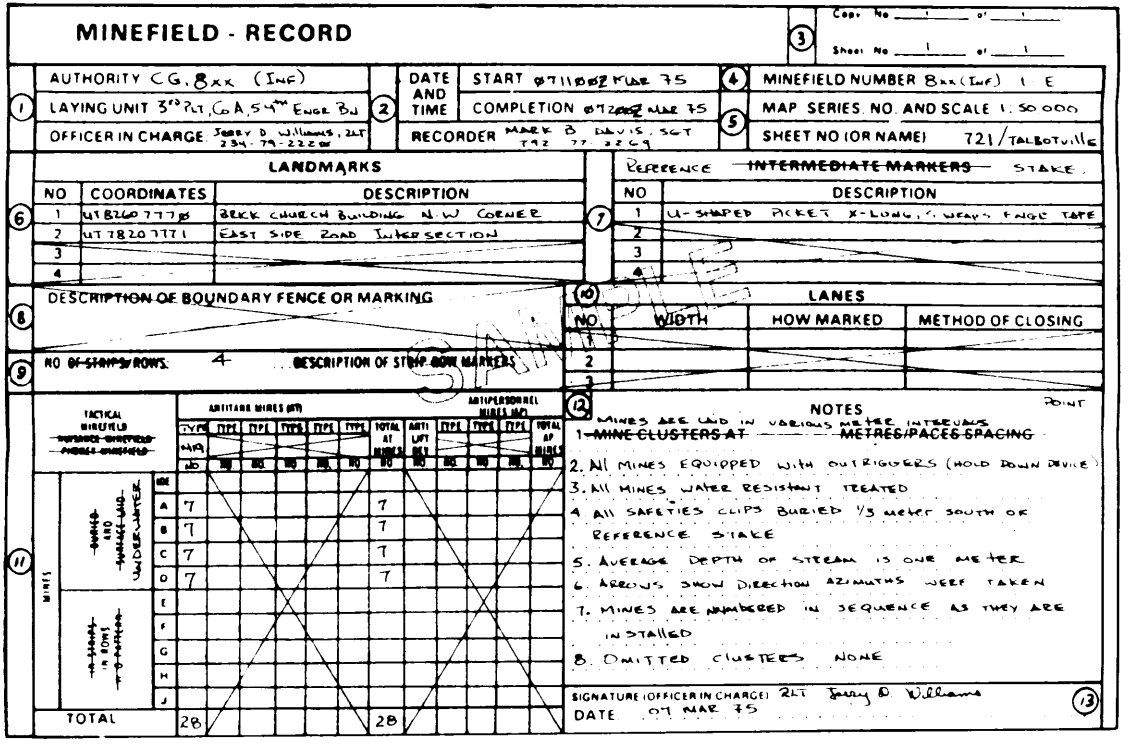
DA Form 1355

Figure 3-34. Record of point minefield with minimum information (DA Form 1355) (front)



DA Form 1355

Figure 3-35. Record of point minefield with minimum information (DA Form 1355) (back)



MINEFIELD - RECORD

Copy No 1 of 1
Sheet No 1 of 1

1 AUTHORITY CG, 8XX (INF)
LAYING UNIT 3RD PLT, CO A, 54TH ENGR BN
OFFICER IN CHARGE JERRY D WILLIAMS, 2LT 234-79-2226

2 DATE AND TIME
START 0711 0Z MAR 75
COMPLETION 0712 0Z MAR 75
RECORDER MARK B DAVIS, SGT 792-77-2269

3

4 MINEFIELD NUMBER 8XX (INF) 1 E
5 MAP SERIES NO. AND SCALE 1:50 000
SHEET NO (OR NAME) 721/TALBOTVILLE

LANDMARKS

NO	COORDINATES	DESCRIPTION
6 1	UT 8260 7770	BRICK CHURCH BUILDING N.W. CORNER
2	UT 8270 7771	EAST SIDE ROAD INTERSECTION
3		
4		

REFERENCE ~~INTERMEDIATE MARKERS~~ STAKE

NO	DESCRIPTION
7 1	U-SHAPED PICKET X-LONG, ½ WEAVE ENGR TAPE
2	
3	
4	

8 DESCRIPTION OF BOUNDARY FENCE OR MARKING

9 NO OF STRIPS OR ROWS 4 DESCRIPTION OF STRIP OR ROW MARKERS

10 LANES

NO	WIDTH	HOW MARKED	METHOD OF CLOSING
1			
2			
3			

11 TACTICAL MINEFIELD ~~DISTANCE-SHEETFIELD PATTERN MINEFIELD~~

MINES

	TYPE	ANTITANK MINES (AT)					TOTAL AT MINES	ANTI LIFT DEVICE	ANTIPERSONNEL MINES (AP)				TOTAL AP MINES
	M/N												
	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
PLACED AND MARKED UNDERWATER	A	7					7						
	B	7					7						
	C	7					7						
	D	7					7						
PLACED IN ROWS OR PATTERN	E												
	F												
	G												
	H												
	J												
TOTAL		28					28						

12 NOTES

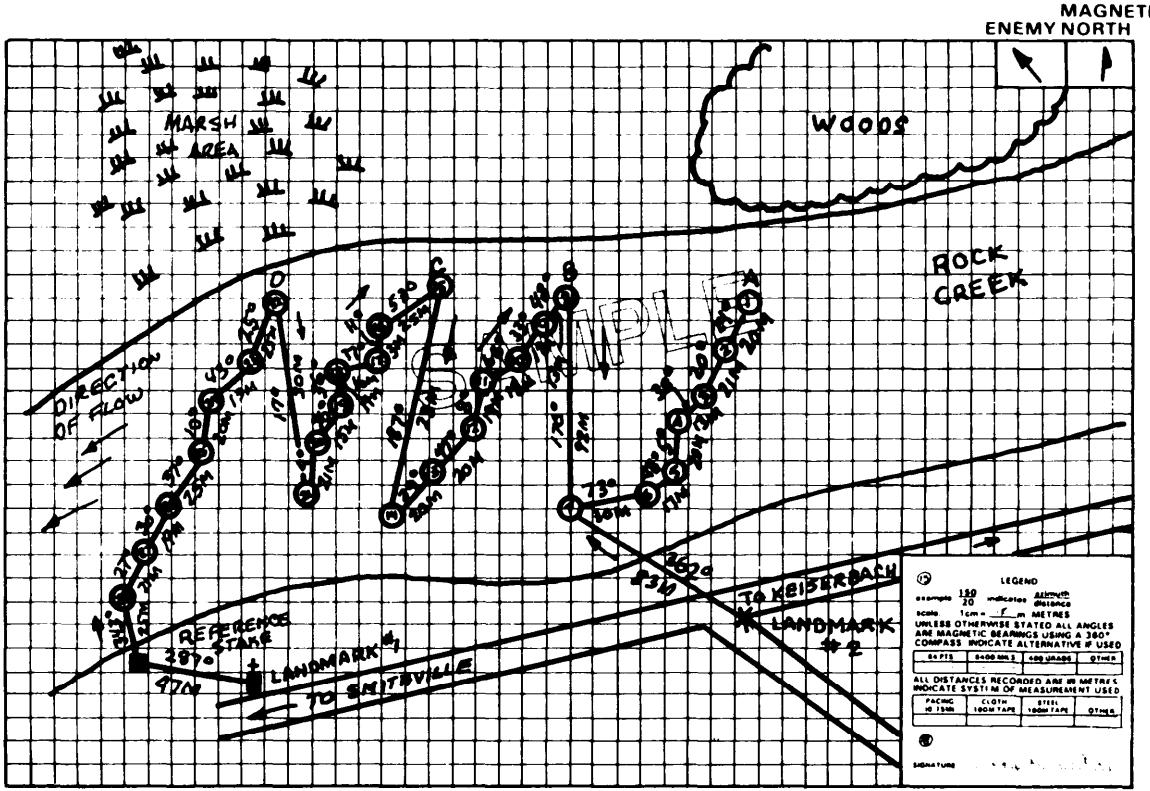
1. ~~MINE CLUSTERS AT~~ MINES ARE LAID IN VARIOUS METRE INTERVALS ~~METRES/PACES SPACING~~
2. ALL MINES EQUIPPED WITH OUTRIGGERS (HOLD DOWN DEVICE)
3. ALL MINES WATER RESISTANT TREATED
4. ALL SAFETIES CLIPS BURIED ⅓ METER SOUTH OF REFERENCE STAKE
5. AVERAGE DEPTH OF STREAM IS ONE METER
6. ARROWS SHOW DIRECTION AZIMUTHS WERE TAKEN
7. MINES ARE NUMBERED IN SEQUENCE AS THEY ARE INSTALLED
8. OMITTED CLUSTERS NONE

