APPENDIX H

SPECIAL MUNITIONS

Section I. FAMILY OF SCATTERABLE MINES

Employment Considerations

The decision to use and the purpose of FA-delivered FASCAM must be carefully considered by the commander, engineer, FSO, and S3. The engineer officer provides the expertise on employment of all types of FASCAM. The FSO provides the technical expertise to the engineer concerning the employment of FA-delivered FASCAM. The ALO advises the engineer officer concerning FASCAM delivered by the Air Force. As part of the estimate process, the FS cell should advise the commander of anticipated FA-delivered FASCAM densities and safety zones. The estimated densities and safety zones could affect the use and/or positioning of FA-delivered FASCAM. The engineer must seek an alternative FASCAM delivery means if FA-delivered FASCAM will not meet the commander's density requirement or cannot be used because of range, positioning, or safety limitations. There are two types of FA-delivered FASCAM: an area denial antipersonnel mine (ADAM) and the remote antiarmor munition system (RAAMS) for use against lightly armored vehicles. **Both are available only in 155 mm.** FASCAM has two preset self-destruct times:

• Short duration (unclassified self-destruct time of less than 24 hours).

• Long duration (unclassified self-destruct time of greater than 24 hours).

The corps commander has the authority to employ FASCAM. Employment may be delegated for specific operations or limited periods of time as follows:

• Long duration down to maneuver brigade.

Ž Short duration down to maneuver battalion.

FA-delivered FASCAM enables the maneuver commander to quickly emplace a minefield. Like any obstacle, FASCAM is best used at a choke point covered by effective indirect and antitank (AT) fire. The principles of obstacle coverage apply even more strongly to FASCAM because the mines are surface-laid and visible. An undisturbed enemy in column can work through this type of field quickly.

Capabilities

In the defense, FASCAM is used –

• To develop targets for long-range antitank weapons.

Ž To close gaps and lanes in other obstacles.

Ž To delay or disrupt attacking forces.

• To deny enemy unrestricted use of selected areas.

Ž To disrupt movement and commitment of second-echelon forces.

Ž To disrupt and harass enemy command and control, logistics, or staging areas.

• To reinforce existing obstacles.

• To disrupt or delay river crossings.

In the offense, FASCAM is used –

Ž TO supplement flank reconnaissance and security forces in protecting flanks along avenues of approach.

- To suppress and disrupt enemy security elements once contact has been made.

Ž To hinder withdrawal of enemy forces.

Ž To hinder the ability of the enemy to reinforce the objective area.

Employment Options

FASCAM may be delivered all RAAMS, all ADAM, or a combination of both. If RAAMS and ADAM are employed on the same target, ADAM is fired as the last volley.

ADAM may be used without RAAMS. Five basic missions for ADAM (besides augmenting RAAMS on an artillery-delivered minefield) are as follows:

- Reinforce antitank obstacles. ADAM can be used to augment antivehicle obstacles by inhibiting dismounted clearing parties. Having ADAM available for this task allows engineer units to concentrate their efforts on antivehicle obstacles such as antitank minefields, abatis, and road craters.

- Reinforce antipersonnel obstacles. ADAM can be used in a similar manner to augment barbed wire or concertina wire obstacles against personnel.

- Interdict unarmored vehicles. When used LAW guidelines discussed later, ADAM can be used for interdiction or area denial against a variety of soft targets. These include resupply vehicles; towed artillery and mortars; and truck-mounted headquarters, communications, and EW sections.

- Augment conventional fires on unarmored targets. ADAM can be used to increase the effectiveness of fires against the same sort of targets it can interdict. These targets can be engaged with HE or improved conventional muntions (ICM), followed by ADAM to limit their ability to reconstitute or reorganize and displace.

Ž Provide counterfire or suppress enemy air defense or field artillery. ADAM could be delivered after HE or DPICM volleys on enemy AD or indirect fire units. This use would prolong the effectiveness of the artillery attack by disrupting and neutralizing or suppressing the target after firing has ceased. If the enemy indirect fire units are self-propelled, RAAMS could be used in conjunction with ADAM.

FASCAM may be delivered in conjunction with other munitions. In that way, it extends the effects of other munitions. For example, ADAM may be fired into a logistical site after DPICM is fired. If fired in conjunction with other munitions, FASCAM is fired in the last volleys.

Basic Uses of FASCAM

There are four basic uses of FA-delivered FASCAM:

Ž Interdiction or area denial.

Ž Employment as an obstacle.

- Employment to augment an obstacle.

- Employment against targets of opportunity.

Interdiction or Area Denial

FA-delivered scatterable mines are not well suited for interdiction or area denial. Because FA-delivered minefield tend to be small and of low density (because of low ammunition availability), they are easily bypassed and/or breached. FA-delivered mines are poorly suited for interdicting roads for three reasons:

- The mines tend to break up or malfunction when they land on a hard surface road.
- The mines are easy to see against the uniform background of a road.
- Units on roads are already moving in column and columns are the best formations for breaching scatterable rninefields.

If RAAMS and ADAM are used for interdiction or area denial, three employment guidelines apply:

- Employ them only at choke points to keep the enemy from easily bypassing the minefield.
- Employ them in high-density fields to prevent breaching.
- Employ them when and where they are hard to detect; for example, in limited visibility (at night or in fog) or where the enemy will be buttoned up (for instance, in a chemically contaminated area).

In summary, FA-delivered minefields can be used for interdiction and area denial, but a larger amount of ammunition must be delivered at a carefully chosen place and time. In general, RAAMS and ADAM are most effectively employed when covered by direct fire.

Employment as an Obstacle.

Any type of FASCAM should be employed according to the basic principles of minefield employment:

- Employ mines at a choke point.
- Cover mines with effective direct fire and indirect fire by using HE-VT or DPICM.
- Keep minefields under continuous observation. Use night observation devices (NODS) and planned illumination targets at night.
- Emplace rninefields in belts if possible. It is better to force the enemy to breach three narrow minefield than to have him breach one wide one.
- plan to defeat enemy breaching efforts. Coordinate with the S2 and engineer to anticipate how and where the enemy will try to breach the minefield. Plan direct and indirect fires to defeat enemy breaching parties.

FASCAM in general presents a unique planning challenge for fire support personnel because it is visible and vulnerable on the surface of the terrain. This leads to two special considerations:

- Reduce the enemy's ability to see. Use indirect fire to make him button up, If you can force the enemy into MOPP 4 with a real or simulated chemical attack, that is even better.
- Minimize indirect fires on top of the FASCAM. This represents a judgment call. Firing on the minefield destroys breaching parties, but it also makes the minefield easier to breach (by destroying the exposed mines).

One compromise is to concentrate indirect fires on targets immediately beyond the minefield and direct fires on targets in the minefield, (This also keeps the artillery from interfering with TOW gunners), If a mine plow or other mine-clearing vehicle enters the minefield and clears a lane, following vehicles will have to bunch up to enter the lane and may present a good target.

If the enemy has cleared a lane and is on the verge of breaching the minefield, consider firing a heavy concentration of smoke and/or DPICM directly on top of the minefield. The smoke should obscure the remaining mines as well as the clear lane markers that the vehicles are trying to follow. Use of smoke will have to be carefully coordinated, since it will inhibit friendly direct fire weapons, However, a fire mission of this type should be on call in case the enemy places smoke in between your maneuver force and the minefield to screen his breaching efforts. If the enemy fires smoke first, it is to your advantage to shoot the minefield with smoke and/or DPICM to disrupt his crossing efforts.

FA-delivered scatterable mines introduce another planning problem – timing. Firing mines too early gives the enemy time to avoid them, limits friendly freedom to maneuver, and can result in the mines self-destructing too early. Firing mines too late can result in their landing behind attacking enemy forces and being worthless.

For these reasons, the trigger point for firing RAAMS and/or ADAM must be very carefully coordinated between the S3, the S2, and the FSO. The trigger point for firing FA-delivered mines must meet two criteria:

- When the enemy reaches the trigger point, he must be committed to the avenue of approach on which the mines will be delivered.
- The trigger point must be far enough forward of the proposed minefield that the minefield can be emplaced before the enemy reaches it.

The trigger point should be a target area of interest in the brigade S2's IPB. The TAI should be under surveillance at all times (use NODS and planned illumination targets at night). The element observing the TAI should have the authority to fire the minefield or a direct communications link to whoever is going to call for the mines.

The TAI must be far enough beyond the minefield that the minefield will be in place in time in a worst-case scenario. The FSO should allow for the time it takes to send the call for fire, process the call for fire, execute the mission, and arm the mines. (Remember, the mines do not arm immediately on impact.) There should be an alternate method of firing the minefield in case TACFIRE is jammed with other fire missions.

The key consideration in emplacing FA-delivered mines is that mines delivered too early may be less effective than they could be, but mines delivered too late are worthless.

Employment to Augment an Obstacle

FA-delivered scatterable mines are optional weapons for closing lanes in existing obstacles or reseeding breached minefield.

