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Armored Task-Force Engineer Combat Operations

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PREFACE

Field Manual (FM) 5-71-2 describes how the mechanized division engineer company supports a mechanized-infantry or armored battalion task force (TF). It is designed as an engineer extension of FM 71-2. This manual serves as a guide for both TF engineers and subordinate leaders in planning, integrating, and conducting engineer operations. It also serves as a guide for the TF staff and subordinate maneuver commanders on the organization, capabilities, and employment of TF engineers.

This manual sets forth the principles of conducting engineer operations supporting an armored TF. It addresses engineer tactics, techniques, and procedures (TTP) that highlight critical principles. However, the TTP are intended to be descriptive rather than prescriptive; they are not a replacement for the TTP and standing operating procedures (SOPs) that are unique to the supported unit. This publication is also designed to be used by corps combat, separate, and armored cavalry mechanized combat-engineer companies.

FM 5-71-2 is fully compatible with Army doctrine as contained in FM 100-5 and is consistent with other combined-arms doctrine. This is not a stand-alone manual. The user must have a fundamental understanding of the concepts outlined in FMs 100-5, 100-7, 100-16, 71-1, 71-2, 5-71-100, 5-100, 101-5, and 101-5-1. This manual also implements Standardization Agreements (STANAGs) 2394 and 2868.

The proponent of this publication is Headquarters (HQ), United States Army Engineer School (USAES). Send comments and recommendations on Department of the Army (DA) Form 2028 (Recommended Changes to Publications and Blank Forms) directly to Commander, USAES, ATTN: ATSE-TD-D, Fort Leonard Wood, Missouri 65473-6650.

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

CHAPTER 1

INTRODUCTION

All United States (US) Army doctrine is based on the tenets detailed in FM 100-5. This chapter relates those tenets to engineer company operations by providing a common, definable framework for doctrinal discussion.

CHALLENGES IN ARMY OPERATIONS

Army forces meet worldwide challenges against a full range of threats, including contingency operations and war. Army forces also conduct joint and multinational operations together with other services and allies. Today's battlefield has become more complex through the use of more advanced vehicles, weapons systems, and communications systems. As a result, we can expect future conflicts to be more chaotic, intense, and destructive than ever before.

ELEMENTS OF COMBAT POWER

Combat power is the ability to fight. Superior combat power is generated by combining the elements of maneuver, firepower, protection, and leadership within a sound plan and then aggressively, violently, and flexibly executing the plan. Engineer leaders understand these elements and also how the engineer force multiplies the combined-arms team's ability to fight.

Maneuver is the movement of forces supported by fire to achieve an advantageous position from which to destroy or threaten the enemy's destruction. Engineer forces maneuver with other members of the combined-arms team. They create mobility opportunities for the force in order to gain advantageous positions. They attack the enemy's maneuver with obstacles that enhance friendly maneuver advantage. With positional advantage, the combined-arms team gains and sustains the initiative, exploits success, preserves freedom of action, and reduces the vulnerability of friendly forces.

Firepower provides the destructive force needed to defeat the enemy's ability and will to fight. Commanders mass fires on the battlefield by rapidly positioning to a place of positional advantage where their effects can be massed on critical enemy targets. Engineer forces enhance the maneuver commander's ability to mass fires by using integrated obstacles within engagement areas (EAs). Engineer terrain analysis assists in the selection of avenues of approach (AAs) and EAs. Rapid obstacle-emplacement capability within the engineer force provides responsiveness to changing situations on the battlefield.

Protection is the conservation of the force's fighting potential so that it can be applied at the decisive place and time. Operations security (OPSEC), deception, reconnaissance, soldier health, safety, and fratricide prevention are all components of force protection. Engineers contribute to force protection by developing fortifications, vehicle fighting positions, and camouflage; by constructing phony and protective obstacles; and by ensuring safe operations. They also prevent fratricide by marking and reporting obstacles.

Leadership is the most essential element of combat power. Competent engineer leaders ensure effective engineer force integration within the combined-arms team. Their leadership provides purpose, direction, and motivation in combat. Engineers give the maneuver commanders options that are not otherwise available to assist them in making

critical decisions within their maneuver plans and operations. Engineer leaders ensure that engineer forces are at their highest combat readiness by continuously preparing and training them under the toughest conditions.

IMPERATIVES OF MODERN COMBAT

The challenge to the combat-engineer company is to multiply the friendly force's effectiveness while degrading the enemy's capability as the battlefield becomes more complex. To do this, the engineer force must—

- Understand how the enemy fights.
- Provide continuous support to the force.
- Ensure unity of effort.
- Anticipate events on the battlefield.
- Understand the effects of battle on soldiers, units, and leaders.
- Use terrain to their advantage and understand and communicate the terrain's effects on friendly and enemy maneuvers.
- Sustain themselves.
- Support the TF commander's intent.

Army operations doctrine, as described in FM 100-5, is the Army's concept for operating and fighting on today's battlefield. The engineer company participates on the modern battlefield as part of a maneuver battalion or TF or as part of the engineer battalion. The tenets of Army operations include agility, initiative, depth, synchronization, and versatility (AIDSV).

Agility

Agility is the friendly force's ability to act faster than the enemy. It permits friendly forces to seize and hold the initiative. Engineer companies ensure that their elements are task-organized to respond rapidly to battlefield changes. Engineers shift support to the main effort with minimum delay, reconfiguration, and coordination. Engineer units are sustainable and responsive to maneuver commanders.

Initiative

Initiative sets or changes the terms of battle by action. It requires a willingness and ability to act independently based on the higher commander's intent. Engineer units at all levels understand the supported commander's purpose and then act independently within the framework of his intent. Engineer tasks, particularly at the company and platoon levels, are often time-consuming and resource-intensive. Engineer leaders anticipate mission requirements and initiate actions before their need is fully realized at higher levels.

Depth

Depth is the extension of operations in space, time, resources, and purpose. Commanders use depth to obtain effective maneuver space, planning time, and the resources to win. Momentum in the attack and elasticity in the defense derive from depth. Engineer companies add depth to the battlefield by providing mobility, countermobility, and survivability y support to maneuver forces. In the offense, engineers add depth to the attack by rapidly reducing obstacles and fortifications to maintain a high rate of advance. In the defense, engineers add depth to the battlefield by placing obstacles and constructing fighting positions. This increases the enemy's time and cost of operation.

Synchronization

Synchronization is the arrangement of battlefield activities in time, space, and purpose to produce the maximum effective combat power at the decisive point. Combat operations involve many elements of the combined-arms force that mesh together. Engineer actions often require considerable

lead time for successful integration with the rest of the force. Engineers carefully plan their activities to ensure that the effect occurs at the decisive point and time. Engineer units also ensure that their elements are working toward the same purpose as the rest of the force. Engineers must ensure that their actions work in concert with other battlefield operating systems (BOSs) to maximize their synergistic effect.

Versatility

Versatility is the unit's ability to meet diverse mission requirements. Commanders shift focus, tailor forces, and move from one role or mission to another rapidly and efficiently. Versatility implies a capacity to be multifunctional; to operate across regions throughout the full spectrum of military operations; and to perform at the tactical, operational, and strategic levels. Engineer forces possess the ability and are ideally suited to perform in many roles and environments during war and contingency operations. They incorporate into their organizations the ability to conduct smooth transitions from one mission to another. Versatility within the engineer force is the result of well-trained and -equipped units, high standards, and detailed planning.

BATTLEFIELD ORGANIZATION

Modern battles involve close, deep, and rear operations that require continuous effort and attention. Engineer companies fight and operate on a linear or nonlinear (no front lines) battlefield. They are positioned throughout the corps's area of operations (AO) to support the overall battle.

Close operations consist of actions that support the current fight against enemy forces in contact. In close operations, engineer companies fight as an integrated part of a committed maneuver unit or in support of it. They may also fight as part of the engineer battalions/TFs.

Deep operations consist of actions directed against enemy forces not in contact. They are used to simultaneously attack the enemy through the depth of the commander's battle space. Engineer units participate in deep operations in several ways. They may provide terrain analysis to maneuver commanders and may assist in target analysis and nomination. They may also provide advice on using remotely delivered situational obstacles in the enemy's rear area. Engineer units may also open and maintain necessary routes and aviation facilities and participate in raids whenever ground forces conduct deep operations.

Rear operations are actions to the rear of elements in contact. These actions assure freedom of maneuver and continuity of operations. Engineer units provide extensive support to rear operations. Survivability in the form of hardened shelters, protective obstacles, and camouflage measures are typical missions.

Army operations doctrine envisions battles fought over wide areas, up to 400 kilometers (km) (249 miles) deep. The battles will be fought at a faster pace and with increasingly sophisticated weapons. The battlefield may be nonlinear, asymmetrical, or noncontiguous. Under this concept, the brigade may replace the division as the major tactical element on the battlefield. Corps commanders may task-organize brigades into divisions to accomplish each mission.

The effect of future Army operations on engineer units is significant. Engineer support to combat operations will be based on habitual relationships. Engineer battalions will support maneuver brigades while engineer companies will support battalions/TFs. Also, the engineer company could fight directly for the engineer battalion/TF. Tactical operations will rely heavily on the use of counterattacks to defeat the enemy. This will require engineer companies to provide extensive mobility support.

TASK-FORCE ORGANIZATION AND FUNCTIONS

The battalion/TF is the lowest echelon at which firepower, maneuver, intelligence, and other combined-arms support are combined under a single commander. Mechanized-infantry and tank battalions are organized, equipped, and trained to accomplish compatible missions based on the respective battalion's unique capabilities and limitations.

The tank and mechanized-infantry battalions' capabilities are increased through task organization. Based on his estimate of the situation, the maneuver brigade commander task-organizes tank and mechanized-infantry battalions by cross attaching companies between units. The brigade commander determines the mix of companies in the TF. Similarly, the TF commander's estimate may require cross attaching platoons to form one or more companies/teams for specific missions.

The TF is formed by placing pure (not task-organized) tank and mechanized-infantry companies under the command of a battalion headquarters. Combat support (CS) and combat service support (CSS) elements within the brigade perform mission analysis and are integrated into the TF structure based on the higher commander's estimate of the mission and the assets required to accomplish the specific mission. This provides a versatile force mix, increasing the options available to the force commander (see Figure 1-1).