SIGNATURE (OFFICER IN CHARGE) 2LT Jerry D Williams
DATE 07 MAR 75

13

DA Form 1355

Figure 3-36. Record of mines emplaced in ford deeper than 0.6 meter (front)



DA Form 1355

Figure 3-37 Record of mines emplaced in ford deeper than 0.6 meter (back)

Minefield markings

Marking sets. The hand emplaced minefield marking set (HEMMS) is capable of marking 700 to 1,000 meters and is normally used for temporary marking The US No. 2 minefield marking set is capable of marking 400 meters per set and is used to replace HEMMS if the minefield is to be left in place for more than 15 days.

Marking procedures. Minefields are normally marked to prevent friendly personnel from accidentally entering the minefield. Figures 3-38 through 3-40 represent typical markings and marked minefield perimeters and lanes. Scatterable minefields will be marked to the maximum extent possible to protect friendly troops. The same marking procedures for conventional minefield will be used. Marking requirements are shown in Table 3-15 (page 3-37)

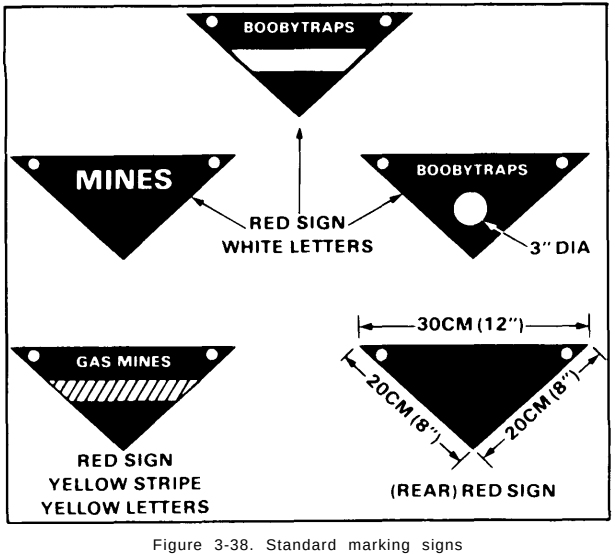


Figure 3-38. Standard marking signs

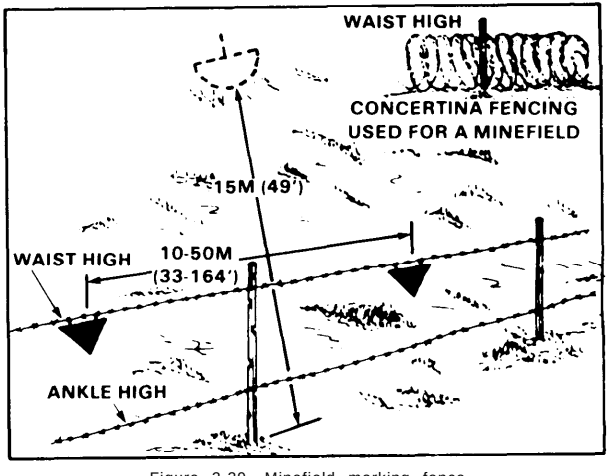


Figure 3-39. Minefield marking fence

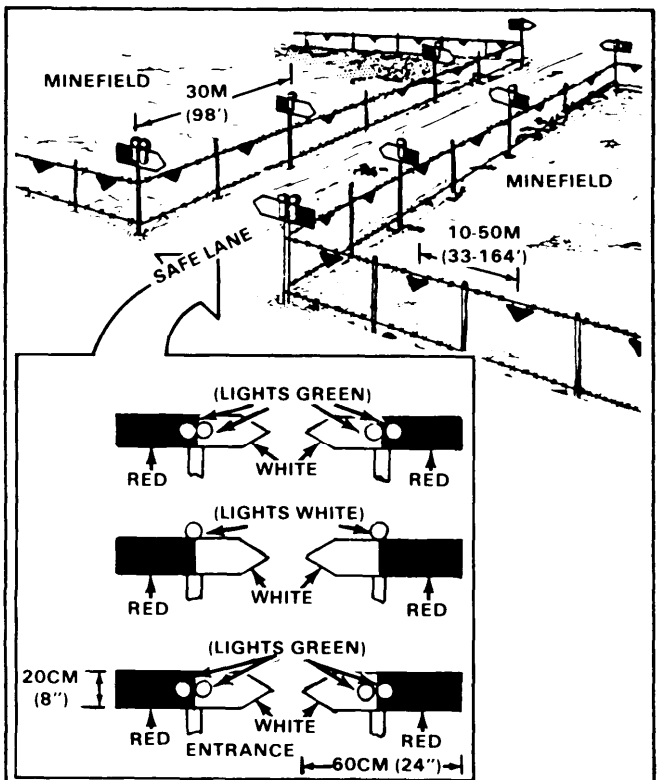


Figure 3-40. Standard lane markings

Scatterable Minefields

Standard scatterable minefield

STANDARD OBSTACLE MFG (GEMSS SCATTERABLE MINES)