RAAMS and/or ADAM used to close a lane(s) in an obstacle should be planned with the same considerations as RAAMS and/or ADAM planned as an obstacle. Another consideration in using RAAMS and/or ADAM to close a lane is how wide the artillery minefield should be. A rule of thumb is to use the width of the lane plus the expected delivery error when the mines are fired. This leads to two planning considerations to minimize the amount of ammunition used:

Ž Get the best possible grid to the center of the lane. Use PADS if possible – intersection or resection if necessary.

Ž If possible, depending on METT-T, adjust the mission in advance onto the center point of the lane and record it as a target.

Planning for using artillery-delivered mines to close breached obstacles should involve the S3, S2, engineer, and FSO. This group should identify the most likely points at which the enemy will try to breach the obstacle and how wide the breach will probably be. As with using mines to close a lane, these points should be identified by the most accurate grid attainable, fired in, and recorded as targets. Even if the enemy does not breach at these exact locations, the targets should provide accurate points from which to shift in firing mines.

The FSO must identify which observer is to fire RAAMS and/or ADAM to close a breach and under what conditions the obstacle is considered breached. (For example, is it when one vehicle passes through or when one engineer vehicle has passed through and marked a lane?) The FSO should identify an alternate observer to fire the minefield in case smoke screens, communications problems, or enemy fire prevents the primary observer from reseeding the obstacle at the proper time.

A call for fire for mines to close a breach will conflict with conventional calls for fire on the breaching units. If a RAAMS or ADAM call for fire is going to take priority over other calls for fire, an alternate channel could be set up so the RAAMS or ADAM call for fire can jump the TACFIRE message queue. This will probably require a voice call for fire over a command net.

Employment Against Targets of Opportunity

Minefields against targets of opportunity (unplanned) must be emplaced immediately because of the fleeting nature of the targets. Minefield may be requested through the fire support channels at any level. Once the maneuver commander has approved the use of FA-delivered FASCAM, minefield can be emplaced according to his guidance.

Normally, these minefield are used against targets that can be observed (by the FIST or AFSO) or that are specifically identified by target acquisition sources such as radar, sensors, and other acquisition devices. Their processing is similar to that of FA target-of-opportunity missions. Fire for effect (FFE) or observer adjustment is used against either moving or stationary targets.

Density and Duration. Unplanned minefield are standard in density and duration, depending on the tactical situation and the commander's guidance. An example is as follows:

Ž Density: 24 RAAMS, 6 ADAM.

- One aimpoint.

Ž Short duration.

Target Location. There are two types of aimpoints – stationary and moving targets:

- The aimpoint for a **stationery target** is placed directly over the target center. Aimpoints are located to an accuracy of 100 meters (adjust fire) and 10 meters (FFE).

- The aimpoint for a **moving target** is placed directly in front of the enemy axis of advance, 1,000 meters in front of the enemy target for every 10 kilometers per hour (kmph) of speed. This allows enough time for mine delivery and arming before enemy encounter.

Fire Mission Request. The fire mission request is transmitted and processed generally the same as other requests for target-of-opportunity fire missions. The requestor must specify the following:

- Identification (call sign).

- Warning order (include RAAMS, ADAM, or both).

Ž Target location (aimpoint).

- Target description.

Ž Method of engagement.

- Method of fire and control.

Unless the observer requests ammunition for adjustment, he will receive DPICM (self-registering) in adjustment and the standard minefield in effect (6 ADAM and 24 RAAMS, according to the previous example).

WARNING

Targets of opportunity are either FFE or adjust fire missions. FFE missions should not be requested If the center of the minefield is less than 700 meters from the nearest friendly position. Adjust fire missions should not be requested if the center of the minefield is less than 425 meters from the nearest friendly position.

EXAMPLES OF FIRE MISSION REQUEST

Fire-for-Effect Mission

A4Z57 THIS IS A4Z42, FIRE FOR EFFECT, ADAM, OVER.

GRID 18045132, OVER.

PLATOON IN THE OPEN, OVER.

Adjust Fire Mission

A4Z57 THIS IS A4Z42, ADJUST FIRE, RAAMS, OVER.

GRID 180513, OVER.

FIVE T72 TANKS ATTACKING OVER.

The FA battalion receiving the call for fire designates the firing unit(s): On completion of the minefield emplacement, the fired data are forwarded to the divisions, brigade, or battalion FSE. The fired data are recorded in Section D of DA Form 5032-R (Field Artillery Delivered Minefield Planning Sheet). A reproducible copy of this form is in Appendix L. The FSE computes the safety zone according to the fired data and passes it to the engineer for dissemination to higher, lower, and adjacent units as appropriate.

Firing in Artillery-Delivered Mines

One of the key considerations in emplacing a minefield with indirect fire is to get a precise target location, The three basic ways of doing this, from most to least desirable, are as follows:

- Use target area survey.
- Fire the center grid in with DPICM in the self-registering (ground burst) mode and have the FDC replot to get the adjusted grid.
- Carefully map-spot the grid through intersection, resection, or terrain association.

No matter which method is used, the center grid of the proposed minefield should be recorded as a target. This provides a center for RAAMS and/or ADAM fires, a target for smoke and/or ICM to attack breaching forces, and a known point from which to shift in calling fires onto units just beyond or in front of the minefield. The use of FA target numbers for FASCAM planning by the engineer facilitates coordination.

Choosing Minefield Width and Density

The first, and most obvious, consideration is ammunition availability. This, combined with fire unit positioning and minefield depth, will provide an estimate of how many meters of minefield width are available for various densities.

Lane-closing mines should be delivered in a sufficient width to cover the lane and allow for delivery error. If the aimpoint grid has been determined by PADS or by replot procedures after being fired in, the delivery error will probably be small. If the aimpoint location is map-spotted, the minefield width must allow for errors in grid location.

Artillery-delivered mines used for interdiction or area denial or as an obstacle should be wide enough to fill the choke point and to tie into natural or artificial obstacles at either end.

Again, the width of the minefield should allow for errors in delivery and aimpoint location.

Density depends on the mission of the minefield. If a minefield is covered with direct and indirect fire (for example, if the enemy is buttoned up and maneuvering), a low-density minefield will provide an effective obstacle. If the mines are available, a medium-density field is desirable but not absolutely necessary.

Medium- and high-density fields are particularly useful for defending forces that are heavily outnumbered and/or who need time to move to alternate firing positions or withdraw to a subsequent battle position.

In general, the greater the enemy combat power, the denser the minefield should be. If the defending force has a relatively large amount of firepower, the minefield serves to slow and restrict enemy units so that they can be engaged with direct fire. If the defending force has relatively little firepower, the direct fire of the force is used to make the enemy maneuver through the minefield so that he can be engaged by the mines.

Fire Unit Selection Considerations

Two questions should be answered in selecting a fire unit:

- What is the counterfire threat?
- What could the battery do if it were not firing RAAMS or ADAM?

The competition for artillery tubes during battle will be great. This tends to increase the time between mission request and completion. The proliferation of artillery munitions and limited haul capabilities of artillery units may tend to reduce the number of mine rounds immediately available at battery level. Given a limited carrying capacity for artillery ammunition, a choice must be made whether to leave behind other ammunition to carry additional FASCAM. Requesting ammunition for immediate consumption, stockpiling of ammunition on the ground, and other measures can be used to overcome the constraint.

Another factor in the counterfire threat is how good the enemy target acquisition assets are. If a battery fires one volley, it is acquired; if a battery fires 20 volleys, it is acquired. The key question becomes not whether or not a battery will be acquired (it will be) but how long it will be before acquired batteries will be engaged. If you are acquired on the first round and you have to move anyway, you might as well finish your mission before you go.

Safety Zone Determination

The FSO is responsible for obtaining safety zones. Safety zones may be computed by the DS battalion FDC or by the FSO by using the safety zone table on page H-8. An alternative method is to use the mine safety template. (See TC 6-40 for specific delivery techniques.) The engineer is responsible for disseminating the safety zones to appropriate units.

Use of Safety Zone Table

Use the following fired minefield data:

- Type of projectile fired (ADAM or RAAMS).
- Trajectory (high or low angle).
- Range (to minefield center).
- Technique (met + velocity error [VE]/transfer or observer adjust).
- Aimpoint coordinate(s) (single or left and right).

Enter the table at the nearest range for the projectile type and trajectory, and use the correct employment technique column to determine the size of the safety zone.

Draw the determined safety zone centered over each aimpoint to establish the minefield safety zone.

> **NOTE:** Approximately 99 percent of all mine-delivery missions will result in the entire minefield (minefleld modules) being inside the safety zone squares.