TASK-FORCE COMMANDER

The TF's fighting characteristics are set by the TF commander's tactical and technical

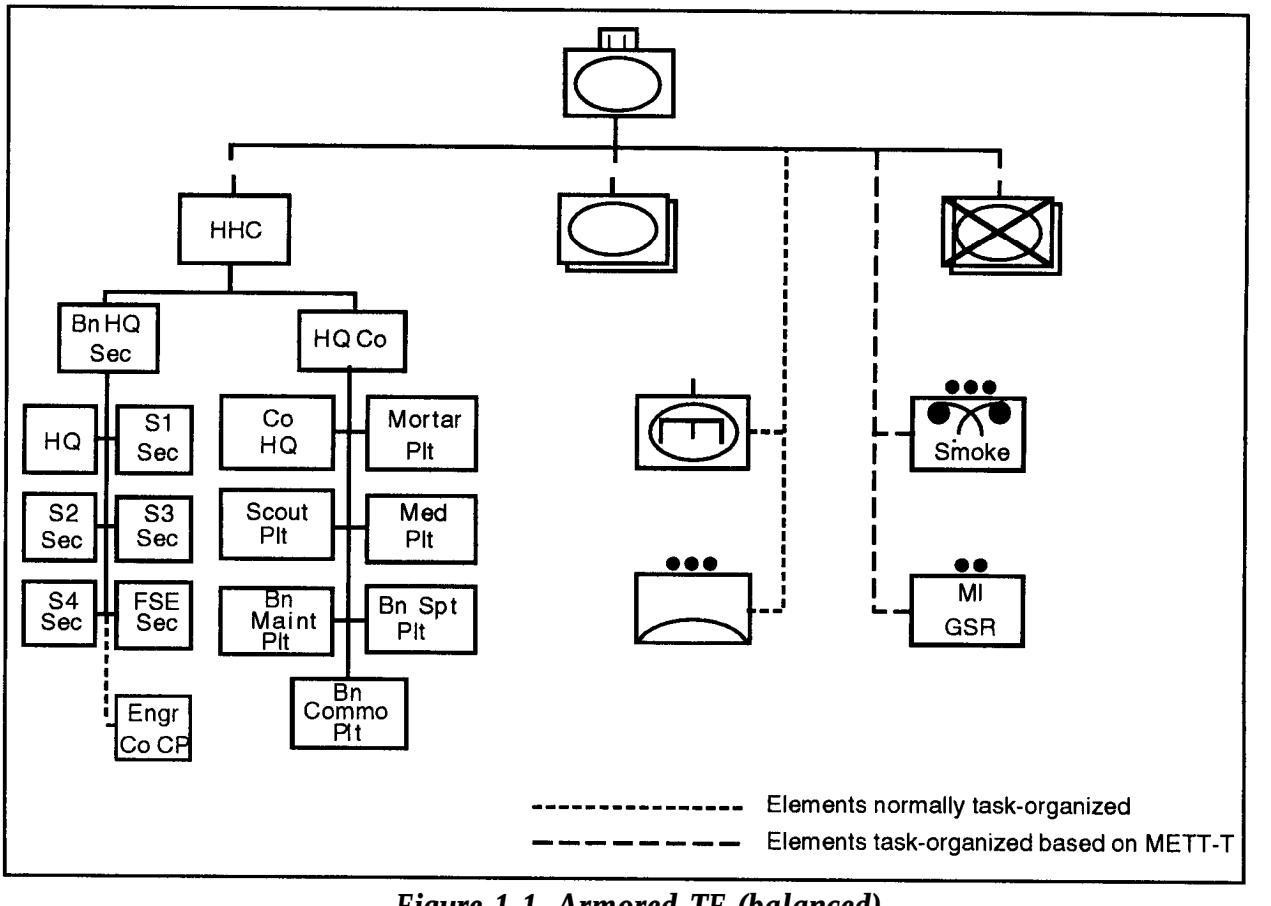


Figure 1-1. Armored TF (balanced)

leadership skills. He develops the TF combat team by organizing his assets based on mission, enemy, terrain, troops, and time available (METT-T).

TASK-FORCE STAFF

The TF is the lowest tactical echelon with a staff. The TF staff is organized specifically to be a single, cohesive unit to assist the commander in accomplishing the mission. The TF executive officer (XO) is the principal assistant to the TF commander. The TF XO is the TF's "chief of staff" and is second in command (2IC). He is the principal integrator of the coordinating and special staffs, and his main emphasis is on CSS operations in support of the TF maneuver plans. The TF staff consists of the organic coordinating staff officers from the base unit of which the TF was formed. They include the—

- Adjutant (US Army) (S1).
- Intelligence Officer (US Army) (S2).
- Operations and Training Officer (US Army) (S3).
- Supply Officer (US Army) (S4).
- Battalion maintenance officer (BMO).

The TF also has special staff officers (organic, assigned, or attached) who represent special areas of expertise. These officers, who normally advise the TF commander during combat operations, include the—

- *S3* air officer.
- Chemical officer.
- Tactical intelligence officer.
- Liaison officer (LO).
- Battalion signal officer (BSO).
- Battalion surgeon.
- Battalion chaplain.
- TF engineer.
- Fire-support officer (FSO),
- Air-defense artillery officer (ADO).
- Air liaison officer/forward air controller (FAC).

The special staff represents the subject-matter expertise of the TF staff in their particular BOS.

Senior leaders of critical elements supporting the TF provide special staff assistance to the commander directly or through the primary staff. These leaders provide the commander with information on integrating their assets into the TF combat team. They are the special staff representatives for specific BOSs. These senior leaders include the following:

TF Engineer

The TF engineer is the senior leader of the supporting engineer unit. He advises the commander on the employment of engineer assets. He is normally the engineer company commander.

FSO

The FSO is a habitually associated special staff officer from the field artillery (FA) battalion in direct support (DS) of the brigade. He coordinates all fire support for TF operations and establishes the fire-support element (FSE) at the TFs main command post (CP). The FSO normally operates forward with the TF commander. The FSO coordinates for indirect-fire coverage of obstacles and breaching. He is also a key planner for artillery-delivered family of scatterable mines (FASCAM).

ADO

The ADO is the senior leader of the supporting air-defense artillery (ADA) unit. He advises the TF commander on the employment of ADA assets.

Air Liaison Officer/FAC

The FAC is a United States Air Force (USAF) officer responsible for coordinating and employing USAF assets in support of the TF. The FAC is responsible for the tactical air-control party (TACP). He primarily operates forward with the TF commander.

Further detailed descriptions of the special staffs respective functions can be found in FMs 71-2 and 101-5.

ENGINEER COMPANY ORGANIZATION

The engineer company is the lowest engineer echelon that can plan and execute continuous 24-hour operations in support of the maneuver force. The engineer company is ideally suited for integration into maneuver TF operations. It is an agile organization that assures the freedom to maneuver on the battlefield within the combined-arms-team framework. Its structure and operational characteristics enhance force momentum and lethality and increase the synchronization of engineer actions within the TF's battle space.

The engineer company frequently fights as part of the engineer battalion/TF. The company retains its normal mission of assuring mobility. However, the commander does not have a special staff responsibility relationship with the engineer battalion commander. When fighting with the engineer battalion, the company commander enjoys a role similar to that of his armor and mechanized-infantry peers in TF organizations.

MISSION

The engineer company's mission is to increase the combat effectiveness of the maneuver TF by accomplishing mobility, countermobility, and survivability tasks. Engineers supporting the TF are critical combat multipliers, preserving the freedom of maneuver, enhancing the TF's firepower, and protecting the force from enemy weapons effects.

ORGANIZATION

The division engineer company consists of a company headquarters, two combat-engineer platoons, and an assault and obstacle (A&O) platoon (see Figure 1-2). Other mechanized nondivision engineer companies have different variations of this organization (see Figure 1-3). The company can be organized to operate as an engineer pure element, or it can receive cross-attached tank or infantry platoons. The company headquarters includes the commander; the operations officer (also known as the XO); the first sergeant (lSG); the operations noncommissioned officer (NCO); the supply sergeant; the nuclear, biological, and chemical (NBC) sergeant and the communications specialist or NCO. The company headquarters commands and controls the unit's tactical employment and administrative operations.

Engineer Platoon

The engineer platoon is normally the lowest-level engineer unit that can effectively accomplish independent missions and tasks. It is a basic unit capable of maneuvering during combat operations, and it can fight as part of the engineer company or as part of the maneuver company/team. The engineer platoon consists of a platoon headquarters section and three engineer squads. On the battlefield, the engineer platoon can expect rapid and frequent movement. It prepares to fight both mounted and dismounted, during various situations. The engineer platoon frequently receives augmentation in the form of special equipment from the A&O platoon.

Engineer squads can be task-organized for specific missions with limited duration such as engineer reconnaissance missions. Task-organizing below platoon level degrades the engineer platoon leader's ability to mass critical engineer assets during operations.