ANTITANK MFGT ANTIPERSONNEL MFGP MIXED MFGM Width 60 meters Lenqth (meters) (If every mine of a maximurn 800 mine load IS dispensed.) NOTE: Length of minefield may be doubled when a width of 30 meters is used.	13,333	2,666	1,904	1,333	533
Density (mines/M^2)	.001	005	.007	.01	.025
Effort (squad hours)	2.24	.45	32	.22	.09

STANDARD OBSTACLE MFH (M56 SCATTERABLE MINES)

Width 20 meters		
Length (meters)	1,600	800
Area density (mines/M^2)	.005	.01
Linear density (mines/M)	. 1	. 2
Time	1 to 3 minutes	

STANDARD OBSTACLE MFAF (GATOR SCATTERABLE MINES)

1 Area of minefield is dependent upon the speed and altitude of the aircraft Normal size is 650 x 200 meters.
2 Density is dependent upon the number of canisters that are dropped As the system is used primarily for interdiction minefields, somewhat lower than normal densities (0.001 mines/M^2) are normally planned.
3 Each canister (bomblet)contains 72AT and 22 AP mines Up to six canisters may be mounted on each aircraft.

STANDARD OBSTACLE MFM (MOPMS SCATTERABLE MINES)

Area	Number of Mines	Density (Mines/M^2
Semicircle, 35-meter radius	21	.01

STANDARD OBSTACLE MFA (ADAM RAAMS SCATTERABLE MINES)

Aiming points

Table 3-14 Estimated aiming points

	DESIRED MINEFIELD WIDTH (METERS)									
DELIVERY TECHNIQUE	100	200	300	400	500	600	700	800	900	1,000
RAAMS Low Angle Met + VE Observer adj	3 2	4 3	4 3	5 4	5 4	6 5	6 5	7 6	7 6	8 7
RAAMS High Angle Met + VE Observer adj	2 1	2 1	2 1	3 2	3 2	3 2	3 2	4 3	4 3	4 3
ADAM Low/High Angle Met + VE Observer adj	2 1	2 1	2 1	3 2	3 2	3 2	3 2	4 3	4 3	4 3

NOTES: 1. Chart based on 12,000-meter range
2. Depth RAAMS 400 meters (high angle)
RAAMS 200 meters (low angle)
ADAM 400 meters (high/low angle)
3. BMA - less than or equal to 800 Mil
See FM 6-20 for exact aiming point requirements.

MFAT
RAAMS (high angle)
400 x 400 merers coverage

Purpose	Area Density	Number of Rounds Per Aim Point
Harass enemy	.001	24
Covered by heavy, direct fire	.002	48
Covered by light, direct fire	.004	96

MFAT
RAAMS (low angle)
200 x 200 meters coverage

Purpose	Area Density	Number of Rounds Per Aim Point
Harass enemy	.001	6
Covered by heavy, direct fire	.002	12
Covered by light, direct fire	.004	24

MFAP
ADAM
400 x 400 meters coverage

Purpose	Area Density	Number of Rounds Per Aim Point
Harass enemy	.0005	3
Covered by heavy, direct fire	.001	6
Covered by light, direct fire	.002	12

Recording

LINE #	INFORMATION REQUIRED	DATA - INST ON BACK (EXAMPLE)
1	APPROVING AUTHORITY	2BDE3AD
2	TGT/OBSTACLE #	NA
3	TYPE EMPLACING SYSTEM	GEMSS
4	TYPE MINES	AT/AP
5	SELF-DESTRUCT PERIOD	101630Z-102130ZOCT82
6	AIM PT/CORNER PTS OF MINEFIELD [1]	MB 17955490
7		MB 18604860
8		MB 18504890
9		MB 18054895
10		MB 17804850
15	SIZE SAFETY ZONE FROM AIM PT [2]	NA
16	UNIT EMPLACING MINES/ RPT#	BC023ENGR/4
17	PERSON COMPLETING RPT	1LT JENNINGS
18	DTG OF REPORT	051400ZOCT82
19	REMARKS	MINEFIELD AROUND TANK DITCH

NOTES:
1. If the system used to emplace the minefield uses a single aim point to deliver the mines, enter that aim point MB 10102935. If the system has distinct corner points such as GEMSS, enter those corner points MB 17954790, MB 18604860, MB 18504890, MB 18054895, MB 17804850.
2. If an aim point is given in Line 6, enter the size safety zone from that aim point. Example: Artillery emplaces a minefield from aim point MB 10102935 and the safety zone is 1,000M x 1,000M, enter 500M so that personnel plotting or receiving the information can plot the coordinate and go 500M in each direction from the aim point and plot the safety zone.

Figure 3-41. Scatterable minefield report and record, with example

Marking

Table 3-15. Scatterable minefield marking requirements

MINEFIELD LOCATION		MARKING REQUIRED (NOTE)
ENEMY AREAS		NONE
Friendly areas	Forward of FEBA	Both sides and rear
	Rear of FEBA	All sides

NOTE: Ground emplaced mines - mark prior to laying
Air emplaced mines - not marked

Table 3-16. US antipersonnel mines

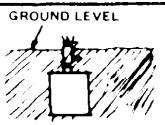
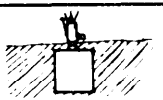
MINE	PACKING	ARMING PROCEDURES			DISARMING
M14 Blast Antipersonnel Mine  Wt ..... 3 1/3 oz Explosive ..... 1 oz TETRYL Fuze ..... integral (with Belleville Spring) Functioning 20 to 35 lb Penetrate Boot and Foot	Carton contains 90 mines 90 detonators 6 or 9 wrenches Dimensions (cm/in) Length 50/20 Width 44/17 Height 22/9 Total Wt 46 lb 21 Kg	 Unscrew shipping plug from bottom of mine. Turn pressure plate to ARMED position with arming tool.	 Remove safety clip and check for malfunctioning.	 Replace safety clip.	**TO DISARM**: Insert safety clip and remove detonator.
		 Screw detonator into detonator well.	 Bury mine and remove safety clip.	**CAUTION**: Repeated turning of arming dial may cause excessive wear. **TO BURY**: Pressure plate should be slightly above ground level.	
M16A1 Bounding Antipersonnel Mines  Wt ..... 8.25 lb Projectiles ..... steel Fuze ..... M605 (Combination) Functioning Pressure ..... 8 to 20 lb Pull ..... 3 to 10 lb Bounding Height ..... 6-1.2m Casualty Radius 30m	Wooden Box 4 mines per box 4 fuzes per box 1 arming wrench 4 tripwires Dimensions (cm/in) Length 41/16 Width 28/11 Height 22/9 Total Wt 45 lb 20 Kg	 Remove shipping plug and screw in fuze.	 GROUND LEVEL Pressure installation	 Tripwire installation	**TO DISARM**: Reverse arming procedure.
		 Attach tripwires—first to anchor, then to pull ring.	 Remove locking safety pin first. The interlocking pins should fall free. Then remove positive safety.	**M16A2** is similar to **M16A1/M16** but fuze well is not centered on mine.	