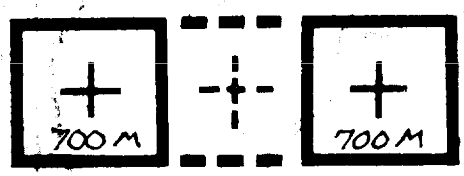
MINEFIELD SAFETY ZONES

PROJECTILE AND TRAJECTORY	RANGE (KM)	MET + VE/TRANSFER TECHNIQUE	OBSERVER ADJUST TECHNIQUE
RAAMS Low-Angle	4	500 x 500	500 x 500
	7	550 x 550	500 x 500
	10	700 x 700	550 x 550
	12	850 x 850	550 x 550
	14	1000 x 1000	650 x 650
	16	1050 x 1050	650 x 650
	17.5	1200 x 1200	650 x 650
ADAM Low-Angle	4	700 x 700	700 x 700
	7	750 x 750	700 x 700
	10	900 x 900	750 x 750
	12	1050 x 1050	750 x 750
	14	1200 x 1200	850 x 850
	16	1250 x 1250	850 x 850
	17.5	1400 x 1400	850 x 850
RAAMS or ADAM High-Angle	4	750 x 750	700 x 700
	7	900 x 900	700 x 700
	10	1050 x 1050	750 x 750
	12	1200 x 1200	750 x 750
	14	1400 x 1400	850 x 850
	16	1500 x 1500	850 x 850
	17.5	1400 x 1400	850 x 850

EXAMPLE SAFETY ZONE DETERMINATION

FIRED DATA	ACTION
Projectile: RAAMS **Trajectory:** Low-angle **Range:** 9 kilometers **Technique:** Met + VE **Aimpoints:** Three (left and right aimpoint coordinates given)	Enter the table at range 10 km (closest) for RAMMS, low-angle, and met + VE. The safety zone for each aimpoint is 700 x 700 meters. Draw the 700- by 700-meter safety zone over the left and right aimpoints. To determine the safety zone for the minefield, draw lines connecting the two squares.

Completed Example



Use of the Mine Safety Template

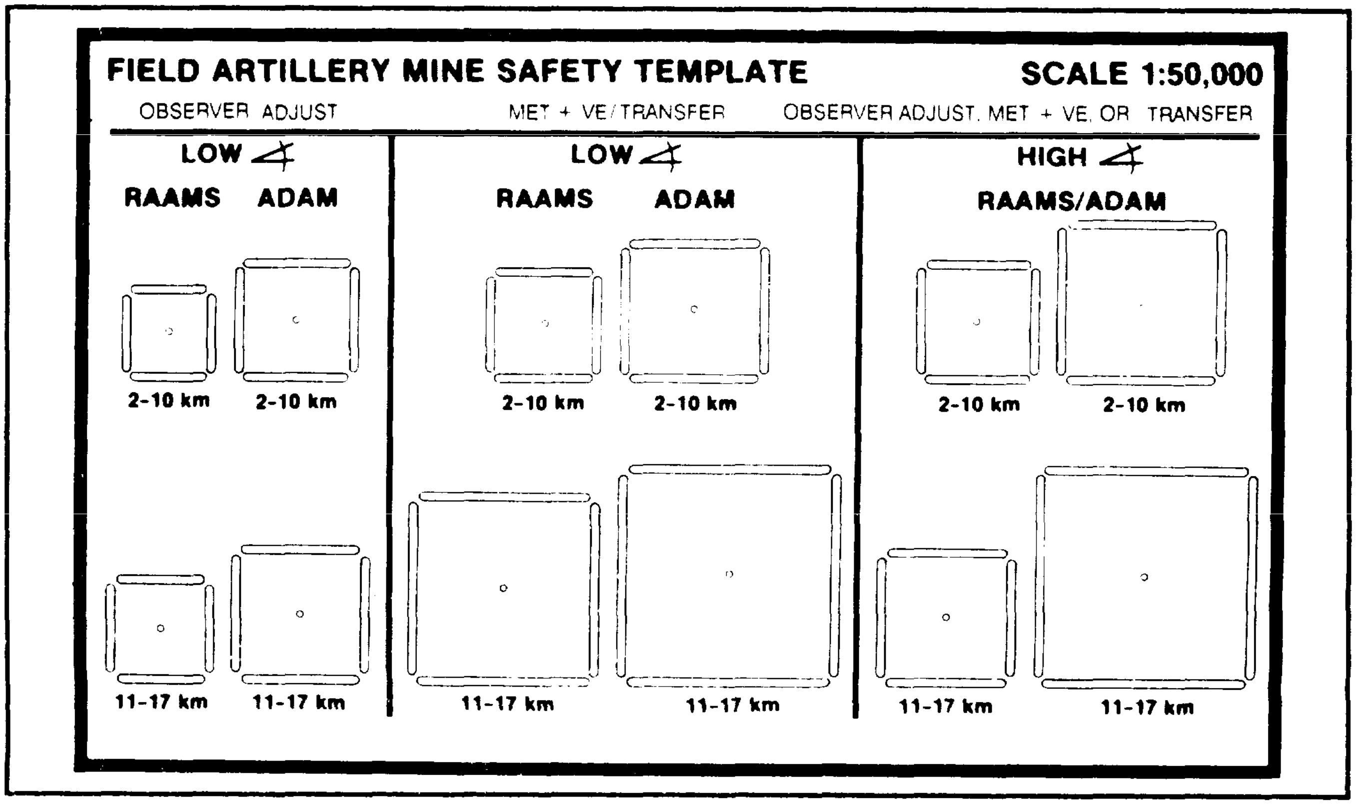
Enter the template with the fired minefield data:

- Technique (met + VE/transfer or observer adjust).
- Trajectory (high or low angle).
- Type projectile fired (RAMMS or ADAM).
- Range (to minefield center).
- Aimpoint coordinates (center or left and right).

Center the selected template safety zone square over the aimpoint(s). Draw a square to establish the minefield safety zone.

NOTE: A template pattern is in Appendix L.

FIELD ARTILLERY MINE SAFETY TEMPLATE



Scatterable Minefield Report

The FASCAM delivery unit is responsible for initiating the scatterable minefield report, first by radio and later by hard copy. This report is submitted through the FS cell to the engineer. The format is as shown below.

SCATTERABLE MINEFIELD REPORT FORMAT

LINE	INFORMATION REQUIRED	INSTRUCTIONS
1	Approving authority	Enter the approving authority; for example, *CDR 3AD.*
2	Target or obstacle	If the minefield is part of an obstacle plan, enter the obstacle number (such as *2XXX0157*, which represents 2d Corps, target number 157). If the minefield is not a part of an obstacle plan or does not have a number, then leave this line blank or enter *NA*.
3	Type emplacing system	Enter the type of system that emplaced the minefield; for example, *GEMSS, ARTY,* or *Volcano.*
4	Type mines	Enter *AP* for antipersonnel mines or *AT* for antitank mines. If both are used, enter *AP/AT*.

SCATTERABLE MINEFIELD REPORT FORMAT (CONTINUED)

LINE	INFORMATION REQUIRED	INSTRUCTIONS
5	Self-destruct period	Enter the time period in which the minefield will self-destruct
6-14	Aimpoint or corner points of minefield	If the system emplacing the minefield uses a single aimpoint to deliver the mines, enter that aimpoint; for example, *MB10102935*. If the system has distinct corner points, as does *GEMSS*, enter those corner points; for example, *MB17954790, MB18604860, MB18504890, MB18054895, MB17804850*.
15	Size of safety zone from aimpoint	If an aimpoint is given in line 6, enter the size of the safety zone from that aimpoint. For example, if artillery emplaces a minefield from aimpoint MB10102935 and the safety zone is 1,000 by 1,000 meters, enter *500 M* so that personnel plotting or receiving the information can plot the coordinate and then plot the safety zone 500 meters in each direction from the aimpoint.
16	Unit emplacing mines and report number	Enter the unit emplacing the mines and the report number; for example, *CO B, 23 ENGR BN 4*. (Reports are numbered consecutively.) This would be the fourth minefield that Co B, 23d Engr Bn has emplaced.
17	Person completing report	Enter the name of the person completing the report; for example, *SFC Hollings*.
18	Date-time group of report	Enter the date-time group of the report; for example, *160735ZJUL89*.
19	Remarks	Enter any other items the reporting unit may consider important.

LEGEND: ARTY = artillery AP = antipersonnel GEMSS = ground-emplaced mine-scattering system

MATRIX KEY TO FA-DELIVERED SCATTERABLE MINE EMPLOYMENT TABLES

ENTRY DATA	EMPLOYMENT TABLE							
	1	2	3	4	5	6	7	8
Transfer or met +VE	X	X	X	X				
Observer adjust					X	X	X	X
M718/741 (RAAMS) low angle	X	X			X	X		
M718/741 (RAAMS) high angle			X	X			X	X
M692/731 (ADAM) low or high angle			X	X			X	X
BMA ≤ 800 mils	X		X		X		X	
BMA > 800 mils		X		X		X		X

Field Artillery Employment Tables

Matrix Key

As a quick reference, use the matrix key to determine the minefield employment table to be used. Enter the matrix from the left with the appropriate deiivery technique, shell, trajectory, and the battery-minefield angle (BMA). Read right and then up to select the proper employment table.