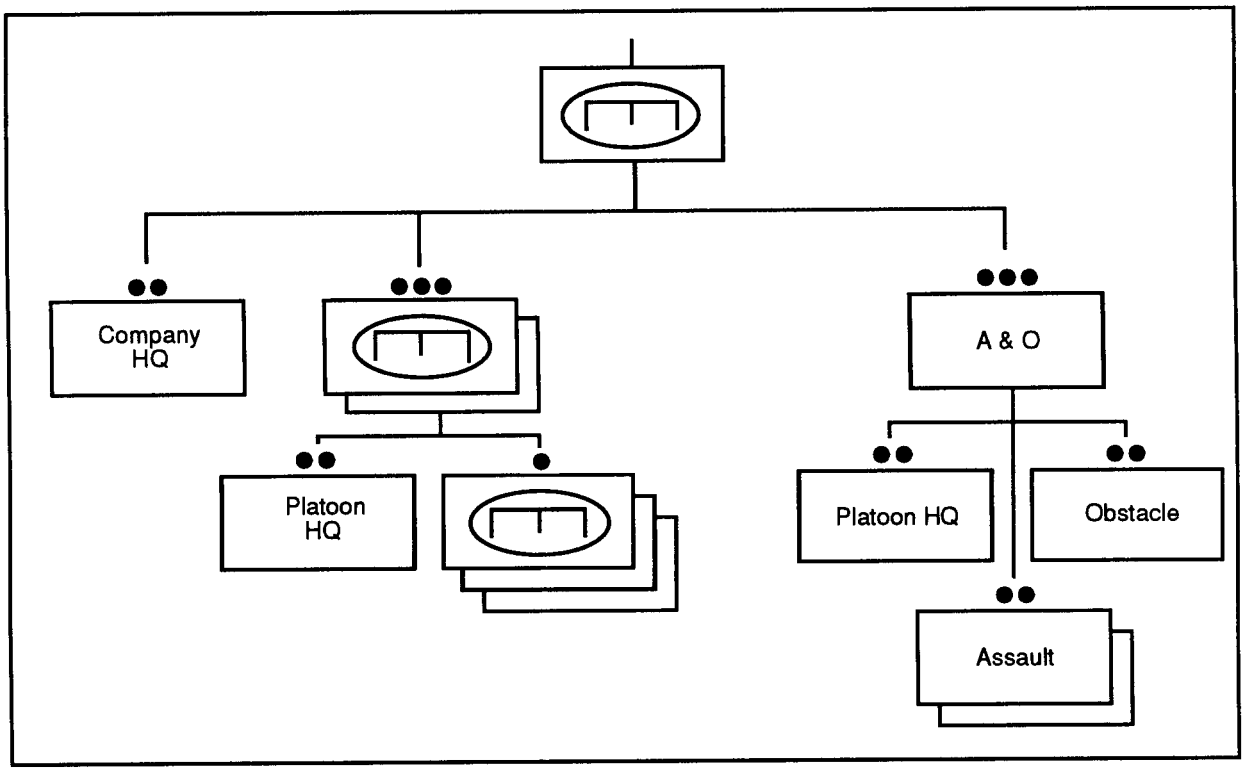


Figure 1-2. Engineer company (mechanized) structure

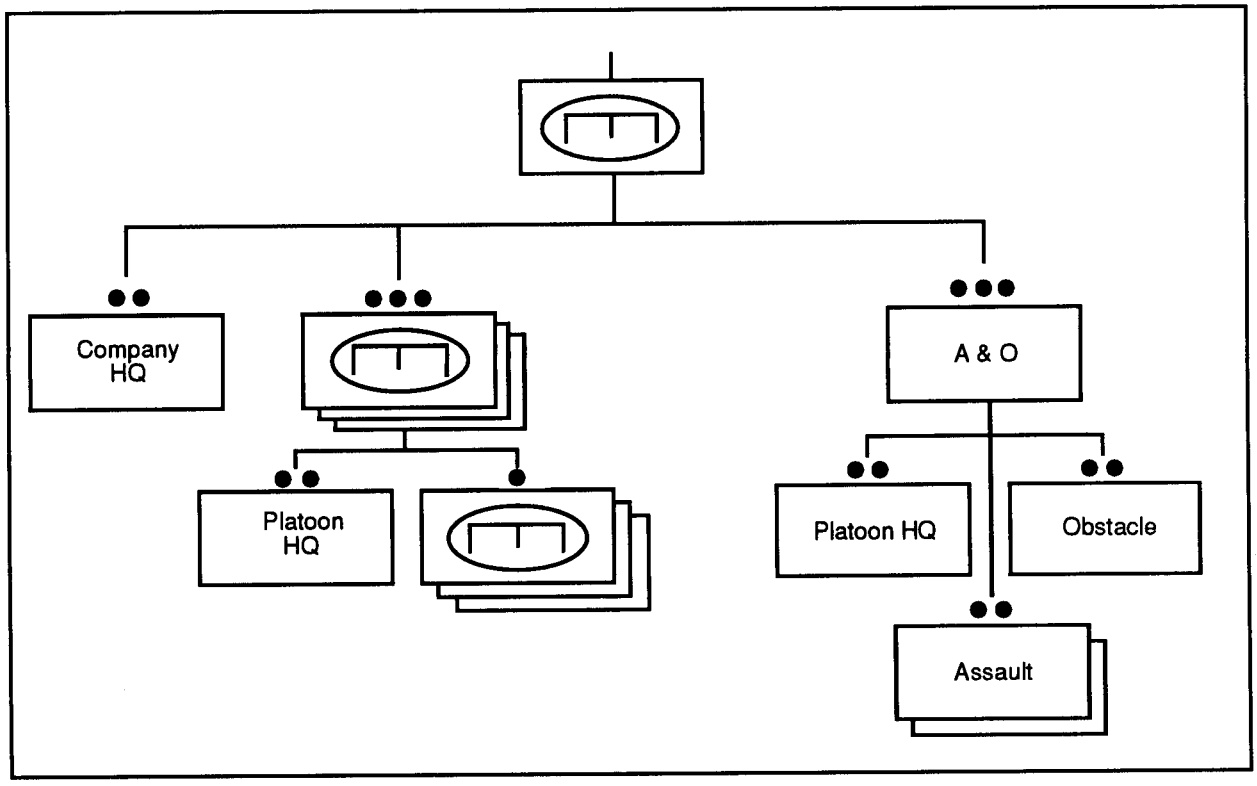


Figure 1-3. Engineer company (armored cavalry reglment/separate brigade) structure

A&O Platoon

The A&O platoon is a unique element that contains specialized engineer heavy equipment to support mobility, countermobility, and survivability tasks undertaken by the company or platoons. The platoon consists of a platoon headquarters section, two assault sections, and an obstacle section. The A&O platoon is not organized to operate independently like the other engineer platoons. It provides the company commander with specialized equipment to weight both offensive and defensive operations. Normally, the A&O platoon is responsible for fortification construction, specialized equipment control, and flank obstacles. The platoon will normally operate—

- Supported by an engineer platoon.
- In task-organized sections in support of the engineer platoon or company.
- Task-organized to a maneuver company/team within the TF.

The assault sections are structured for mobility missions, focusing on reducing enemy complex obstacles and fortifications that inhibit friendly maneuver. Each assault section contains armored combat-engineer vehicles that are capable of reducing a variety of natural and man-made obstacles such as minefield, gaps, and constructed berms. The section's activities are controlled by a section sergeant who maintains communications with the individual vehicles and the element that they are supporting.

The obstacle section is structured to focus on reinforcing terrain with obstacles to attack the enemy's ability to maneuver. The section also has the capability to perform survivability tasks to protect personnel and fighting vehicles and systems within the maneuver force. The section contains armored combat earthmovers (ACEs) and multiple mine-delivery systems. Their activities are controlled by a section sergeant, using the same considerations as within the assault sections.

CHAPTER 2

COMMAND AND CONTROL

A company commander uses the command-and-control (C^2) process to ensure that his company accomplishes its missions. Many tools are available to assist him in planning and executing tactical missions. This chapter provides the TTP needed to command and control the engineer company and to make sound tactical decisions.

COMMAND AND CONTROL RESPONSIBILITIES

A leader's fundamental responsibility is to understand both the boundaries and distances of C^2. He must provide the proper level of command while exercising the appropriate level of control to be effective. Both are critical to the engineer company's success.

COMMAND

Command is the art of military leadership. As part of commanding, leaders weigh the mission requirements and the soldiers' welfare. The company commander demonstrates concern for the soldiers' well-being and leads by example to inspire their confidence. A commander often delegates authority to subordinates. This reinforces and strengthens the chain of command. Responsibility, however, can never be delegated. When subordinates succeed, it is their success; when they fail, it is the commander's responsibility to accept that failure and to initiate corrective action.

CONTROL

Control is inherent in C^2. The commander uses control to monitor the company's status and to identify and correct deviations from set standards. The commander provides a means to measure, report, and correct performance. Control allows him the freedom to operate, to delegate authority, to lead from any critical point on the battlefield, and to synchronize actions across his AO.

COMMAND/SUPPORT RELATIONSHIPS

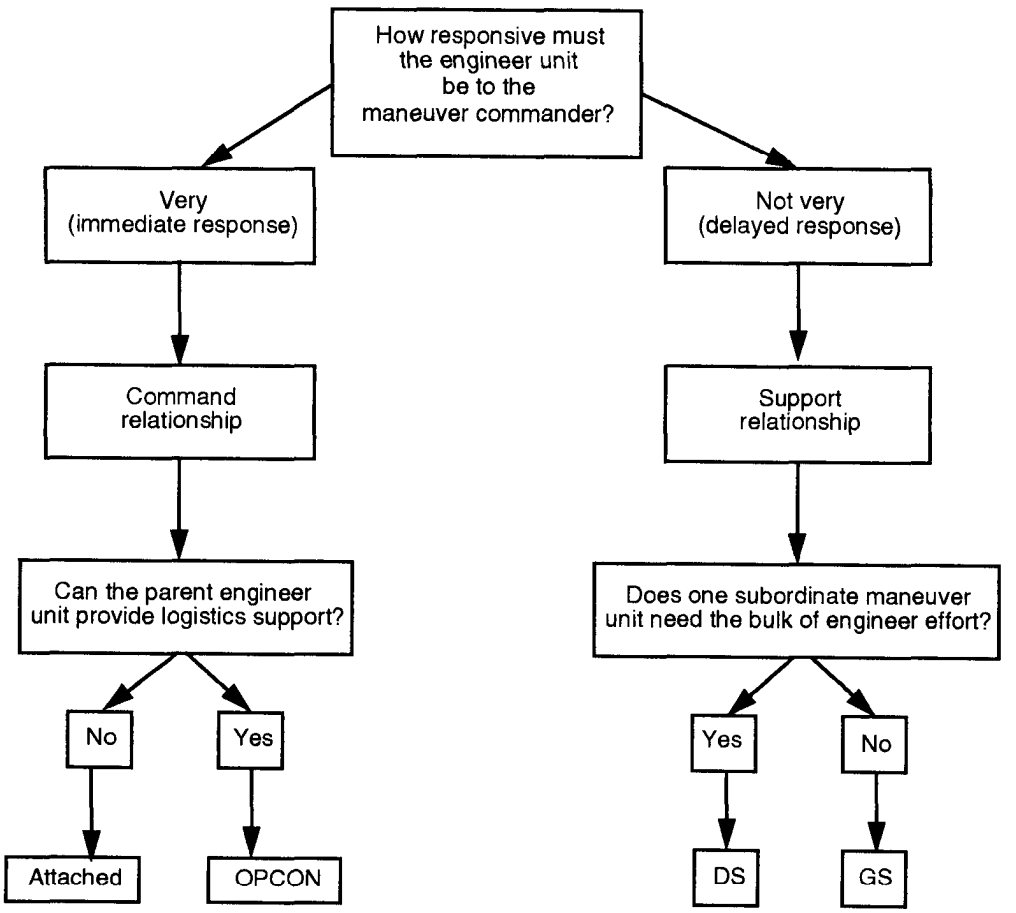
Engineer companies are organic to engineer battalions (except numbered separate companies). The engineer company can be task-organized to support maneuver TFs, other engineer battalions, or cavalry squadrons based on mission requirements. However, these task organizations are relatively short in duration. The engineer company commander has the challenging task of keeping his parent engineer battalion apprised of his status regardless of the command/support relationship the company enjoys with another unit. This is a critical concept that facilitates future planning and the use of the engineer force in subsequent operations.