Table 3-16. US antipersonnel mines (continued)

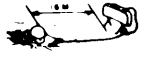
MINE	PACKING	ARMING PROCEDURES			DISARMING
M18A1 Fragmentation Antipersonnel Mine  Wt 3.5 lb Explosive 1.5 lb C4 Projectiles 700 (steel balls) Equipment One electric cap 30m firing wire per mine. One electric firing device per mine. One tester per 6 mines.	**Wooden Box** 6 mines with accessories. Dimensions (in) Length 20 Width 11.5 Height 9.75 Total Wt 33 lb	 **TEST CIRCUIT** Mate firing device, circuit tester, and blasting cap. Depress handle. Light should show in window. Separate test components.	**AIMING** In aiming the M18A1, when using the slit type peep sight, aim the mine at an individual's head when standing 45m from the mine. When using the knife edge sight, aim the mine at an individual's feet when standing 50m from the mine.	 Remove shipping plug, priming adapter, insert blasting cap and screw into either cap well.	**TO DISARM** Reverse arming procedure.
		 Unroll firing wire and connect directly to firing device with safety engaged.	 **FIRING POSITION** A minimum of 16 meters from rear of mine to fighting position. Friendly troops at side and rear should be under cover at a minimum of 100 meters.	TO FIRE Disengage safety bail and depress handle.	

Table 3-17. US antitank mines

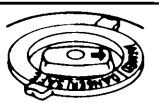
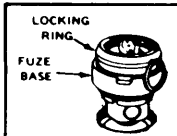
MINE	PACKING	ARMING PROCEDURES	DISARMING
M15 Heavy Antitank Mines  Wt ..... 30 lb Explosive ..... 22 lb Fuze ..... M603 Secondary fuze wells ..... 2 Functioning: 300 to 400 lb	Individual crate 1 mine with fuze 1 activator Dimensions. (in) Length: 18 Width: 15 3 Height: 7 5 Total Wt: 49 lb	 Remove plug and inspect fuze well.  Inspect fuze and remove safety.  Insert fuze.  Replace plug with dial in safe position.  Turn dial to ARMED. TO BURY: Put mine in hole with pressure plate at or slightly above ground level.	TO DISARM: Reverse arming procedure
M15 Antitank Mine used with M608 Fuze  Functioning ..... 200-350 lb for 250-450 milliseconds. Resistant to blast type countermeasures.	Same as above	 Remove plug and inspect fuze well. Ensure fuze is in SAFE position. Thread fuze into mine...HAND TIGHT. Hold fuze to prevent rotating, turn locking ring down until it locks against pressure plate.  Place mine in hole and remove pull pin from fuze.  Turn dial from SAFE to ARMED.	TO DISARM: Reverse procedure except DO NOT replace pull pin.

Table 3-17. US antitank mines (continued)

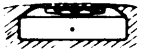
MINE	PACKING	ARMING PROCEDURES			DISARMING
M19 Plastic Heavy Antitank Mine  Wt 28 lb Explosive 21 lb Fuze M606 integral (with pressure plate) Secondary fuze wells 2 Functioning 350 to 500 lb	Wooden Box 2 mines 2 fuzes 1 arming wrench Dimensions (in) Length 16 8 Width 10 8 Height 16 Total Wt 71 8 lb	 Remove pressure plate fuze	 Remove shipping plug, check position of striker (offset). Remove safety fork, then turn dial to ARMED position. Check position of striker (center). Turn to SAFE and replace safety fork.	 Screw threaded detonator into detonator well	TO DISARM Reverse arming position
		 Place mine in hole, remove safety fork, and turn dial to ARMED	 Complete camouflage.	TO BURY Put mine in hole with pressure plate at or slightly above ground level	

Table 3-17. US antitank mines (continued)

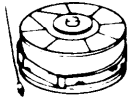
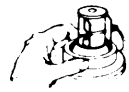
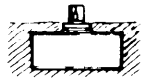
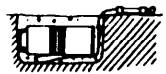
MINE	PACKING	ARMING PROCEDURES			DISARMING
M21 Metallic (Killer) Antitank Mine  Wt 18 lb Explosive 10.5 lb Fuze M607 Functioning 290 lb (Pressure or pressure ring or 20° deflection of tilt rod)	Wooden Box 4 mines 2 wrenches Dimensions (in) Length 22.2 Width 20.2 Height 16 Total Wt 90.8 lb	 Remove closing plug, insert M120 booster in bottom, and replace closing plug	 Remove closure assembly from fuze	 Remove shipping plug from mine and screw in fuze, then screw in tilt rod extension	TO DISARM: Reverse arming procedure
		 Bury mine	 Remove safety (pull ring assembly) and complete camouflage	For pressure type mine bury with fuze cap flush with ground surface. Tilt rod-mines should be seated firmly in snug-fitting hole. Most effective in tall brush or grass	
M23 and M1 1 Gallon Chemical Landmines   Wt 11 lb loaded, has a 1.2m length of detonating cord for burster charge. May be armed for electric or tripwire actuation.	Uncrated	WARNING: Soldiers preparing, laying, and removing chemical landmines must wear protective clothing.	When armed for pressure detonation, emplace in same manner as the M15 antitank mine.	 Bury mine 10cm and attach detonating cord to controlled firing system.	If armed for pressure, see warning and disarm as M15. If armed electrically or nonelectrically, disable firing circuit IAW appropriate procedure for specific system.
		Nonelectric Firing  Bury mine as above and attach nonelectric detonator to burster	Electric Firing  Attach burster charge (1.2m length of detonating cord) to side of mine.		

Table 3-17. US antitank mines (continued)

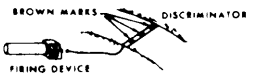
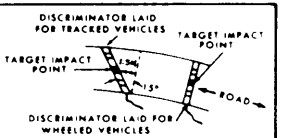
MINE	PACKING	ARMING PROCEDURES	DISARMING
M24 Off-Route Antitank Mine Dispenser Pouch  Accessories Pouch	Wooden Box 4 mines Dimensions (in) Length: 28 1 Width: 13 9 Height: 10 8 Total Wt: 55 lb	 Remove above items from accessories pouch. Insert batteries (issued separately) in firing device.  Attach discriminator wire to DETECTOR of firing device (toggle switch on SAFE). Stand on two brown marks on discriminator nearest firing device. If lamp lights, circuit is good, otherwise, discard system.  Disconnect discriminator wire from firing device. Remove launcher from dispenser pouch and place in position. Remove packing blocks, push rocket forward to safety band, and remove band. Depress ejection pin and push rocket back into launcher until contact ring is exposed at base. Grounding clip must be connected. Remove tagged shorting clip and push rocket back into launcher. Tape plastic covers over ends of launcher.  Unreel discriminator starting at far side of road (perpendicular to edge for wheeled vehicles; about 15° from perpendicular for tracked vehicles).  Position launcher on bipod assembly or mound of earth. Mount sighting assembly and sight along discriminator to target impact point about 1m above road (soldier's belt buckle.) To aim, move launcher, not sight. Fill poucher with dirt, lay over launcher, recheck sight, remove sight, reconnect discriminator wire to firing device (light out), connect rocket cable to firing device, and push toggle switch to ARM. The system is now armed and will fire when pressure is applied to the discriminator. See TM 9-1345-200.	Reverse arming procedures