Employment Tables

Once the correct table has been located, the entry arguments into each table are the range to the minefield center (expressed to the nearest 2,000 meters; if exactly halfway between, express to lower range) and the desired width of the minefield. Extract from the table the number of aimpoints required to emplace the minefield.

MINE EMPLOYMENT TABLE 1

Delivery Technique: Transfer or met + VE — Trajectory: Low angle
Shell: M718/741 (RAAMS) — BMA: Equal to or less than 800 mils

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
10,000	3	3	4	4	5	5	6	6	7	7
12,000	3	4	4	5	5	6	6	7	7	8
14,000	4	4	5	5	6	6	7	7	8	8
16,000	4	4	5	5	6	6	7	7	8	8
17,500	4	5	5	6	6	7	7	8	8	9

MINE EMPLOYMENT TABLE 2

Delivery Technique: Transfer or met + VE — Trajectory: Low angle
Shell: M718/741 (RAAMS) — BMA: Greater than 800 mils

RANGE (METERS)	DESIRED MINEFIELD WIDTH (METERS)									
	100	200	300	400	500	600	700	800	900	1,000
4,000	1	2	2	3	3	4	4	5	5	6
6,000	1	2	2	3	3	4	4	5	5	6
8,000	1	2	2	3	3	4	4	5	5	6
10,000	2	2	3	3	4	4	5	5	6	6
12,000	2	3	3	4	4	5	5	6	6	7
14,000	2	3	3	4	4	5	5	6	6	7
16,000	3	3	4	4	5	5	6	6	7	7
17,500	3	3	4	4	5	5	6	6	7	7

MINE EMPLOYMENT TABLE 3

Delivery Technique: Transfer or met + VE
Shell: M692/731 (ADAM)
M718/741 (RAAMS)

Trajectory: Low angle or high angle (ADAM)
High angle (RAAMS)
BMA: Equal to or less than 800 mils

RANGE (METERS)	DESIRED MINEFIELD WIDTH (METERS)									
	100	200	300	400	500	600	700	800	900	1,000
4,000	1	2	2	2	2	3	3	3	3	4
6,000	1	2	2	2	2	3	3	3	3	4
8,000	1	2	2	2	2	3	3	3	3	4
10,000	2	2	2	2	3	3	3	3	4	4
12,000	2	2	2	3	3	3	3	4	4	4
14,000	2	2	3	3	3	3	4	4	4	4
16,000	2	2	3	3	3	3	4	4	4	4
17,500	2	3	3	3	3	4	4	4	4	5

MINE EMPLOYMENT TABLE 4

Delivery Technique: Transfer or met + VE
Shell: M692/731 (ADAM)
M718/741 (RAAMS)

Trajectory: Low angle or high angle (ADAM)
High angle (RAAMS)
BMA: Greater than 800 mils

RANGE (METERS)	DESIRED MINEFIELD WIDTH (METERS)									
	100	200	300	400	500	600	700	800	900	1,000
4,000	1	1	1	2	2	2	2	3	3	3
6,000	1	1	1	2	2	2	2	3	3	3
8,000	1	1	1	2	2	2	2	3	3	3
10,000	1	1	2	2	2	2	3	3	3	3
12,000	1	2	2	2	2	3	3	3	3	4
14,000	1	2	2	2	2	3	3	3	3	4
16,000	2	2	2	2	3	3	3	3	4	4
17,500	2	2	2	2	3	3	3	3	4	4

MINE EMPLOYMENT TABLE 5

Delivery Technique: Observer adjust
Shell: M718/741 (RAAMS)
Trajectory: Low angle
BMA: Equal to or less than 800 mils

RANGE (METERS)	DESIRED MINEFIELD WIDTH (METERS)									
	100	200	300	400	500	600	700	800	900	1,000
4,000	2	2	3	3	4	4	5	5	6	6
6,000	2	2	3	3	4	4	5	5	6	6
8,000	2	3	3	4	4	5	5	6	6	7
10,000	2	3	3	4	4	5	5	6	6	7
12,000	2	3	3	4	4	5	5	6	6	7
14,000	2	3	3	4	4	5	5	6	6	7
16,000	3	3	4	4	5	5	6	6	7	7
17,500	3	3	4	4	5	5	6	6	7	7

MINE EMPLOYMENT TABLE 6

Delivery Technique: Observer adjust
Shell: M718/741 (RAAMS)
Trajectory: Low angle
BMA: Greater than 800 mils

RANGE (METERS)	DESIRED MINEFIELD WIDTH (METERS)									
	100	200	300	400	500	600	700	800	900	1,000
4,000 through 17,500	1	2	2	3	3	4	4	5	5	6

MINE EMPLOYMENT TABLE 7

Delivery Technique: Observer adjust
Shell: M692/731 (ADAM)
M718/741 (RAAMS)
Trajectory: Low angle or high angle (ADAM)
High angle (RAAMS)
BMA: Equal to or less than 800 mils

RANGE (METERS)	DESIRED MINEFIELD WIDTH (METERS)									
	100	200	300	400	500	600	700	800	900	1,000
4,000 through 17,500	1	1	1	2	2	2	2	3	3	3

MINE EMPLOYMENT TABLE 8

Delivery Technique: Observer adjust
Shell: M692/731 (ADAM)
M718/741 (RAAMS)

Trajectory: Low angle or high angle (ADAM)
High angle (RAAMS)
BMA: Greater than 800 mils

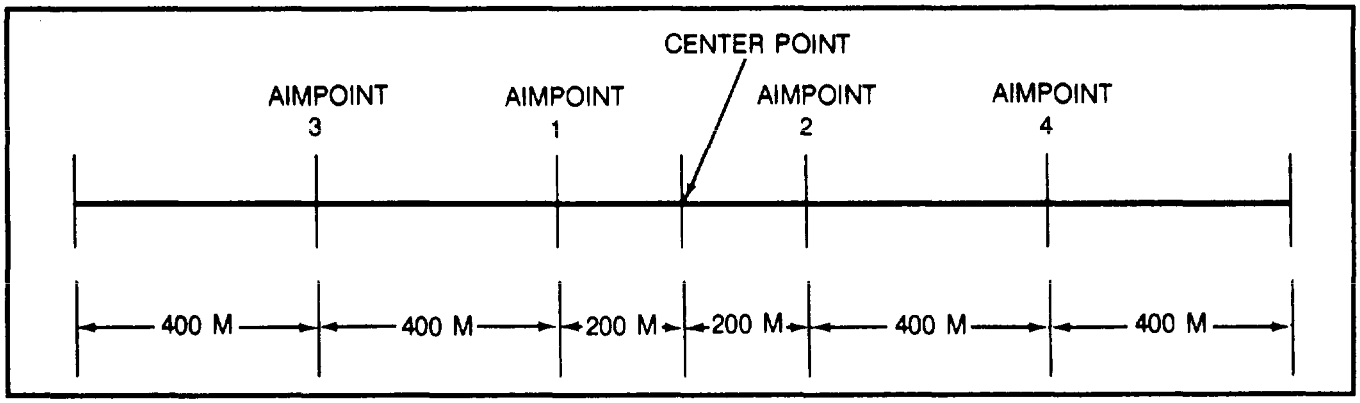
RANGE (METERS)	DESIRED MINEFIELD WIDTH (METERS)									
	100	200	300	400	500	600	700	800	900	1,000
4,000	1	1	2	2	2	2	3	3	3	3
6,000	1	1	2	2	2	2	3	3	3	3
8,000	1	2	2	2	2	3	3	3	3	4
10,000	1	2	2	2	2	3	3	3	3	4
12,000	1	2	2	2	2	3	3	3	3	4
14,000	1	2	2	2	2	3	3	3	3	4
16,000	2	2	2	2	3	3	3	3	4	4
17,500	2	2	2	2	3	3	3	3	4	4

Location of Aimpoints

To locate aimpoints for 400- by 400-meter modules–

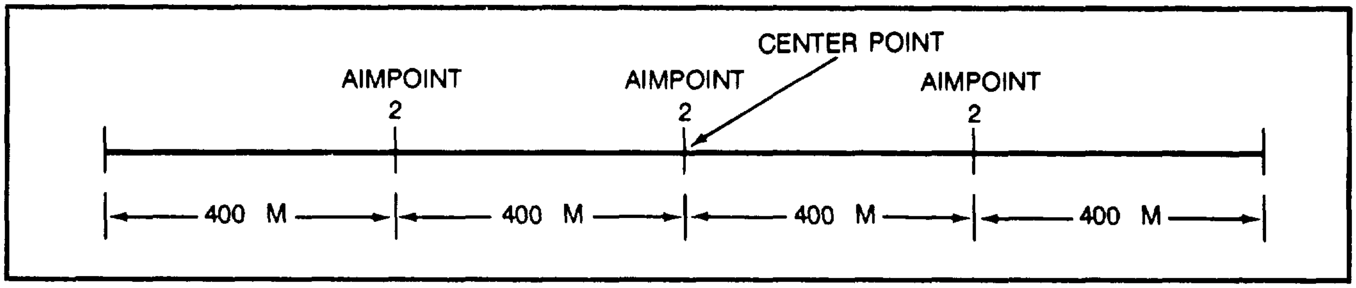
- For an even number of aimpoints, place the aimpoints 200 meters left and right of the center point along the centerline with the remaining points at 400-meter intervals.