Engineer companies are frequently task-organized in a variety of ways, depending on the mission and its requirements. The command/support relationship with other units establishes the lines of authority and support. Figure 2-1, page 2-2, illustrates a decision graphic for command/support relationships. A company may be organized under any of the following relationships:

Attached

An attached relationship is the temporary placement of the company in an organization. The commander of the supported organization exercises the same degree of C^2 as he does over his organic units. When attached, the engineer company receives all

Decision graphic



Engineer support

	Command/ task-organize	Assign tasks	Support logistically[2]	Reorganize as infantry
Attached	S	S	S	S
OPCON	S	S	P	S
DS[1]	P	S	P	P
GS	P	P	P	P

NOTES: [1]**The engineer commander retains the authority to further allocate engineer support in a DS relationship to maneuver.**

[2]**Although this is the normal arrangement, support can be obtained from the supported unit with prior coordination.**

Legend: P = Parent unit
S = Support unit

Figure 2-1. Decision graphic and engineer support

of its missions and support from the supported TF, not the engineer battalion.

Operational Control

In an operational control (OPCON) relationship, the company receives all of its taskings and missions from the supported TF. The supported commander retains the same authority over the engineer company as over his organic units. Logistical support normally comes from the parent engineer battalion. However, the supported unit provides Class IV/V barrier materials to the engineer company. Additionally, engineer units under OPCON can receive Class I, III, V, and IX support to the maximum extent possible. This support is coordinated through the engineer battalion and the supported unit before the OPCON directive becomes effective.

Direct Support

In a DS relationship, the company answers directly to the TF's request for support. Logistical support is provided by the parent engineer battalion. The engineer company is commanded by the engineer battalion commander. Normally, the engineer company will be in DS when the supported commander does not require immediate engineer responsiveness or a higher-level commander requires a flexible engineer force structure.

General Support

In a general support (GS) relationship, the company supports the TF or supported unit as a whole, not as any particular part or subdivision of the force. The company receives missions and all support from the engineer battalion. Usually, the supported commander does not require the bulk of the engineer effort. Table 2-1, page 2-4, details the specifics of each command/support relationship.

Other Considerations

In certain extreme situations, the engineer battalion may not be able to provide all of the CSS the engineer company requires, but an attached relationship with the TF may not be appropriate. With proper coordination (between the engineer battalion, the maneuver brigade, and the TF) the TF can provide additional CSS to the engineer company even though the engineer company is not attached. This additional CSS may be only partial support. For example, the TF may supply Class I, II, III, and V (small arms) supplies and medical support, while the engineer battalion provides all other classes of supply and maintenance support.

UNIT COOPERATION

Cooperation is essential to the mission's overall success, even when formal relationships have not been determined. Cooperation normally occurs when units—

- Are adjacent to each other.
- Occupy the same area.
- Maneuver through the same area.
- Are given parts of the same task to accomplish.

Close cooperation requires coordination. Close communication between units improves cooperation and synchronization.

ENGINEER COMPANY ORGANIZATION AND RESPONSIBILITIES

The engineer company commander normally has dual responsibilities as both a commander and TF staff officer. He is responsible for all engineer missions within the TF's AO. He is the primary engineer advisor to the TF commander on mobility, survivability, and countermobility. His leadership is vital to the engineer company's C^2. He provides the purpose, direction, and motivation necessary for his company to accomplish the many missions that the TF requires.

The XO is normally the primary engineer staff officer on the TF staff. He assists the

Table 2-1. Command/support relationships

	Support Relationships		Command Relationships	
An engineer element with a relationship of—	GS	DS	OPCON	Attached
Is commanded by—	Parent unit (note 2)	Parent unit (note 2)	Supported unit	Supported unit
Maintains liaison and communications with—	Supported and parent units	Supported and parent units	Supported and parent units	Supported unit
May be task-organized by—	Parent unit	Parent unit	Supported unit	Supported unit
Can be—	Used only to support the parent force as a whole; may be given task or area assignments	Dedicated support to a particular unit; may be given task or area assignments	Placed OPCON to other engineer/ maneuver units; made DS to divisions, brigades, or TFs; or retained GS	Further attached, OPCON, or DS to divisions, brigades, or TFs or retained GS
Responds to support requests from—	Parent unit	Supported unit	Supported unit	Supported unit
Has work priority established by—	Supported unit	Supported unit	Supported unit	Supported unit
Has spare work effort available to—	Parent unit	Parent unit	Supported unit	Supported unit
Forwards requests for additional support through—	Parent unit	Parent unit	Supported unit	Supported unit
Receives logistical support from—	Parent unit	Parent unit	Parent unit (note 1)	Supported unit (note 1)
Sends reports to—	Parent unit	Supported unit; information to parent unit	Supported unit; information to parent unit	Supported unit; information to parent unit

NOTES:

1. When attached, the engineer element is provided administrative/logistics support. When placed under OPCON, the supporting unit provides support in the common classes of supply to the maximum extent possible.

2. It is possible that units will receive additional engineer support without a command relationship (for example, the DS relationship to the division).

3. Regardless of the type of relationship, activities of engineer units working in an area are under the staff supervision of the area engineer.

4. The supported unit, regardless of the command/support relationship, is to furnish engineer materials to support engineer operations.

engineer company commander in his special staff-officer responsibilities and collocates the engineer CP with the TF tactical operations center (TOC) throughout the planning, preparation, and execution phases of the operation. The CP remains an integral part of the TOC for monitoring the engineer preparation and execution status during the operation. The XO is responsible for the initial development of the engineer battlefield assessment (EBA). He receives guidance and direction from the company commander and information from the TF and engineer battalion S3s and the assistant brigade engineer to assist him in this task. He also supervises the company headquarters section. The XO, along with the TF S2, develops the TF's situation template (SITEMP). The XO ensures that the terrain analysis and the analysis of the enemy's engineer capabilities are incorporated into the SITEMP. He analyzes the friendly engineer capability and assists the company commander in integrating engineers into the TF's scheme of maneuver and in developing the TF engineer annex and the company operation orders (OPORDs). The XO is the logistics planner for the engineers in the TF's sector.

The 1SG is the primary company logistics executor. He coordinates with either the TF or engineer battalion S4, the support platoon leader, the company supply sergeant, and the A&O platoon leader to ensure that the engineer company is logistically prepared for its next mission. He develops the company's CSS plan and ensures that it is integrated into the engineer battalion or TF CSS plan. He is the company commander's senior enlisted advisor, his primary agent for the welfare of the company's soldiers, and his quality-control agent. The 1SG is the driving force behind the company's prebattle preparation. He directly supervises the company's NCOs as they inspect their platoons before the company commander performs his precombat inspections. He is also the key coordinator for additional medical support for the company.

The engineer platoon leader has dual responsibilities as both a platoon leader and as the senior engineer advisor to the maneuver company/team. He is the company/team commander's expert on mobility and countermobility.

The A&O platoon leader is the survivability expert in the engineer company. In the offense, he may lead the company's mobility reserve. He may also act as the company's maintenance officer to assist in this critical combat function.

The company operations NCO is critical to the company's ability to maintain 24-hours-per-day operations. He must be able to prepare the initial EBA in the XO's absence. He is pivotal to the company's ability to perform sustained planning.

The engineer company CP provides the TF's TOC with information about current engineer operations that are required for making timely decisions. The company CP should have the same command, control, communications, computers, and intelligence (C4I) capabilities as the company commander, the supported TF, and the engineer battalion in order to interface digitally with these elements. The engineer company CP—

- Tracks friendly and enemy obstacles.
- Coordinates the execution of the scheme of engineer operations (SOEO) within the TF.
- Synchronizes the engineer effort among the maneuver companies/teams.
- Provides engineer expertise to the TF staff.
- Receives, posts, and analyzes combat information affecting current engineer operations and provides input to the TF intelligence preparation of the battlefield (IPB).

- Coordinates reports and information with the engineer battalion CP.
- Provides engineer expertise to the TF FSE.

ENGINEER TACTICAL PLANNING

Engineer tactical planning is an integral part of the TF's decision-making process. It is imperative that the engineer be fully integrated in TF planning and also an expert at engineer planning.

PLANNING AND DECISION MAKING

Commanders at all levels are responsible for planning tactical operations and making sound decisions. The tactical decision-making process, troop-leading procedures (TLPs), and the engineer-estimate process are all tools available for decision making. These processes are integrated and accomplished concurrently rather than sequentially. The engineer estimate and the TF and engineer company OPORDs are covered in greater detail in Appendixes A and B. The engineer estimate is prepared as part of the TF's tactical decision-making process and follows the basic format of the TLPs. The engineer company OPORD is based on the SOEO from the engineer estimate.

The engineer estimate is the primary tool that engineers use to facilitate planning in the TF. The estimate allows the TF engineer to integrate his company's capabilities as a combat multiplier into the TF's plan. The estimate allows the timely development of an SOEO and facilitates the early employment of engineers.