Table 3-18. Firing devices and trip flare

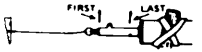
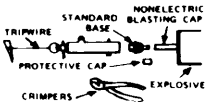
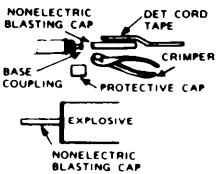
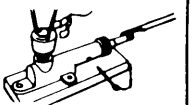
TYPE	ARMING PROCEDURES			DISARMING
M1 **Pull Firing Device**  Initiating action: 3 to 5 lb pull on tripwire.	 **TO ARM**: Remove locking safety pin first and position safety pin last.	 Remove protective cap from standard base and crimp on nonelectric blasting cap. Attach firing device assembly in charge. Attach anchored tripwire.	 The M1 pull firing device can be used as an antihandling device on the M15 or M19 AT mines. The arming procedures are the same as above. The device is employed in the side fuze well and a tripwire attached from the M1 to a stake secured underground near the mine.	 **TO DISARM**: Insert nail, wire, or original safety pin in postive safety pin hole first. Then insert similar pin in locking safety pin hole. Cut tripwire, and separate fire device and explosive. Unscrew standard base.
M1A1 **Pressure Firing Device**  Initiating pressure: 10 lb or more	 	Remove protective cap from base and crimp on nonelectric blasting cap. Assemble detonating cord, nonelectric blasting cap, and firing device.	 **TO ARM**: Remove safety clip. Then positive safety pin.	 **TO DISARM**: Insert wire, nail, or original pin in positive safety hole. Replace safety clip if available. Unscrew base assembly from firing device.
M3 Pull-Release **Firing Device**  	 **TO ARM**: With cord, remove small cotter pin from locking safety pin, and withdraw locking safety pin. If it does not remove easily, adjust winch winding. With cord, pull out positive safety pin.	 	Remove protective cap and crimp on a nonelectric blasting cap. Attach firing device assembly to anchored charge (must be firm enough to withstand pull of at least 6-10 lb. pull on tripwire). Put free end of anchored tripwire in hole in winch with knurled knob, draw up tripwire until locking safety is pulled into wide part of safety pin hole.	**TO DISARM**: The M3 is dangerous to disarm. It should be blown in place. **NOTE**: If the device must be disarmed, proceed as follows: Insert wire, nail, or original pin in positive safety pin hole first. Then insert wire, nail, or original locking pin in locking pin hole. Disassemble tripwire, firing device, and explosive.

Table 3-18. Firing devices and trip flare (continued)

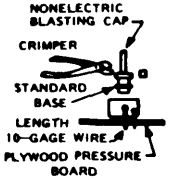
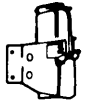
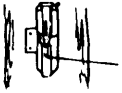
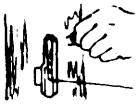
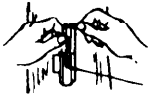
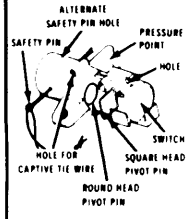
TYPE	ARMING PROCEDURES			DISARMING
M5 Pressure-Release Firing Device  Initiating action: Lifting 1.59cm or removing restraining weight (5 lb or more).	 	Insert 10-gage wire in interceptor hole, hold release plate down, and remove safety pin. Replace safety pin with length of No. 18 wire. Assemble cap, firing device, and mine.	 **TO ARM**: Remove thin wire (locking safety) and then heavy wire (positive safety) from interceptor hole. **FOLLOW ARMING PROCEDURES CAREFULLY.**	 **TO DISARM**: Insert heavy gage wire in interceptor hole. Bend wire to prevent dropping out. Proceed carefully, as the slightest disturbance of restraining weight may detonate mine. Disassemble firing device and mine.
M49A1 Trip Flare  Burning period .....55 to 70 sec Illumination radius..... 300m Initiated by taut or loose tripwire.	**WARNING**: Never look directly at burning flare. Note: For loose tripwire initiation, attach tripwire to eye of safety pin.  Attach flare to post or tree.	 Attach tripwire to anchor, then to trigger. Pull trigger to vertical position and secure.	 **TO ARM**: Remove safety clip.	 **TO DISARM**: Insert safety pin.  Check both ends of tripwire and cut near trigger.

Table 3-18. Firing devices and trip flare (continued)

<table>
<tr><th>TYPE</th><th>PACKING</th><th colspan="2">ARMING PROCEDURES</th><th>DISARMING</th></tr>
<tr>
<td>M142 Multipurpose Firing Device
 

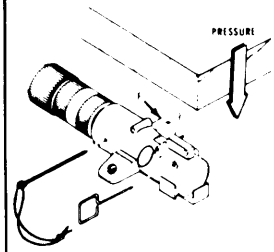
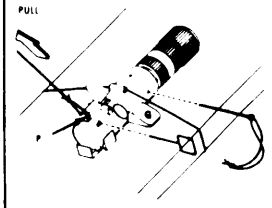
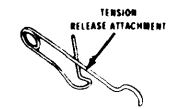
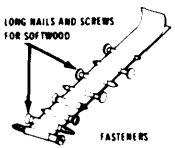
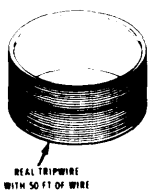
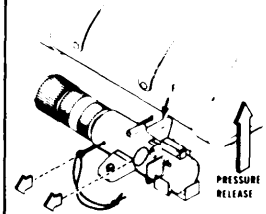
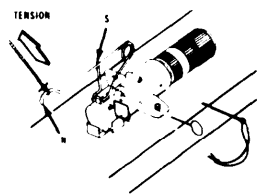
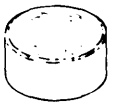
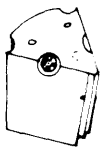