MODULE SIZE 400 x 400 METERS, EVEN NUMBER OF AIMPOINTS



Ž For an uneven number of aimpoints, place the first aimpoint at the center point of the minefield and the others at 400-meter intervals.

MODULE SIZE 400 x 400 METERS, ODD NUMBER OF AIMPOINTS



Projectiles Per Aimpoint

The number of projectiles required to achieve the desired density within each module (as defined by each aimpoint) is determined from the table below. Entry arguments are the projectile type, trajectory, and desired density.

M718/M741 RAAMS AND M731 ADAM ROUNDS PER AIMPOINT

	HIGH-ANGLE RAAMS			LOW-ANGLE RAAMS			HIGH- OR LOW-ANGLE ADAM		
Desired density	0.001	0.002	0.004	0.001	0.002	0.004	0.0005	0.001	0.002
Rounds per aimpoint	24	48	96	6	12	24	3	6	12

EXAMPLE PROBLEMS

PROBLEM 1

Given		Action
Delivery Technique:	Met + VE	Select Table 2.
Shell:	M718/741 RAAMS	
Trajectory:	Low angle	Enter at range 14,000 to 600-meter minefield width.
BMA:	840 mils	
Range:	14,000 meters	Extract number of aimpoints = 5.
Minefield Width:	600 meters	

EXAMPLE PROBLEMS (CONTINUED)

PROBLEM 2		
Given		**Action**
Delivery Technique:	Observer adjust	Select Table 5 for RAAMS and Table 7 for ADAM.
Shell:	M718/741 RAAMS and M692/731 ADAM	Enter at range 14,000 meters (if over 15,000 meters in range, round up) to 300-meter minefield width.
Trajectory:	Low Angle	
BMA:	660 mils	
Range:	15,000 meters	Extract number of aimpoints = RAAMS 3, ADAM 1
Minefield Width:	300 meters	

PROBLEM 3		
Given		**Action**
Delivery Technique:	Transfer	Select Table 4.
Shell:	M692/731 ADAM	
Trajectory:	High Angle	Enter at range 12,000 meters to 500-meter minefield width.
BMA:	830 mils	
Range:	12,350 meters	
Minefield Width:	460 meters	Extract number of aimpoints = 2

NOTE: The RAAMS or ADAM minefield is based on a 400- x 400-meter planning module with one exception. When RAAMS is delivered by low angle, a 200- x 200-meter module is used. Consider this when determining the delivery technique to provide the minefield depth required.

Section II. OBSCURANTS

Applications

Obscurants have many applications on the battlefield. During offensive operations, they are used to conceal units and individual weapon systems. This enables the commander to maneuver behind a screen and deceive the enemy about his strength and position. Obscurants are also used to blind acquisition means. During defensive operations, smoke is used to separate and isolate attacking echelons, which creates gaps and disrupts enemy movements. Smoke can slow and blind individual units and weapon systems, forcing mechanized infantry to dismount. Also, it makes enemy targets easier to hit and may conceal defensive positions.

There are four general applications of obscurants on the battlefield:

- Obscuration.
- Screening
- Marking and signaling.
- Deception

Obscuration

Smoke placed on or near the enemy position to interfere with his observation of the battlefield is called obscuration smoke.

Screening

Screening smoke is placed within the areas of friendly operation or in areas between friendly and enemy forces to degrade enemy observation and fire. It is primarily intended to conceal friendly forces.

Marking and Signaling

Smoke is used to communicate actions on the battlefield or to mark locations.

Deception

Smoke used in conjunction with other actions to confuse or mislead the enemy. This use is generally in conjunction with other deceptive measures.

Employment Considerations

To be effective, smoke must be used in sufficient quantities. Factors affecting the amount used are atmospheric conditions, type of smoke required, size of the area to be obscured, and length of time needed. On the basis of those conditions, excessive amounts of ammunition may be required to meet the commander's guidance.

If not coordinated properly, smoke may adversely affect battlefield systems that must operate in concert, such as tactical air, armor, infantry, field artillery, and Army aviation.

Smoke hinders visual communications, which causes the unit to rely to a greater degree on radios.

Sources of Obscurants Available to the Fire Support Officer

Mortars can deliver a high volume of smoke at midranges. They are the most rapid and effective indirect delivery means. Both 8l-mm and 107-mm mortars deliver WP.

Field artillery cannons can deliver smoke out to distant targets. They can deliver HC (hexachloroethane) and WP; however, as smoke is available in limited quantities, excessive use should be planned in advance.

Smoke pots can produce large volumes of smoke for extended periods. They are the commander's primary means of producing small smoke screens.

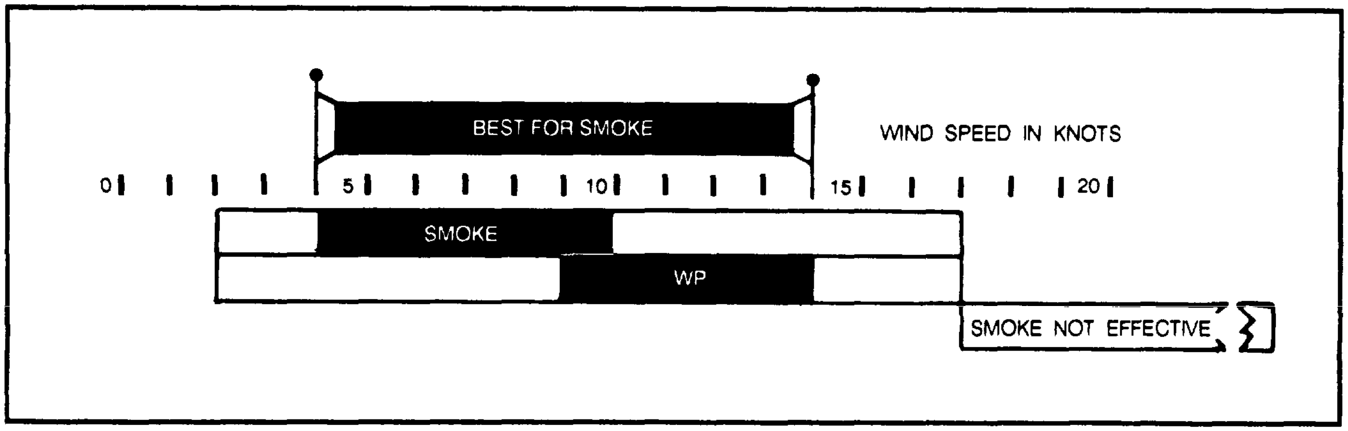
The heavy division has an organic smoke generator platoon in the chemical company. The platoon has 12 M3A3 smoke generators, which can provide large-area smoke support.

Obscurant Employment Tasks

When obscurants are to be used, the FSO must do the following:

- Coordinate with the commander or S3 to determine obscurants requirements for the unit.

SMOKE EFFECTIVENESS



- Obtain from subordinate FSOs their lists of obscuration targets that require engagement beyond their capability.
- Identify the potential sources of obscurants that will support the operation (mortars, maneuver combat vehicles, FA, and smoke generators if available).
- For FA-delivered smoke, use the graphics in the rest of this section to determine the number of rounds required to support the screens.

NOTE: The first three graphics provide general employment data and/or specific weather characteristics. These serve as planning factors and as entry values to the last two tables for the purpose of calculating the number of obscuration munitions required to support the operations. For specific employment techniques, refer to TC 6-40.

- Notify FA units of calculated ammunition requirements. If insufficient ammunition exists, delete targets or select an alternative delivery source.
- For any delivery source other than field artillery, coordinate with the brigade chemical officer to determine brigade capability to support.
- For smoke planned at brigade level, designate the person, event, or time that will initiate the smoke mission.
- For smoke planned at brigade level, coordinate with units that might be affected by the smoke.
- Before firing the smoke, check weather conditions to determine if conditions still support the smoke mission.

GENERAL ATMOSPHERIC CONDITIONS AND THE EFFECTS ON SMOKE

SMOKE CONDITION (TEMPERATURE GRADIENT)	TIME OF DAY WEATHER CONDITIONS	EXPECTED SMOKE BEHAVIOR AS THE SMOKE DRIFTS DOWNWIND (WIND DIRECTION → →)
Ideal (inversion)	1. Night—until 1 hour after sunrise. 2. Wind speed less than 5 knots. 3. Sky cover less than 30 percent. **All three conditions must be met.**	 Stable condition—ideal for smoke employment.
Favorable	This condition occurs most often 1 to 2 hours before and after sunrise and when the wind speed is 5 knots or more and/or the sky cover is 30 percent or more.	 Neutral condition—favorable for smoke employment.
Marginal (lapse)	1. Day—beginning 2 hours after sunrise. 2. Wind speed less than 5 knots. 3. Sky cover less than 30 percent. **All three conditions must be met.**	 Unstable condition—marginal for smoke employment.