The tactical decision-making process provides the framework for focusing the TF staff as they develop the TF plan. The engineer estimate is an extension of the tactical decision-making process and is integral in developing a successful plan. Figure 2-2 illustrates the relationships between the engineer estimate, the tactical decision-making process, and the TLPs.

The TF plan dominates the development of the engineer estimate. The engineer must understand the TF plan in order to plan for engineer support properly. He must thoroughly understand the TF commander's intent and concept for maneuver, engineers, and fire support. The engineer estimate should be a continuous process, with each step or consideration refined based on changes in the current situation and any changes to future missions.

The engineer battalion is a principal provider of intent. The engineer battalion commander may also provide important information, intent, guidance, and direction to assist the company commander's development of his plan, regardless of the command/support relationship. The company commander should seek the brigade engineer's guidance whenever possible.

The TF engineer ensures that required engineer missions and instructions and constraints or limitations are included in the appropriate part of the TF OPORD. Information related to engineers is not solely compiled in an engineer annex. Doing so can obscure information that is critical to all elements of the TF. For example, the enemy's use of scatterable mines (SCATMINEs) during his preparatory fires should be included in the enemy situation subparagraph of the OPORD. Likewise, if Team A is required to breach two lanes to allow the TF to envelop the enemy, then this should be a task specified in the subunit instructions to Team A, not hidden in an engineer annex.

The SOEO is another example of engineer information contained in the base TF OPORD. It describes the general concept for how the engineer company will support the TF operation. The engineer-estimate process enables the TF engineer to identify critical engineer-specific information and mission-essential tasks for inclusion into the

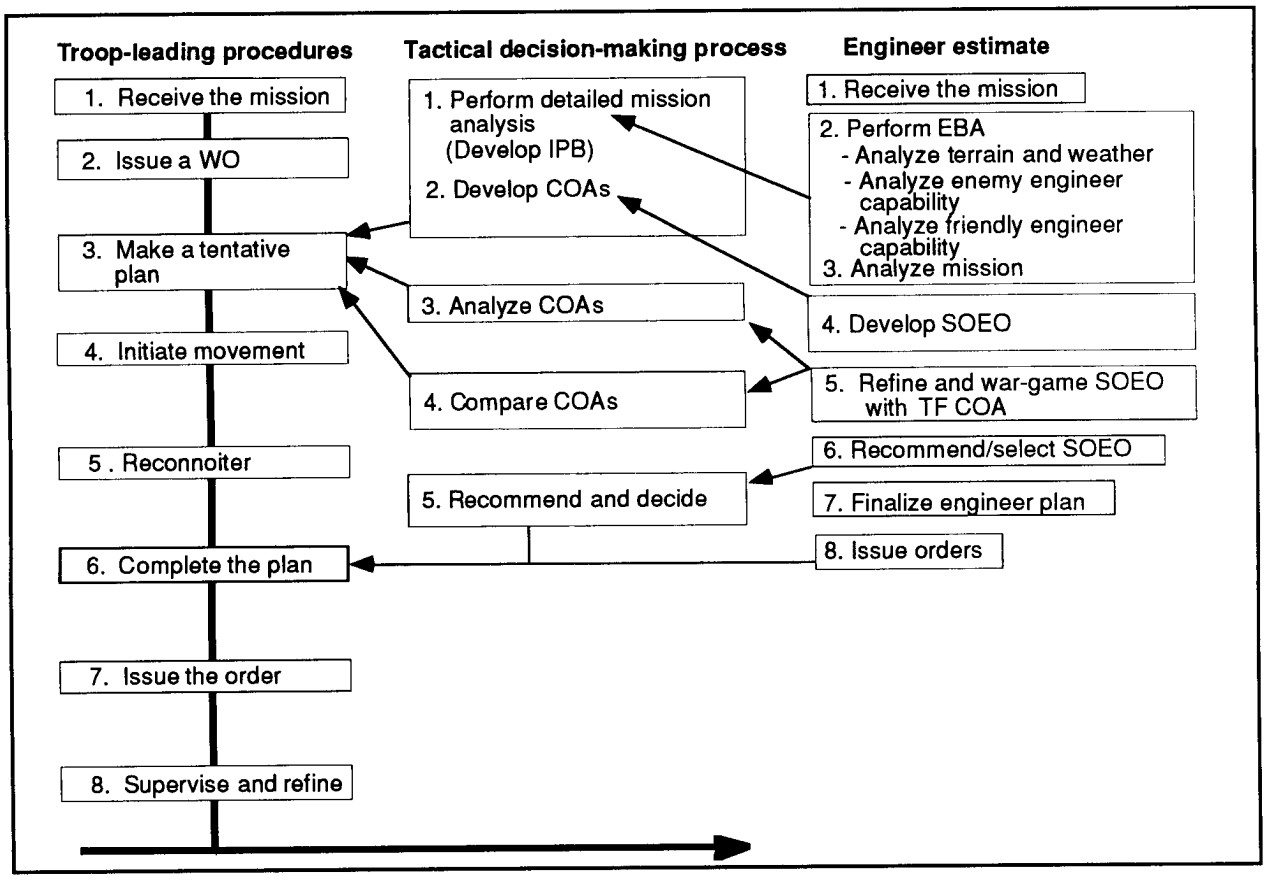


Figure 2-2. Relationship between TLPs, the tactical decision-making process, and the engineer estimate

base TF order. Table 2-2, page 2-8, illustrates how key components of the engineer-estimate process drive engineer input into the TF order.

FINALIZED ENGINEER PLAN

The SOEO is refined during war gaming as part of the TF's course of action (COA). The final SOEO is the basis for the engineer order.

ORDERS

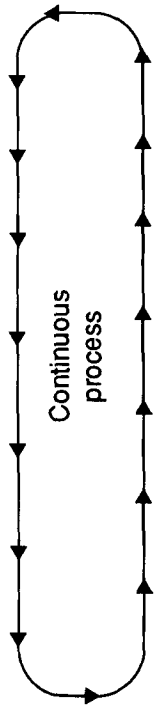
Commanders issue timely, clear, and concise orders to give purpose and direction to their subordinates. The engineer company commander translates the TF's SOEO into clear, concise engineer missions. The company order combines the concept of engineer support for the TF with the engineer-company-specific plans required to accomplish specific engineer tasks identified during mission analysis. The engineer company order ensures unity of engineer effort.

The engineer company commander uses the OPORD to command the engineers remaining under his control for the operation. The engineer company commander, as the TF engineer, uses the combination of the TF order and his company order to exercise the appropriate level of C^2 of the engineers in the TF. The TLPs provide the format for developing the company order and supervising the engineer company's preparation for the operation.

TROOP-LEADING PROCEDURES

TLPs begin when the mission is received, and they end when the mission is completed.

Table 2-2. Engineer estimate/input into the OPORD



Engineer Estimate	Input	OPORD Paragraph
Conduct IPB/EBA	Critical aspects of the terrain and enemy engineer activity that impact the TF plan	1. Situation a. Enemy Intelligence annex
Analyze the engineer mission	Mission-essential M/S tasks assigned to the TF or engineer company	3. Execution e. Subunit missions • Maneuver • Engineer
Develop the SOEO	Concept of engineer operations to support the TF	3. Execution d. SOEO
	Task organization of engineer forces and command/ support relationships	Task organization
	Allocation of M/S mission resources to companies/ teams	4. Service support
	Graphic control measures needed for obstacle control or breaching	Overlays: Operations Engineer CSS
War-game and refine the engineer plan	Additional coordinating instructions to companies/ teams that are needed to synchronize the engineer effort	3. Execution f. Coordinating instructions
Recommend a COA	Finalize the SOEO	2. Mission 3. Execution d. SOEO

These procedures consist of a series of actions used for planning, coordinating, executing, and supervising tactical operations. The exact sequence and timing of each TLP depend on the time and information available to the leader. A warning order (WO) may be issued immediately after the receipt of the mission or later as more information is available. Reconnaissance should be ongoing throughout the preparations, but should be completed before the order is issued. The following are the steps involved in TLPs:

1. Receive the mission.
2. Issue the WO.
3. Make a tentative plan.
   - Estimate the situation.
     - — Analyze the mission in detail.
     - — Analyze the terrain and enemy.
     - — Develop a COA (plan).
     - — Analyze the COA (war-game).

— Make a decision.

- Expand the COA into a tentative plan.

4. Initiate movement.
5. Reconnoiter.
6. Complete the order.
7. Issue the order.
8. Supervise the execution.
   - Rehearse.
   - Inspect.
   - Coordinate.

Receive the Mission

The mission is received either in writing or as an oral order. Normally, the order will be preceded by a WO from the engineer battalion. The company commander starts planning upon receipt of the WO with the information available. He plans backwards to ensure that key parts of the mission are adequately planned and that planning time is well-spent. He tries to use one-third of the time available to provide two-thirds of the time to his subordinates for planning at their levels. The engineer commander will have advanced warning of the mission because of his role as the TF engineer. He can then begin his TLPs with the receipt of the TF's WO. This gives him a head start on the other company commanders within the TF.

Issue the Warning Order

The WO should include, as a minimum, the following information:

- The situation and the mission type (attack, defend, or delay).
- The time the operation starts (start-point [SP] time, line-of-departure [LD] time, or no later time to defend).
- The time and place of the company OPORD.

Any other available information should also be part of the WO (such as information needed to begin preparation and required precombat inspections); however, the order should be issued as soon as possible to allow planning to start. Subsequent WOs may be issued as more information becomes available. See page B-5 for additional information on the WO.

Make a Tentative Plan

A tentative plan requires a substantial amount of information and generally follows the development of the SITEMP. During this planning step, the commander seeks to understand the enemy he will face and the terrain on which he will fight. The tentative plan focuses his understanding of the engineer company's contribution to the TF fight. The EBA process of the engineer estimate will provide the company commander the information he needs to develop the SOEO, which is the basis for his company's tentative plan.

Initiate Movement

Based on the commander's tentative plan, it may be necessary to move the company or task-organize engineer platoons to other companies/teams in the TF. The company SOP should allow the company to move to its new location. When attaching or detaching platoons, the following should be considered:

- The time and place of linkup.
- Recognition signals.
- Call signs, frequencies, and communications security (COMSEC) variables.
- The tactical situation (why the platoon is being task-organized).
- The CSS status and requirements.