</td>
<td>Wooden Box
56 each
Dimensions (in)
Length 17 3
Width 11 78
Height 8 18
Total Wt 53 lb</td>
<td> 
</td>
<td>PRESSURE 25 lb or more to function
(1) Check safety pin for ease of removal and reinsert
(2) Secure switch in position with either nails screws or wire
(3) Screw in coupling base firing device F4
(4) Place a suitable pressure plate in position to rest on point F
Ensure plate is not heavy enough to activate the switch
(5) Remove pin with square head using wire if necessary
(6) Withdraw safety pin using wire if necessary
If safety pin resists movement do not withdraw recheck setting</td>
<td rowspan="2">STEPS
1 Determine mode of operation
2 Determine what fires the charge (blasting cap activator or time fuze)
3 Proceed based on following table
<table>
<tr><th>FIRER</th><th>MODE</th><th>STEPS</th></tr>
<tr><td>Blasting cap or Activator</td><td>Tension release</td><td>4</td></tr>
<tr><td>Blasting cap or Activator</td><td>Pressure, pull
Pressure release</td><td>6 thru 14</td></tr>
<tr><td>Time fuze</td><td>All mode</td><td>5 thru 14</td></tr>
</table>
4 Destroy in place or notify EOD
5 Cut time fuze
6 Insert nail, wire, or safety pin through positive safety hole
7 Insert round head pin (if not in place)
8 Insert square head pin (if not in place)
9 Ensure that positive safety pin, round head and square head pins are in place before continuing
10 If disarming on mine, place mine arming dial to SAFE
11 Cut tripwire or release pressure
12 Unscrew coupling base or standard base
13 Remove firer from charge
WARNING
DO NOT REMOVE BLASTING CAP FROM BASE
14 Restore mechanism to shipping configuration</td>
</tr>
<tr>
<td> 
</td>
<td>PULL 7 lb or more to function
(1) Check safety pin for ease of removal and reinsert
(2) Secure switch to a fixed object with nails, screws, or wire
(3) Screw in coupling base firing device F4
(4) Attach tripwire to hole P so that pull is in direction shown
(5) Remove pin with square head
(6) Withdraw safety pin from a safe distance using a wire if necessary
If safety pin resists movement do not withdraw recheck setting</td>
</tr>
</table>

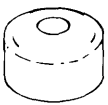
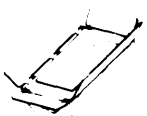
Table 3-18. Firing devices and trip flare (continued)

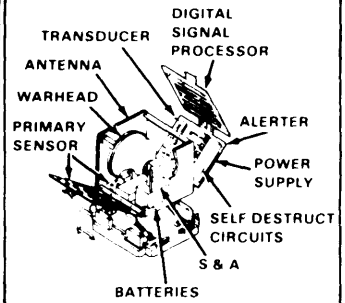
TYPE	PACKING	ARMING PROCEDURES		DISARMING
  			PRESSURE RELEASE - 2 lb or more to set but not more than 150 lb. (1) Check safety pin for ease of removal and reinsert. (2) Place switch in position and secure with either nails, screws, or wire. (3) Screw in coupling base firing device F4. (4) Place an object so that at least 2 lb force presses down on Point F. (5) Remove pin with round head using a wire if necessary. (6) Withdraw safety pin, using a wire if necessary. If safety pin resists movement, do not withdraw, recheck setting. **REMEMBER—REMOVE ROUND FOR RELEASE**	
			TENSION RELEASE (1) Check safety pin for ease of removal and reinsert. (2) Secure switch to a fixed object with nails, screws, or wire. (3) Screw in coupling base firing device F4. (4) Fit tension release device and loop end of wire over curved neck N. Adjust tension in tripwire until N lines up with set point S. Make sure pull is in the direction shown on the diagram. (5) Remove pin with round head. (6) Withdraw safety pin. If safety pin resists movement, do not withdraw, recheck setting. **REMEMBER—REMOVE ROUND FOR RELEASE**	

Scatterable Mine Characteristics

Table 3-19. Scatterable mine characteristics

ANTIPERSONNEL	SYSTEM	CASUALTY RADIUS	TYPE MINE	ACTUATION	SELF DESTRUCT OPTIONS
	GEMSS	10 15M	Blast	Tripwire (20 40)	2
	GATOR				3
	MOPMS				Adjustable
	VOLCANO				3
	FLIPPER				2
	ADAMS	6 10M	Bounding	Tripwire	2

ANTITANK	SYSTEM	TYPE KILL	ACTUATION	SELF DESTRUCT OPTIONS
	GEMSS/FLIPPER	K	Magnetic Influence	2
	GATOR			3
	MOPMS			Adjustable
	VOLCANO			3
	RAAMS			2
	M56	M	Pressure	1

ANTITANK	SYSTEM	TYPE KILL	ACTUATION	SELF DESTRUCT OPTIONS
	WASPM	K	Acoustical	Adjustable

NOTE: M Mobility Kill
K = Crew Kill

CAUTION

1. Antipersonnel tripwire may not deploy properly if mines land in mud or snow.
2. Mine antihandling devices may cause premature destruction of mines if placed on snow.
3. Mine self destruct times are classified CONFIDENTIAL and are available through unit.

EXPEDIENT MINES

Improvised mine construction must consider safety, neutralization, and disarming requirements. Authorization of employment depends on the minefield in which the mine is to be used (Table 3-7, page 3-17). Figures 3-42 through 3-49 (pages 3-49 through 3-54) provide design and function guidance for expedient mines. The actual construction may depend on material availability.

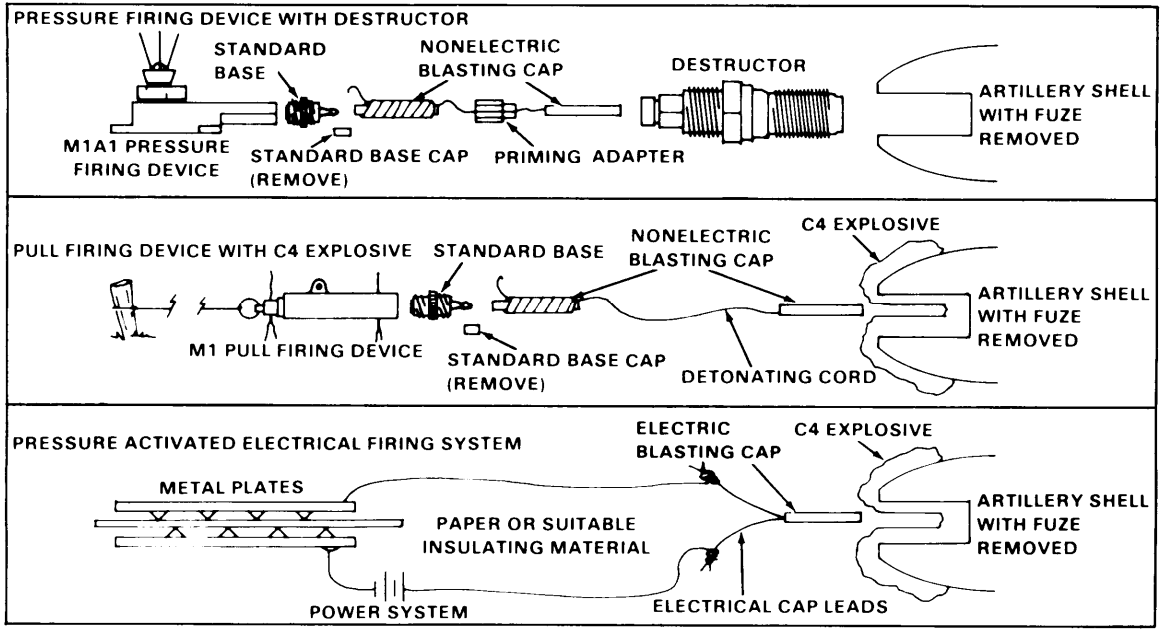


Figure 3-42 High explosive artillery shell AT mine with three different firing systems