EQUIVALENT WIND SCALE FOR ESTIMATING WIND SPEED

KNOTS	OBSERVATION
1	Smoke, vapor from breath, or dust raised by vehicles or personnel rises vertically. No leaf movement.
1-3	Direction of wind slightly shown by smoke, vapor from breath, or dust raised by vehicles or personnel. Slight intermittent movement of leaves.
4-6	Wind slightly felt on face. Leaves rustle.
7-10	Leaves and small twigs in constant motion.
11-16	Wind raises dust from ground. Loose paper and small branches move.
17-21	Small trees with leaves sway. Coastal wavelets form on inland waters.
22-27	Large branches on trees in motion. Whistle heard in telephone or fence wires.
28-33	Whole trees in motion. Inconvenience felt walking against wind.
NOTE: One knot equals 1.15 miles per hour (mph).	

PLANNING DATA FOR SMOKE

DELIVERY SYSTEM	TYPE ROUND	TIME TO BUILD EFFECTIVE SMOKE	AVERAGE BURNING TIME	AVERAGE OBSCURATION LENGTH (METERS PER ROUND)		
				WIND DIRECTION		
				Cross	Quartering	Head/Tail
155 mm	WP	1/2 min	1-1 1/2 min	150	75	50
	HC	1-1 1/2 min	4 min	350	250	75
105 mm	WP	1/2 min	1-1 1/2 min	75	60	50
	HC	1-1 1/2 min	3 min	250	175	50
107 mm	WP	1/2 min	1 min	200	80	40
81 mm	WP	1/2 min	1 min	100	60	40
60 mm	WP	1/2 min	1 min	75	50	40

NOTE: All rounds are fired as standard missions with parallel sheafs under favorable conditions.

QUICK SMOKE DATA—155-MM SHELL SMOKE

WEATHER CONDITION	WIND SPEED (KNOTS)	RATE OF FIRE	DURATION REQUESTED BY FORWARD OBSERVER (MINUTES)											
			4	5	6	7	8	9	10	11	12	13	14	15
			Rounds Per Tube											
Ideal	5	1 rd per 2 min	2	2	3	3	4	4	5	5	6	6	7	7
Favorable	5	1 rd per 2 min	2	2	3	3	4	4	5	5	6	6	7	7
	10	1 rd per 1 min	2	3	4	5	6	7	8	9	10	11	12	13
	15	1 rd per 40 sec	3	4	6	7	9	10	12	13	15	16	18	19
Marginal	5	1 rd per 40 sec	3	4	6	7	9	10	12	13	15	16	18	19

QUICK SMOKE DATA—155-MM SHELL WP

WEATHER CONDITION	WIND SPEED (KNOTS)	RATE OF FIRE	DURATION REQUESTED BY FORWARD OBSERVER (MINUTES)													
			2	3	4	5	6	7	8	9	10	11	12	13	14	15
			Rounds Per Tube													
Ideal	5	1 rd per 2 min	2	3	3	4	4	5	5	6	6	7	7	8	8	9
Favorable	5	1 rd per 1 min	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	10	1 rd per 30 sec	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	15	1 rd per 20 sec	6	9	12	15	18	12	24	27	30	33	36	39	42	45
Marginal	5	Exceeds rate of fire														

Section III. **COPPERHEAD**

Description

Copperhead is a 155-mm cannon-launched guided projectile (CLGP) with a shaped-charge warhead and a laser seeker. When fired at a moving or stationary hard point target, Copperhead homes in on laser energy reflected from the target during the final part of its trajectory. Laser energy is provided by a remote laser designator. Optimum use of Copperhead is against multiple targets in large target arrays outside the range of maneuver direct fire weapon systems (approximately 3,000 meters). Single targets or very few widely separated targets may be engaged by Copperhead if they are high-value targets; for example, an enemy commander's vehicle. Targets appearing within the range of maneuver direct fire weapon systems should be engaged by Copperhead only when the maneuver commander directs or when the direct fire systems are unable to engage the targets.

G/VLLD Employment

Since the success of the Copperhead depends greatly on reflected energy, the FSO should ensure the G/VLLD is positioned to optimize the system capabilities and complement the direct fire weapons. Laser designation requires an uninterrupted line of sight between the designator and the target. Anything that obstructs or weakens the laser signal will cause a significant decrease in the performance of the round. Terrain, vegetation, fog, smoke, and dust obstruct visibility.

Copperhead Employment

Copperhead targets can be engaged as either planned targets or targets of opportunity. Planned targets are preferred because the firing battery requires less reaction time. Most often, the target-of-opportunity technique is used only during offensive operations.

CHARACTERISTICS OF COPPERHEAD

STRENGTHS	WEAKNESSES
Copperhead has high hit probability on point targets, moving or stationary, at longer ranges than possible with current direct fire weapons. Copperhead is extremely lethal. Mulitple engagement is possible against an array of targets within the same footprint. A laser designator does not have the pronounced firing signature of an ATGM.	Responsiveness of the system depends on several variables created by distinct acquisition and delivery components of the system. The G/VLLD and operator are vulnerable to suppressive fires. The Copperhead system depends on two-way communications between the operator and the firing battery FDC. Effectiveness of target engagement is limited by the operator's ability to track the target during the last 13 seconds of the projectile flight. Weather conditions and battlefield obscuration also may degrade observation of the target. The emitted signal from the designator can be detected.

Regardless of the method of attacking targets, the FSO must get at least the following guidance from the maneuver commander to effectively employ Copperhead:

- Copperhead usage (when, where, and what type of targets)

- Most likely avenues (areas) to be targeted.

FSOs should recommend the use of Copperhead against command and control vehicles and high-payoff targets, rather than against tanks. Command OPs, ACRVs, radars, bridges, and AD assets are examples of generally good high-payoff targets. Analysis of TVA and METT-T provides the best choices.

If the command decision is made that tanks are the targets of choice for Copperhead, our observers must seek flank and rear shots to achieve greatest kill probability, since tanks are difficult to penetrate from the front.

Once the targeting information is obtained, the FSO and G/VLLD operator must be able to visualize Copperhead footprints on existing terrain for effective target planning. Use of the Copperhead footprint template and the ability to construct a visibility diagram for the area contribute to fire planning success. (See TC 6-40 for use of the footprint template.)

Positioning for Copperhead Employment

Effective employment of the Copperhead munition is enhanced by techniques used by the FSO to position the observer or COLT and by the observer or COLT before and during target engagement. Steps involved in optimizing the potential employment of Copperhead are as follows:

Ž Position the observer or COLT to most effectively accomplish the commander’s target attack guidance.

- Construct a visibility diagram from the selected position when it is occupied.
- Employ the appropriate Copperhead footprint to engage targets effectively.

These steps do not take into account the natural effects of weather, battlefield obscuration, and so forth on Copperhead employment. Since the positioning of the observer or COLT for employment of Copperhead is the concern of the FSO, the first step is discussed below. The other steps are observer tasks; therefore, they are described in detail in FM 6-30.

Copperhead Coverage Template

The Copperhead coverage template was designed as an observer position selection aid. It is used to discriminate quickly between can *shoot* and *can't shoot* engagement areas so that positions which will most effectively meet the commander's attack intent can be selected. (A template pattern is in Appendix L.) The template design is based on experience, which has shown –