Reconnoiter

The commander, platoon leaders, and a security element reconnoiter the terrain where the operation will be conducted. The 1SG and platoon sergeants will supervise the company's preparation for combat concurrently with the leader's reconnaissance. The reconnaissance should be as extensive and detailed as possible within the time limits available. If time is short, a thorough map reconnaissance should be done. The reconnaissance effort should be organized and focused on the company's mission. The following are normally reconnoitered in the company's AO:

- Observation and fields of fire, cover and concealment, obstacles, key terrain, and avenues of approach (OCOKA).
- Vehicle positions.
- Routes the company will use.
- Fire-control references, including target reference points (TRPs) and EAs.
- LDs and phase lines (PLs), if they can be seen.
- Terrain to the company's flanks and rear, especially along the flanks.
- Danger areas.
- Known or suspected enemy locations.

Complete the Order

With the information gained from the reconnaissance, the engineer commander and XO finalize the SOEO and the company's scheme of maneuver. The plan should be simple, with enough information to complete the mission without further instructions. It should also be flexible to allow the company to react to changing situations quickly. It is critical that the platoon leaders understand their purpose during the operation.

The execution matrix is used to help complete and execute the plan. The matrix is not designed to replace a verbal order with an overlay, a terrain model, or an operational sketch; it is designed to help the company commander develop and execute the order. During the operation, the company leaders refer to the matrix for C^2 information. Figure 2-3 shows an example of an execution matrix.

Issue the Order

The commander issues the order at the time and place specified in the WO. Normally, the order is issued on terrain overlooking the battlefield prior to the TF OPORD, if possible. This allows the platoon leaders the maximum planning and coordination time if they are task-organized to a maneuver company/team. This is an especially effective technique during defensive operations. If this is not possible, then the use of terrain models, sketches, maps with overlays, and sand tables can be very effective in helping the platoon leaders visualize the operation.

Before starting the company order, the commander ensures that his subordinate leaders have their overlays attached to their maps. He then orients everyone to the terrain. The order normally covers the commander's intent and concept of the operation by ensuring that the platoon leaders are able to visualize the operation and understand their unique contributions to the operation. Possible contingencies and the company's reactions to those contingencies are also covered. The commander ensures that the platoon leaders understand how their missions fit into the overall scheme of maneuver. Before concluding the order, subordinates repeat the critical instructions they have received. Figure 2-4, page 2-12, illustrates examples of TF, engineer company, and engineer platoon time lines for orders preparation.

Mission: Same as briefed

Intent: Same as briefed

Engr Unit: CS/Freq	1/A/45 F41/45:45	2/A/45 B41/58:35	A&O/A/45 D41/64:00	1SG/A/45 Z33/56:20	TOC/A/45 C87/56:20
Spt'd Unit CS/Freq	PH III D/3-39 G32/71:20	CO (Cont) →	→	→	→
Task org sub units					
Spec equip	2 MICLIC	7 ACE, 2 CEV 2 MICLIC, 2 SEE 2 Volcano			
I-C-Recon Prep / Prep Obst GPs & BPs	GPs A1A, A1D / See obst execution matrix	GPs A1B, A1C	Prep BPs, 1,2,3	Track def prep report to bde / Collocate TF TOC	LOGPAC / Vic plt work sites
II-Defeat Lead MRBs PL Dog / Detach 1/A/45 consolidate	Link up w/ D/3-39 / AA 485275	Consolidate / 475295	Consolidate / 475295	Track battle / Collocate TF TOC	Consolidate / 475295
III-CATK EA Ball / Spt CATK reorganize	Breach 2 lanes / Dir of ATK D/3-39	↓	↓	Track battle / Collocate TF TOC	Spt CAS EVAC / Dir of ATK D/3-39
IV-Consolidate screen PL Cat / O/O spt Cont DIS	Consolidate O/O spt Cont DIS / 458288	Consolidate O/O spt Cont DIS / 458288	Consolidate O/O spt Cont DIS / 458288	Track battle / Collocate TF TOC	Consolidate O/O spt Cont DIS / 458288

Coord instructions:
MOPP 0 1 2 3 4 time O/O
OEG 70 CGY
ADA
PCI: After order, A&O 2 hr, 1/A 4 hr, 2/A 5 hr

Rehearsals: TF EAs rehearsal in EA strike 1400___ 199___

PIR: Enemy recon sitings, obst type/loc/comp during CATK

OTHER: Plts est/operate plt mine dumps. select/report loc to A&O ASAP. All obst marked IAW SOP.

Service support:
Cbt Trns 479291 W/TF cbt trains
Fld Trns 640261 W/BSA
UMCP W/cbt trains
CL IV/V Sup pt 460271
MAS 508275
FAS W/cbt trains
CL I: M-M-M, plts keep 3-day supply.
CL III: A&O 1 HEMTT to spt surv. 1SG 1 HEMTT for LOGPAC
CL IV/V Obst: See obst matrix

CL V: Basic load, resupply thru LOGPAC

Pers Replacement priority 1/A, 2/A, A&O. EPW to cbt trains.

Trans Plts cont 1 HEMTT ea.

Command & signal:
Ldr loc: CO vic AA, XO w/ TOC, 1SG w/cbt trns
TOC loc: 475295

Succession of cmd: CO, XO A&O, 2/A, 1/A

Listening silence: In effect at end of PH I until contact

Signals/code words:
See obst matrix.

Reports:
All contact, obst initiation, obst at 50%, completion, and turnover IAW SOP. Survey by BP by position completion.

Figure 2-3. Sample execution matrix

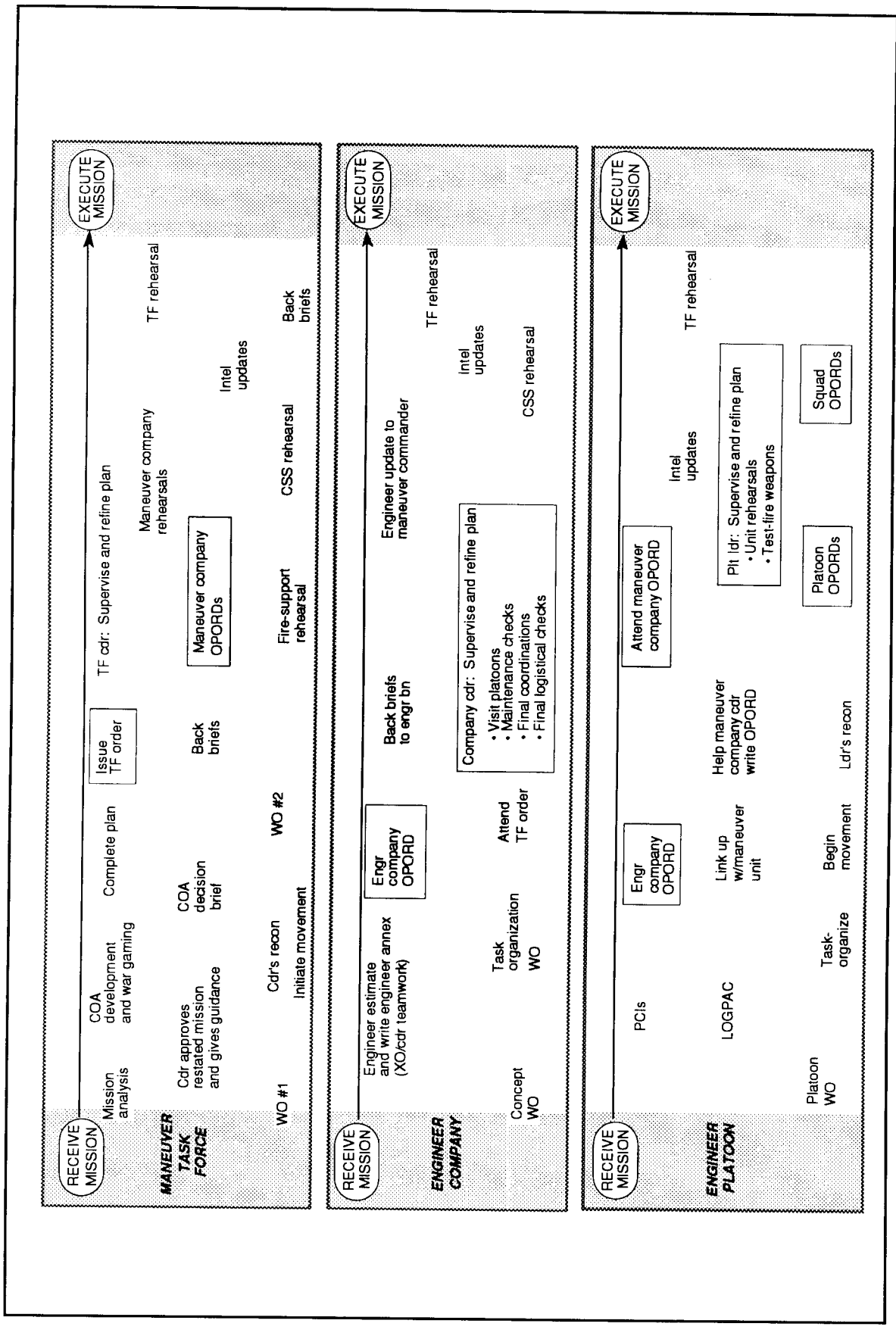


Figure 2-4. Time lines for orders preparation

Supervise the Execution

After the order is issued, subordinates use the remaining time to plan their own platoon or section plans. The commander supervises the subordinates as they prepare their platoons. He gives the platoons a reasonable amount of time to execute their orders and then inspects them through a combination of confirmation briefs, rehearsals, and inspections.

Confirmation briefs are subordinates' briefings to the commander on their plans after their reconnaissance and estimate of the situation. The platoon leaders brief back to the commander before they give their orders. This allows the commander to make corrections or make recommendations to his leaders *before* they give conflicting orders to their platoons.

Generally, it is better to have all subordinate leaders brief back at the same time. This provides a chance to make changes to the operation and to coordinate a final time with all key leaders. The A&O platoon leader and the 1SG are included in this process.