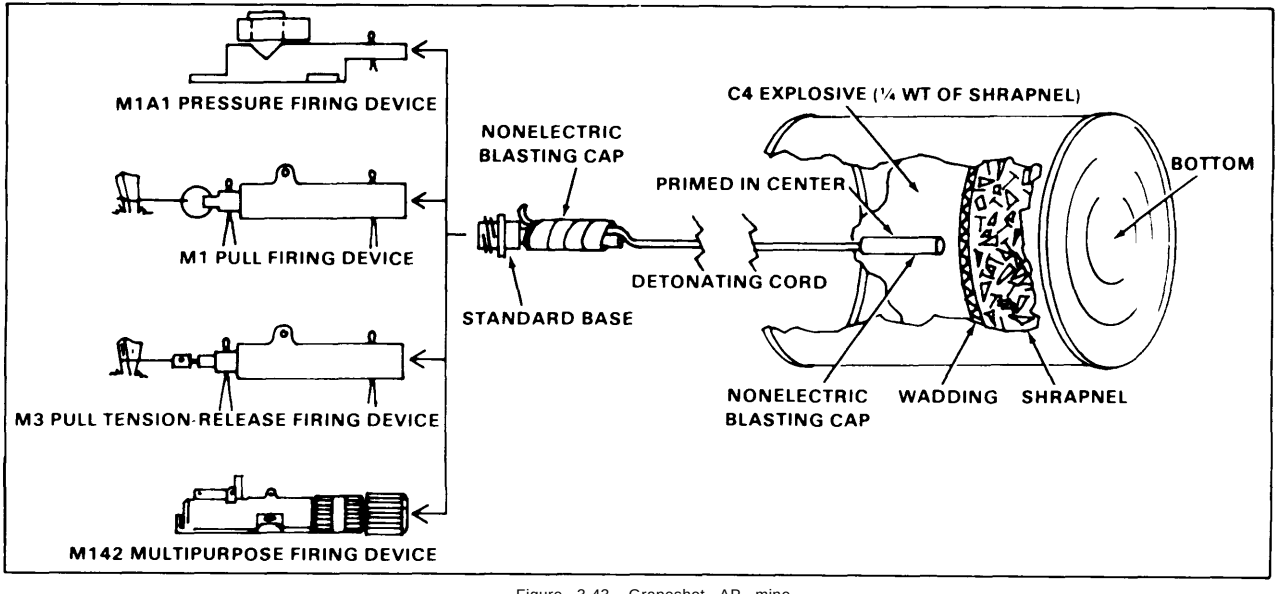


Figure 3-43. Grapeshot AP mine

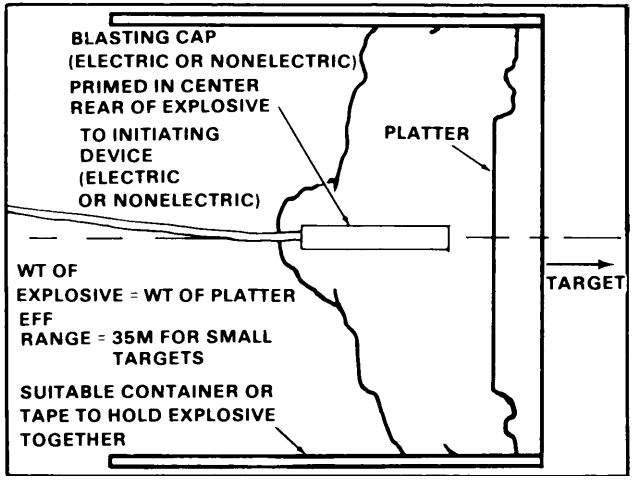


Figure 3-44. Plate charge expedient mine

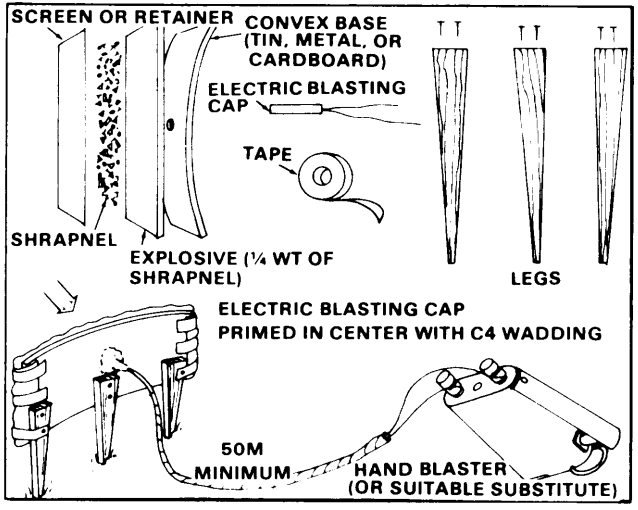


Figure 3-45. Improvised claymore mine

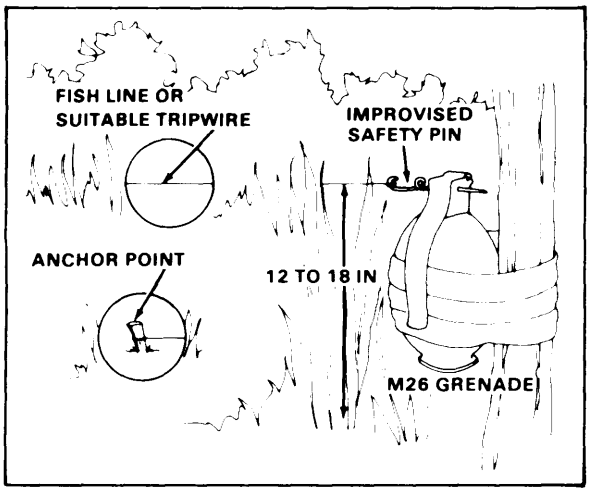


Figure 3-46. Fragmentation grenade mine (5 second delay)