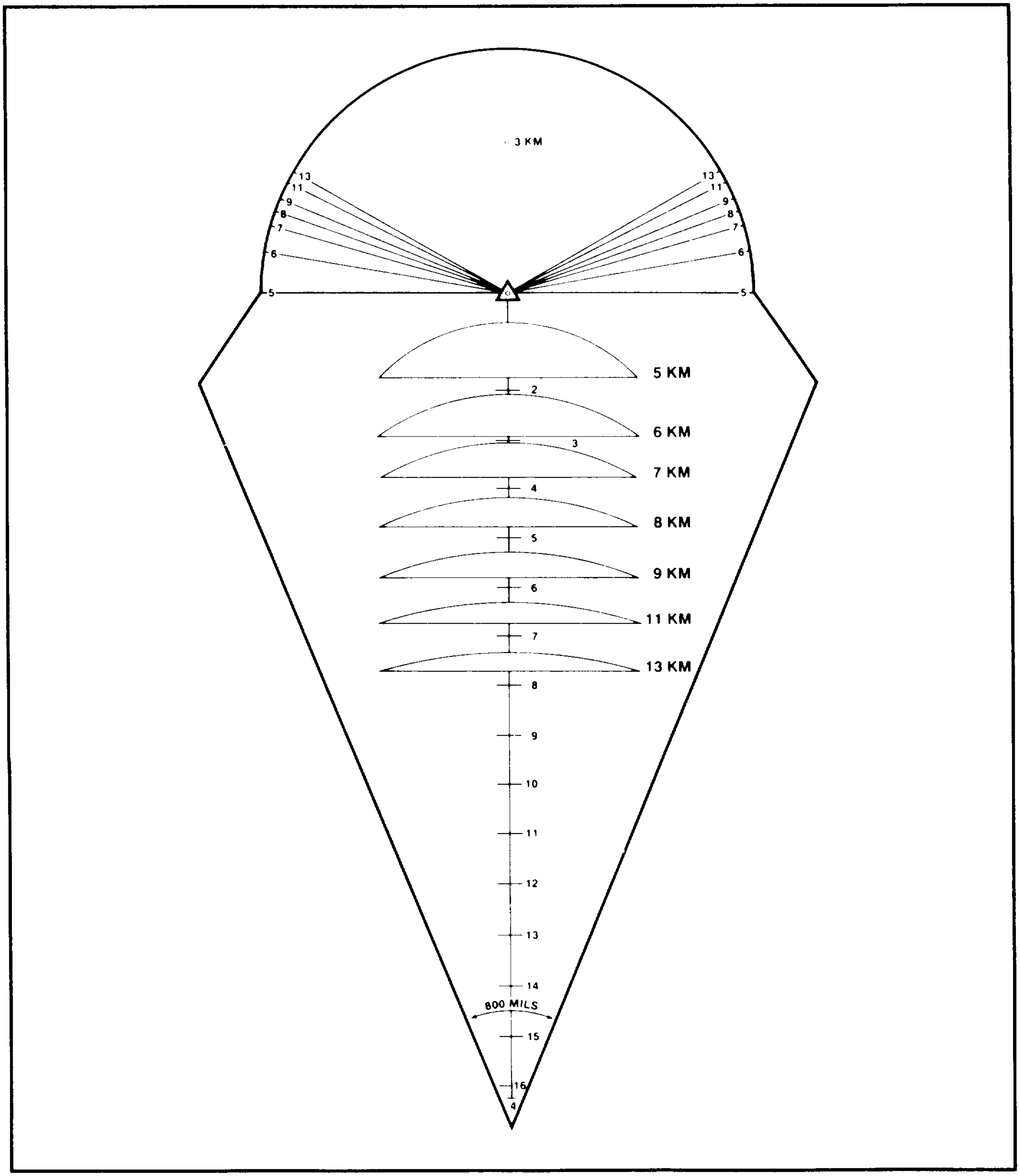
- A target engagement angle T greater than 800 roils adversely effects Copperhead targeting.
- The maximum effective distance for G/VLLD operator engagement is 3 kilometers for moving targets and 5 kilometers for stationary targets.

Thus, given desired observer positions and known firing unit locations, the Copperhead coverage template is used to quickly evaluate potential engagement areas.

There are two different procedures for determining effective Copperhead engagement areas from a given position. They are based on the location of the observer:

- More than 5 kilometers from the delivery unit.
- Less than 5 kilometers from the delivery unit.

COPPERHEAD COVERAGE TEMPLATE



More Than 5 Kilometers

The following procedure should be used to determine Copperhead coverage if the observer is located more than 5 kilometers from the FA delivery unit:

- A Determine the prospective observer positions to support the commander's intent. Place the template OP symbol over the initial desired OP location. Rotate the template over the selected OP location until the delivery unit location is under the center range line of the template.

- B Read the distance on the center range line from the observer to the delivery unit. This distance becomes the entry distance for other parts of the template.

- C Mark the distance obtained above at the appropriate point on each side of the 5-kilometer semicircle. Trace the arc along the semicircle between the marks. This arc represents the maximum effective observer engagement distance for stationary targets.

- D Select the arc in the middle of the template that is next lowest from the distance determined in B above. Reposition the template so that the ends of the selected arc are over the observer location and one end of the 5-kilometer engagement arc draw in C above. Trace the selected arc from point to point. Repeat the step for the other end of the 5-kilometer engagement arc.

- E Draw the 3-kilometer engagement arc within the engagement area designated by the previous steps. This may be done by using the holes in the template at the observer location and the 3-kilometer mark of the center range line as a field-expedient protractor.

- F This completes the construction of the Copperhead coverage area for the observer's location in relation to the particular FA delivery unit.

This procedure must be repeated for each additional Copperhead delivery unit that may fire for this observer. Considering the coverage area constructed, the FSO must now determine if the intended observer location will allow the observer to meet the commander's intent for target engagement. If the intended location will not meet the commander's intent, then another location should be selected; or, if the tactical situation does not permit alternative position selection, the commander should be told of the deficiencies in targeting capability in the selected position. A third alternative is to move the firing unit location to better support the desired observer position. This is a less desirable alternative, since the firing unit move undoubtedly would be of a greater distance than a move by the observer.

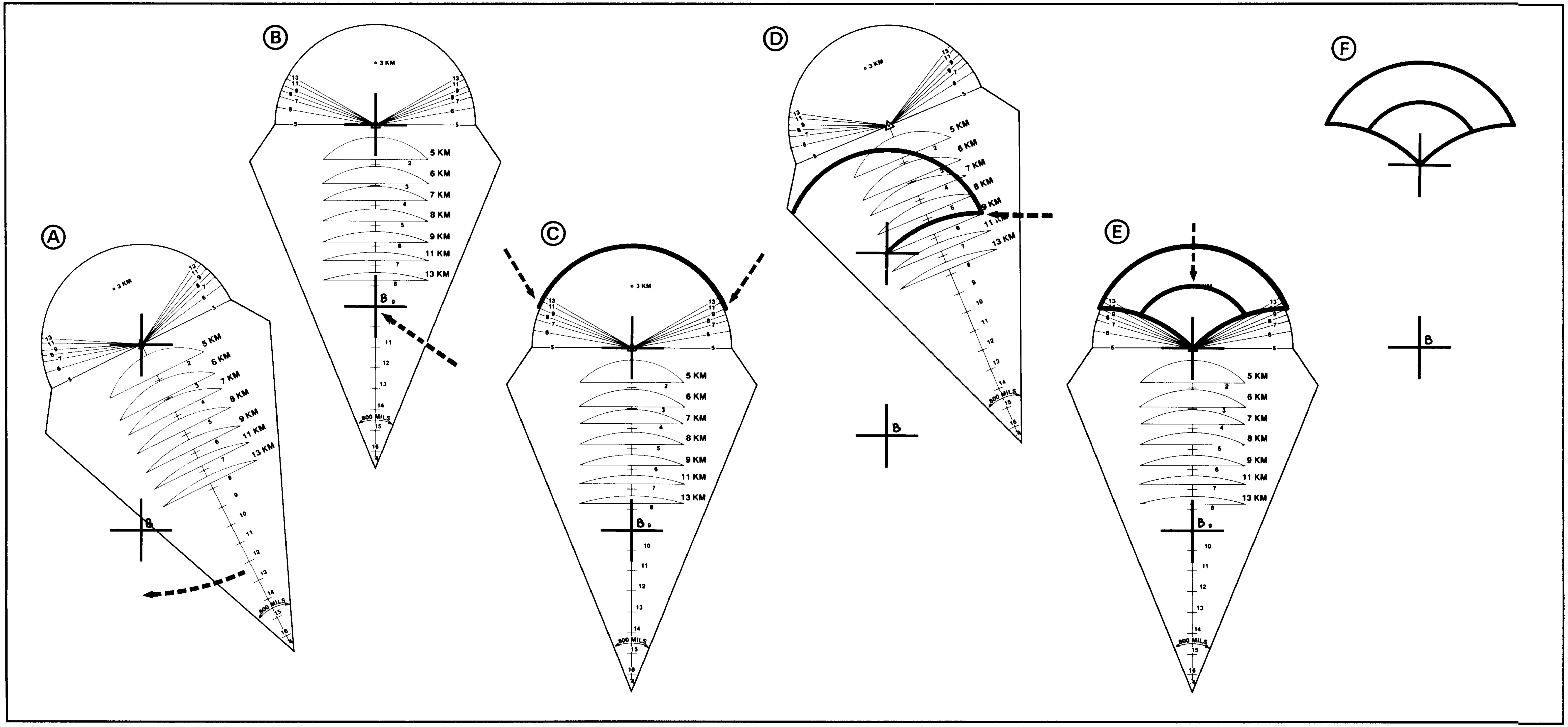
Less Than 5 Kilometers

The following procedure to determine Copperhead coverage should be used when the observer is located less than 5 kilometers from the FA delivery unit:

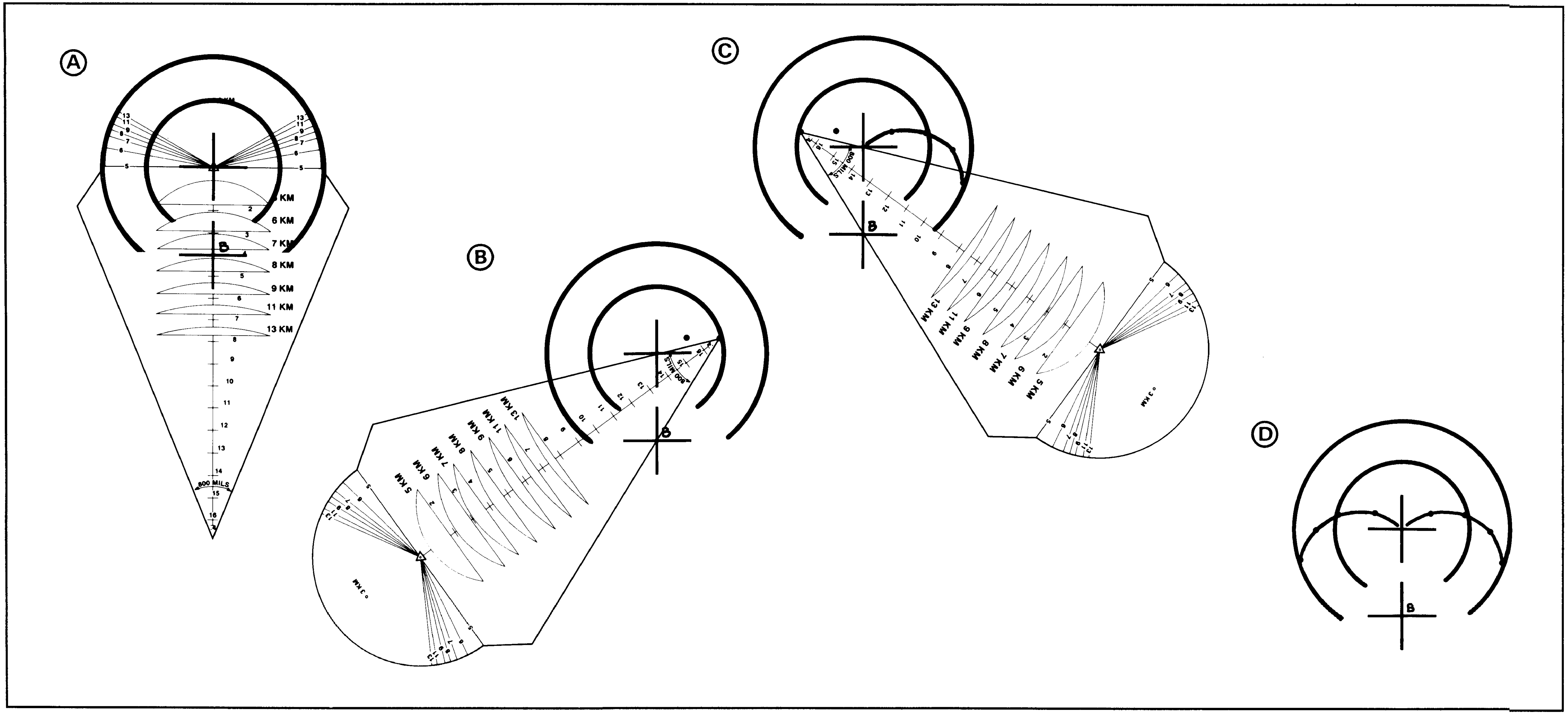
- A Draw the 5- and 3-kilometer engagement arcs around the proposed observer location. The 5-kilometer arc and the holes at the observer designation and the 3-kilometer center range line mark of the template can be used for this purpose.

- B Determine the *minimum distance wings* of the Copperhead coverage area. Position the template so that one side intersects the observer location, the other side intersects the delivery unit location, and the vertex of the 800-mil angle on the template is on the 5-kilometer arc. Mark the location of the vertex. Keeping the sides of the template aligned on the observer and delivery unit locations, move the vertex of the template and mark its location at several points across the radius of the 5-kilometer arc. These points at the vertex of the template 800-mil angle designate the minimum angle T distance for effective target engagement.

OBSERVER POSITION DETERMINATION – DISTANCE MORE THAN 5 KILOMETERS



OBSERVER POSITION DETERMINATION –OBSERVER-TO-DELIVERY-UNIT DISTANCE LESS THAN 5 KILOMETERS



- C Realign the template, and mark points across the opposite radius of the 5-kilometer arc.
- D Connect the selected points through the observer location. The resulting Copperhead coverage area is the optimum for that observer location with respect to the specific delivery unit location.

Additional coverage areas should be computed for the intended observer location in relation to other delivery units. As discussed in the previous procedure, the FSO must determine if the coverage area for the intended position meets the commander's intent. If not, another location for the observer should be chosen or the commander should determine whether the degradation of attack capability is acceptable. The third option, moving the firing unit, is also available with the same considerations as discussed previously.

Section IV. CHEMICAL MUNITIONS

Chemical Munitions Employment

The responsibility for controlling chemical weapons remains at corps until after release has been approved by national command authority. The technical aspects of planning and coordination are done at division in the FS cell with assistance from the chemical element. Authority to execute may be delegated to lower echelons (that is, division, separate brigades, or in some cases brigade) in the release message.

Planning For Chemical Munitions

For the brigade, the focal point of chemical fire planning input is the division FS cell.

The brigade may impact on the chemical strike plan by nominating to the division FS cell targets to be considered for chemical attack.

There are two important planning factors to remember:

- Chemical agents do not cause many casualties against a well-trained and well-equipped force.
- Large quantities of ammunition must be delivered in a very short time period to achieve lethal dose rates.

If authority to plan and fire chemical weapons is delegated to brigade, chemical fire planning is done by the FS cell with the assistance of the S2, S3, and chemical officer. Together they select high-payoff targets for attack with chemical munitions. Constraints from division and corps, along with the brigade commander's guidance, are considered. Just before attack chemical warning (CHEMWARN) messages are disseminated to higher, lower, adjacent, and supporting units.

Section V. NUCLEAR MUNITIONS

Nuclear Employment

In most cases, final control for the employment of nuclear weapons rests with the corps commander. It is his responsibility to ensure that nuclear weapons are used to the greatest tactical advantage, integrated into the battle plan, and employed in accordance with guidance from higher commanders. For this reason, corps is the focal point in the planning and employment of nuclear weapons using a corps nuclear package. Divisions are involved in the process using a division nuclear subpackage. Echelons below division level usually are involved as executors. Exceptions to this may exist when, for example, a brigade assumes the responsibilities of a division.

Nuclear Planning

For the brigade, the focal point of nuclear planning is the division FS cell. Nuclear planning is rarely done below this level. Brigade may impact on the nuclear strike plan by nominating to the division FS cell targets to be considered for nuclear attack. (See FM 101-31-1.)

Nuclear Execution

The DS FA battalion maybe required to execute part of the division subpackage. Just before the nuclear subpackage is executed, the brigade receives the portion of the nuclear strike warning (STRIKEWARN) that affects its zone. The brigade FSO analyzes the brigade battle plan in light of the STRIKEWARN and reports its impact to the brigade commander along with recommended changes. Also, the brigade FSO verifies the safety of friendly elements in the brigade zone against the nuclear aimpoints selected by division. If a conflict arises, he takes one of the following actions:

- Recommends to the S3 that the element be moved to a safe area or its protection be increased.
- Tells the division FS cell of the conflict and requests that the aimpoint be moved.

Nuclear Vulnerability Analysis

The brigade chemical officer conducts a nuclear vulnerability analysis for all elements of the brigade anytime the brigade is in a nuclear environment (anytime either force has the capability to use nuclear weapons, whether or not they have been employed). Recommendations on increasing protection and dispersal distances are discussed with the S3 and are presented to the commander when the situation dictates.

Fire Support Coordination

The use of nuclear weapons does not change the principles of fire support coordination. However, the greater lethality and variety of effects place an increased importance on methods and procedures for safeguarding friendly troops and activities during nuclear employment.

Fire Support Officer Responsibilities

The brigade FSO is responsible for advising the brigade commander on all aspects of the nuclear operations. These aspects include, but are not limited to –

- Time considerations in performing the nuclear mission.
- How the nuclear weapons effects may enhance the scheme of maneuver.

> **NOTE:** See FM 101-31-1 and FM 6-20-30.

Aimpoint Refinement

Certain aimpoints of the division subpackages may be located in the brigade area of operations. During the decision-making process, the brigade commander or S3 and FSCOORD must analyze the aimpoint locations as follows to ensure that the brigade scheme of maneuver is not affected:

- Will collateral damage rubble structures that will interfere with movement?
- Are aimpoints located where collateral and equipment damage is avoided from tree blowdown, bridge blowdown, and fires?
- Are minimum safe distance constraints followed?
- How will a nuclear detonation at the aimpoints affect the unit RES category?
- If the brigade is required to exploit a nuclear strike, will radiological contamination affect the scheme of maneuver?