Rehearse. The company rehearses actions critical to mission accomplishment. This ensures that the unit can accomplish these actions given its training level, the orders issued, and the terrain and weather conditions expected.

There are many rehearsal techniques, including—

- Full rehearsal. This rehearsal produces the most detailed understanding of the mission within the command. A full rehearsal involves the entire company. It is time-intensive and requires detailed planning to ensure that all key events are synchronized (for example, a deliberate breach and marking of a complex obstacle). The full rehearsal is the preferred technique because it allows all elements to practice their individual tasks for the mission. Full rehearsals, especially when working with elements or TFs that the commander has not worked with before, are the best preparation.

- Key leader. This rehearsal places the key leaders in their combat vehicles and rehearses on terrain similar to the battlefield. These rehearsals are more involved and allow the commander to rehearse movement techniques and synchronize communication procedures at critical times in the operation.

- Terrain model. This type of rehearsal is done with a terrain model. It rehearses key leaders on critical events. A terrain-model rehearsal is done when there is not enough time for a more involved rehearsal. When possible, the commander should place the terrain model where it overlooks the actual battlefield. The commander and the platoon leaders walk through the terrain model and rehearse their respective plans and how they are synchronized.

- Sketch map. The sketch-map rehearsal uses the same procedures as a terrain model, but is used when time restricts the construction of a terrain model. The commander uses a sketch instead of a model, and the platoon leaders walk through their respective plans. This type of rehearsal is done when there is little time available. When possible, the commander should rehearse at a location overlooking the actual battlefield.

- Map. The map rehearsal is used when time is very short. The commander and the platoon leaders use

their maps and graphic overlays to rehearse the plan. Where possible, the map rehearsal should be done on terrain overlooking the actual battlefield. The map rehearsal uses the same procedures as the terrain-model and sketch-map rehearsals.

- Radio. The commander and the platoon leaders rehearse by interactively and verbally executing critical portions of the plan over established communication networks. This rehearsal must be carefully supervised to ensure proper OPSEC procedures are followed.

Rehearsals should emphasize events that trigger different contingencies. This helps subordinates understand the intent. The rehearsal should cover critical elements of the maneuver. The engineer company should practice what actions will be done, where these actions are required, who will do them, and who will be the backup. Backup procedures are rehearsed in case the key leader responsible is incapacitated. See FM 101-5 for more information on rehearsals.

Inspect. The company commander inspects by physically checking to see what the unit has done for preparation. A precombat checklist may be helpful as a guide and memory cue of what to inspect. The company precombat checklist should follow the same format as the platoon list (Appendix C gives an example of a company precombat checklist). The platoon leaders should finish their inspections at a certain time to give the commander an overall look at the company.

A report halfway through the preparation phase will allow the commander to check the company's progress and give him time to redirect the priority of tasks. A filled-in copy of the checklist does not substitute for a personal inspection. It is not necessary to conduct a formal inspection; the commander just needs to see what his soldiers are doing. Often, the commander can tell how well NCOs have performed the precombat preparation by walking through the company position. The commander should talk to his soldiers and leaders to gauge how well they have prepared and to what extent they understand the upcoming mission.

Deficiencies are corrected when they are observed. On-the-spot corrections provide a chance for the commander to train soldiers and reinforce the chain of command. The following list may help the commander inspect the company's preparations:

- Do soldiers know what the company is doing and where they fit into the platoon leader's plan?
- Do soldiers know the visual signs, call signs, and frequencies being used? Do they know the challenge word and password?
- How well are vehicles prepared to move? Are soldiers using preventive maintenance checklists and technical manuals (TMs) to perform before-operations checks?
- Have the company's weapons been cleaned, properly assembled, and test-fired?
- Has the ammunition received at resupply been broken down and distributed? Have the ammunition containers been properly disposed of?
- Are vehicle load plans to the unit standard?
- Are soldiers in the proper uniform?

Coordinate. Coordinating is a part of supervising the company's preparation for combat. The XO, the 1SG, and other leaders help complete coordination. Coordination is critical during the following functions:

- To tie in flanks and to provide mutual support to adjacent units.

- For overwatch, obstacle handover, and passage of lines (lane closure) with the companies/teams.
- For obstacle location, siting, and construction standards with the TF.
- For CSS plans (including logistics release points [LRPs], unit maintenance collection points [UMCPs], aid stations, prestocks, Class IV/V supply-point locations, combat trains, and decontamination sites) with the TF or battalion S4.
- For field-fortification location and construction standards with the companies/teams.
- For reconnaissance and surveillance (R&S) plans with the TF S3/S2.
- Obstacle locations for adjacent units.

TASK-FORCE INTEGRATION

The company CP normally collocates with the TF TOC during the operation's planning phase. The company CP serves an important function within the TF. It allows the company commander the freedom to command and supplies a dedicated engineer planning section to the TF battle staff. The company commander must provide direction, guidance, and intent to the company operations section in the CP. This facilitates TF integration.

The company XO leads the company CP. He works closely with the TF S2 to develop the SITEMP, particularly in the arenas of terrain analysis and enemy engineer capability. The XO works with the S3 during the COA development and analysis processes. He recommends where obstacles, fortifications, and other engineer efforts can support the TF during the defense. In addition, the XO works closely with the TF FSO during defensive operations for integration of fire-support planning into the obstacle plan. In the offense, he must ensure integration of fire-support planning into breaching operations.

During the offense, the XO recommends where breaching assets should be task-organized and which type of breaching system would be best employed. The engineer company commander will normally provide the engineer XO with planning guidance and engineer company status. The commander will make his own recommendations on which engineer assets should be task-organized and where.

The XO is assisted by the company operations sergeant, the NBC NCO, the communications chief, and the CP-vehicle operator. The engineer CP's vehicle must be a dedicated vehicle with the same C4I capability as the engineer commander's combat vehicle and with the same survivability and mobility as the TF TOC. This allows the CP to operate 24 hours a day and provides for continuous planning and reporting.

The commander gives the XO guidance on using the engineer company. Task-organization recommendations, current equipment availability, and the training level are the commander's to assess, and he provides this guidance to the XO for the planning cell to effectively contribute to the TF planning process.

The engineer company commander frequently accompanies the TF commander during the leader's reconnaissance and assists in the TF commander's development of the command estimate. The company commander's ground reconnaissance can provide pertinent information to the XO and assist him in developing the SOEO.

COMMAND AND CONTROL OF OPERATIONS

The planning process provides the engineer company with the framework for executing the operation. However, the realities of combat demand that leaders be prepared for the unexpected. They must be able to read the terrain, enemy, and friendly situations and understand how these factors might require changes to the plan. They must be capable of making modifications to the original plan and issuing fragmentary orders (FRAGOs) to implement those modifications. They must be capable of exercising their personal influence on the outcome of the battle. The following paragraphs provide techniques to help achieve success. The engineer company commander provides a unique and capable C^2 resource to the TF to facilitate operations.

The engineer company commander places himself so that he can see the most critical engineer company mission. Terrain and weather should be used to conceal movements from the enemy, but the commander must maintain either visual or radio contact with the platoons. **NOTE: If the most critical engineer platoon is not under engineer company control, a good technique is for the company commander to eavesdrop on that platoon's or the attached company's/team's net to keep current on the situation.**

The company commander synchronizes actions with the other company commanders. When something critical happens, he quickly sends the TF commander a situation report (SITREP). If contact is lost, he makes every effort to reestablish communications short of abandoning the mission. Until communications can be reestablished, he continues to take actions that best accomplish the TF commander's intent.

The engineer company commander must see the battlefield. He prepares to change and update his estimate of the situation at any time. He uses initiative and understanding of the company's purpose to see ahead and to identify potential problems before they arise. When it is clear that the original plan will not work or a better opportunity presents itself, he modifies the plan quickly and aggressively to meet the changing situation. The commander should seek to lead engineer soldiers rather than task-organize all of his forces to other elements.

The commander demands that subordinates maintain contact with him and keep him informed of their situations. If the commander cannot communicate with subordinate leaders, he has lost control of the company and failed in his primary mission on the battlefield.

The commander issues timely and clear FRAGOs. He tells platoon leaders what he wants them to do and why. He issues WOs, giving the platoons time to react to all possible upcoming missions. He continually updates subordinates on the enemy situation as well as the situations of the TF's other elements.

The commander encourages the company's key leaders to cross-talk on the company command net to coordinate their actions and to ensure that the company has a clear picture of what is happening. The commander uses SOPs and tactical techniques that can be executed quickly with a brief message. He uses checkpoints and terrain features to orient the company and to control its movement from one position to another.

The commander can quickly lose control if the entire company is operating on the command net. The A&O platoon net can be used as the company administrative and logistical (A&L) net if the signal operating instructions (SOI) provides none. The XO, the A&O platoon leader, and the 1SG can use this tactical frequency to synchronize the company logistics operation without crowding the company command net.

The commander ensures that the company has 360-degree security to have the time and space to react to enemy contact. He establishes observation posts (OPs) at each stop. Elements maintain dispersion both laterally and in depth. The armored combat vehicles in the A&O platoon cannot maintain the same cross-country speed as the engineer squad carriers. To compensate for this, the commander moves the unit in quick dashes over short distances. This allows him to keep the entire unit together and prevents the company from becoming strung out in a disorganized column.

All leaders take every reasonable precaution to avoid fratricide. They understand and enforce vehicle and dismounted recognition signals. They ensure that subordinate leaders maintain a high level of situational awareness and keep the TF notified of engineer work locations forward of the TF's main body. They establish obstacle-marking SOPs to ensure that friendly forces do not stray into tactical obstacles. They ensure that lanes are clearly marked and the standard marking is known to all in the TF, especially the support units operating in the area.

SUCCESSION OF COMMAND

Subordinate leaders must understand the succession of command and the company's mission so that if the situation arises they can take command and accomplish the mission.

The succession of command should be explained in paragraph 5 of the OPORD as well as the location of each key leader. An example of a succession of command follows:

- Commander.
- A&O platoon leader.
- First platoon leader.
- Second platoon leader.
- 1SG.