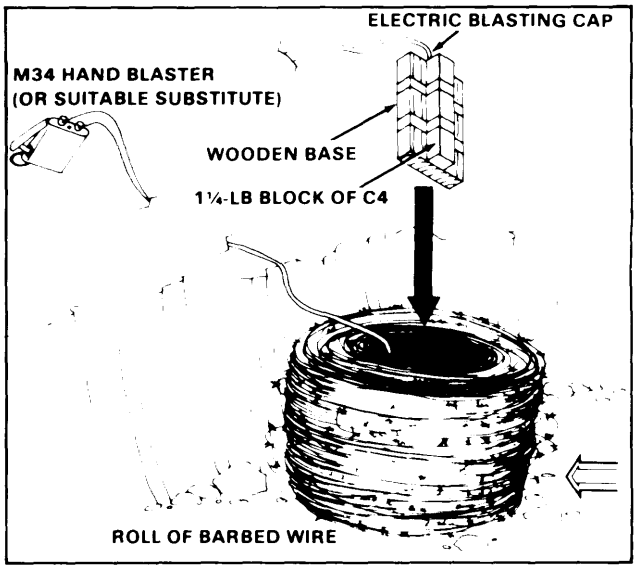


Figure 3-47. Barbed wire expedient mine

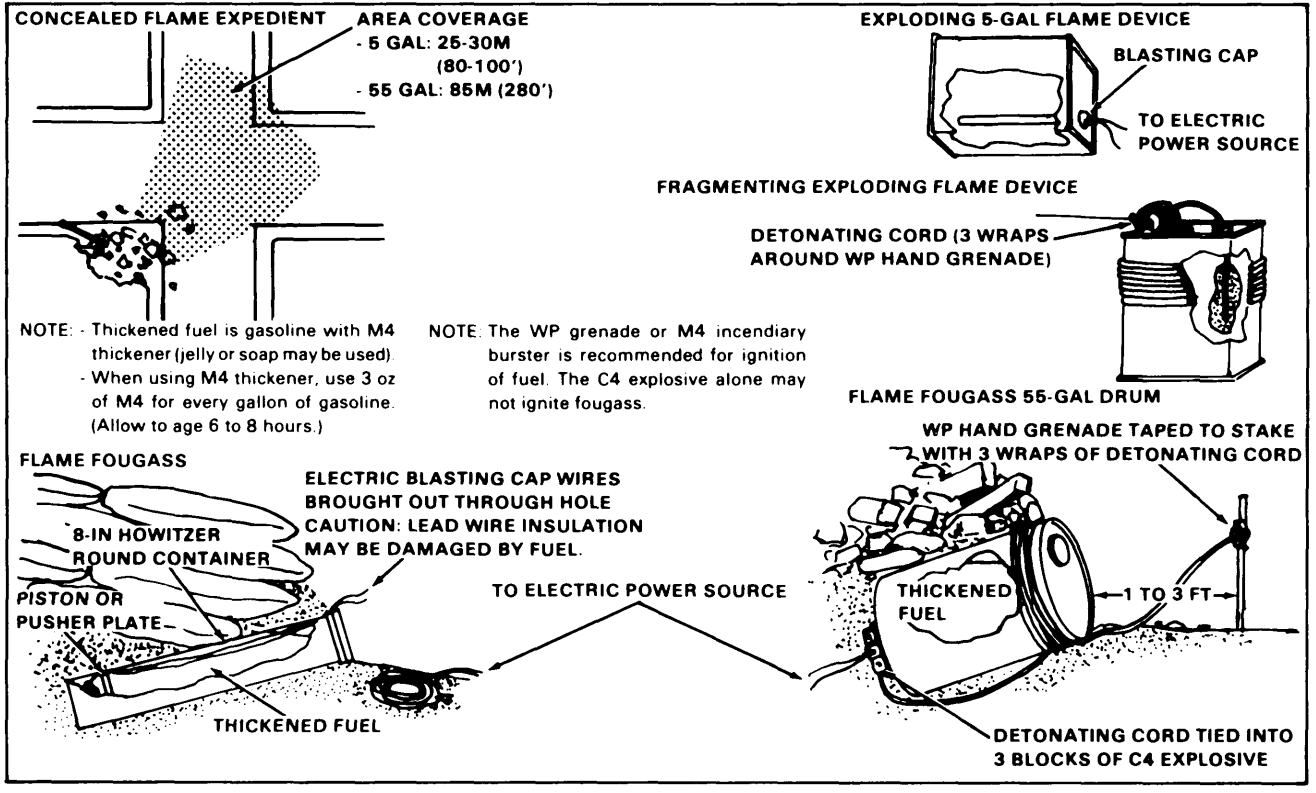


Figure 3-48. Improvised flame mines

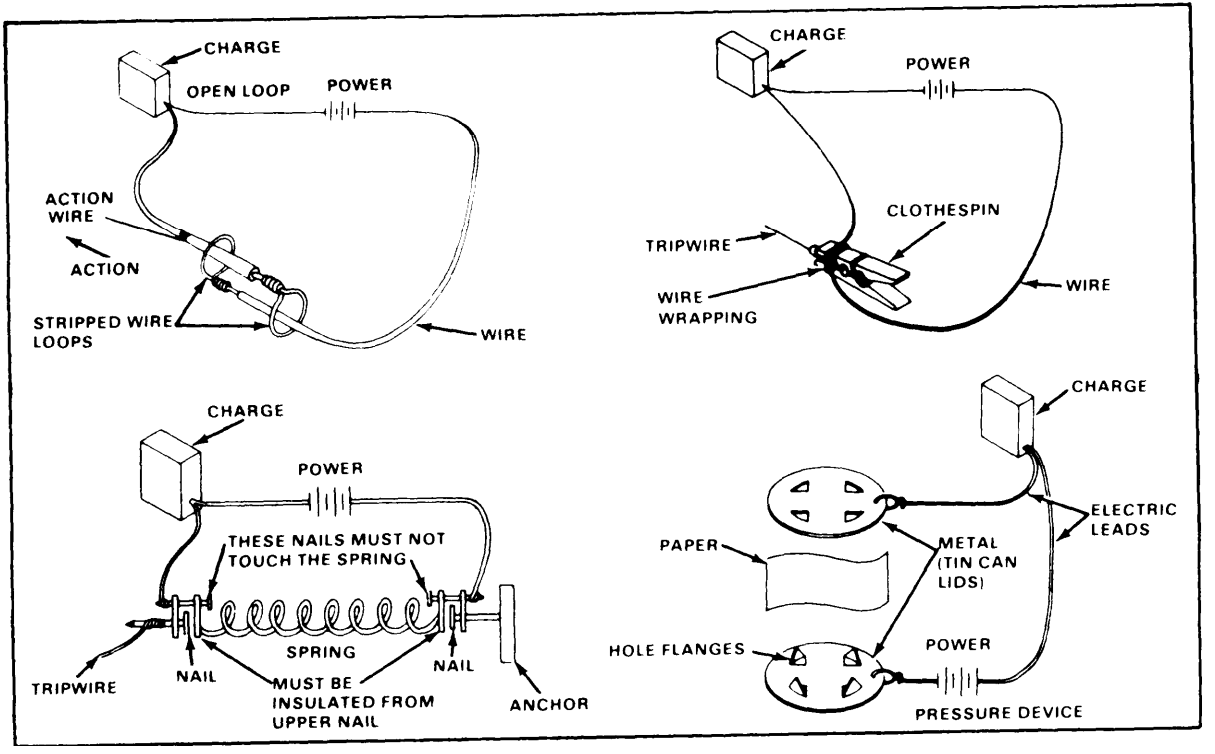


Figure 3-49. Expedient firing devices