If a platoon leader is in a command relationship to a company/team, he should not be included in the succession of command. For example, if the second platoon leader was attached to a company/team, the 1SG would follow the first platoon leader in the company's succession of command. Also, the XO and 1SG are generally not positioned on the battlefield to assume command of the company rapidly. A possible solution is for the commander to designate a platoon leader as the follow-on commander until the XO can come forward and assume command.

CHAPTER 3

OFFENSIVE OPERATIONS

This chapter deals with planning and executing an offensive operation. It does not coverall of the tactical issues dealing with the TF in the offense, but looks instead at the interface that must occur between the TF and the engineer company during offensive operations.

OFFENSIVE CHARACTERISTICS

The engineer company provides a significant offensive capability to the force. The engineer company is the primary agent of obstacle breaching and fortification reduction available to the TF or the engineer battalion, The engineer company normally fights as part of a TF or with the engineer battalion during the offense.

The offense's main purpose is to defeat, destroy, or neutralize the enemy force. The fundamental characteristics of offensive operations are surprise, concentration, tempo, and audacity. These characteristics are all subcomponents of initiative.

SURPRISE

Surprise is achieved by striking at a time or place or in a way that the enemy is not physically or mentally ready for. Engineers achieve surprise through covert breaching operations and the use of situational obstacles. Surprise avoids the obvious and strikes the enemy's weakest point. Engineers enable surprise by rapidly overcoming obstacles, increasing the force's tempo. Increased situational awareness and terrain visualization will enable the engineer company to achieve surprise because of its better understanding of the enemy's defensive preparation.

CONCENTRATION

Concentration of effort is critical to the attacker's success. Concentration of effort does not necessarily mean the massing of large formations. To achieve concentration, all fires must be used at a decisive place and time to destroy the enemy. Concentrating breaching assets, fortifications, and obstacle effects all directly impact on the maneuver unit's ability to concentrate the terminal effects of its fires. The engineer company concentrates breaching assets to overcome fortifications and obstacles at the point of penetration as part of the TF's breaching plan.

TEMPO

Tempo is the speed of military action. The ability to control or alter tempo is essential for maintaining initiative. Engineer speed and flexibility are crucial to the attack. Rapid mobility operations by engineers ensure the TF's tempo. The ability to quickly breach, mark, and guide units through complex obstacles is the engineer's hallmark.

AUDACITY

Audacity is the bold courage to exercise good judgment and take decisive action in a fast-paced, constantly changing situation. The audacious commander is quick, decisive, and willing to take prudent risks.

SEQUENCE OF THE ATTACK

Generally, the following sequence of events are followed when the TF attacks: *reconnuissance, movement to the LD, maneuver, deployment, attack,* and *consolidation and reorganization.*

RECONNAISSANCE

Reconnaissance begins as soon as practical following the receipt of orders to attack. The engineer company assists in the reconnaissance by developing a detailed enemy obstacle template and ensuring that obstacle intelligence (OBSTINTEL) requirements are included in the R&S plan. Engineer patrols or individual engineers with other reconnaissance elements can be used to observe specific named areas of interest (NAIs) to gain information on the enemy's barrier plan and to determine any weakness that the TF can exploit. Engineer-specific reconnaissance must be integrated into the TF's R&S plan to preclude confusion, reconnaissance overlap, and fratricide.

MOVEMENT TO THE LINE OF DEPARTURE

The TF normally moves from an assembly area or defensive position to the LD. Engineers ensure that the TF can move to the LD without pause. They create passages and provide guides through situational obstacles along the TF's march route. This is especially critical during a forward passage of lines.

MANEUVER

As the TF maneuvers to a place of advantage, the engineer company ensures the TF's mobility. Engineers supporting the TF can quickly breach, bypass, and mark obstacles along the axis of advance. Engineers place planned situational obstacles protecting the TF's flank during movement.

DEPLOYMENT

The TF deploys to attack or fix the enemy. The engineer company prepares to breach, mark, and guide the TF through the enemy's obstacles.

ATTACK

The TF attacks, bypasses, or assaults the enemy position. The engineers breach the tactical and protective obstacles and mark lanes, guiding the TF through to the objective. Engineers may also assist in the assault breaching of protective obstacles.

CONSOLIDATION AND REORGANIZATION

As the TF eliminates all remaining enemy resistance, the engineer company reduces the enemy obstacle system, consolidates near the objective and, if necessary, starts to prepare hasty defensive positions for the TF. The engineer company plans and emplaces situational obstacles to protect the TF from enemy counterattack. As the TF, along with the engineer company, consolidates on the objective, ACEs rapidly prepare initial vehicle fighting and protective positions. Emplacement excavators move forward from the combat trains to prepare personnel positions,

FORMS OF MANEUVER

The basic forms of offensive maneuver are envelopment, turning movement, infiltration, penetration, and frontal attack. Attacks frequently use multiple forms of maneuver to achieve the desired effect on the enemy. Double envelopment and turning movements normally require large force structures and are more applicable to division level or higher operations and are covered in FM 71-100.

It is imperative that the TF engineer understands each form of maneuver and its implications to the engineer scheme of operations and task organization.

ENVELOPMENT

An envelopment is the preferred form of offensive maneuver. The envelopment seeks to strike the enemy on his flanks or rear. The envelopment is designed to force the enemy to fight in a direction from which he is least prepared. The envelopment requires an assailable flank. The enemy's defensive positions and obstacle systems and the terrain will define the flank—not the attacker's march direction (see Figure 3-1).

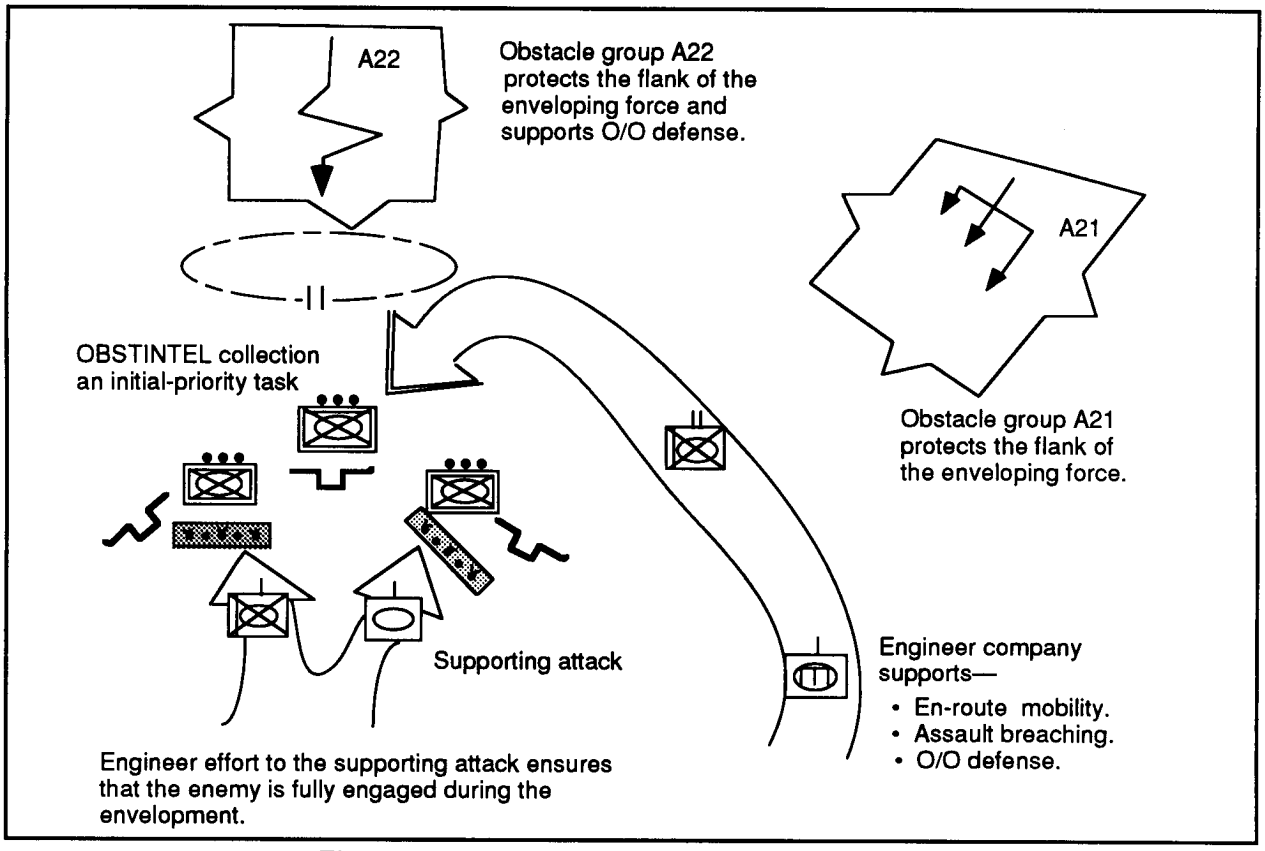


Figure 3-1. Engineer support for envelopment

Engineers plot known and templated enemy obstacles to determine if there is an assailable flank. Breaching an obstacle system can provide the flank the TF commander needs; therefore, the enemy's obstacles and terrain must be adequately studied.

INFILTRATION

During an infiltration, combat elements use stealth to gain the enemy's rear position without fighting. Infiltrations are slow and usually conducted during times of limited visibility. Successful infiltration requires extensive reconnaissance to discover covered, concealed, and undefended routes. Engineers normally support infiltration through covert breaching. The plan's success should not hinge on the covert breaching of minefield due to the possibility of antihandling devices (AHDs) on the mines. All covert breaches should have backup plans to become deliberate breaches if compromised.

PENETRATION

The TF seeks to concentrate on a small front to rupture the enemy's defense. There are three phases of the penetration: rupturing the enemy's position; widening the gap; and securing the objective, thus destroying the continuity of the defense. Normally, the TF will mass on one enemy platoon to create a gap in the enemy's defensive position.

A penetration is normally attempted when the enemy presents no assailable flanks. Engineers support the penetration by breaching the tactical and protective obstacles during the rupture phase. The engineer company widens the gap through obstacle reduction and supports securing the objective by guiding follow-on forces quickly through the gap. The engineer company must prepare to conduct an obstacle handover to follow-on engineers and then continue the attack. Engineers plan, and possibly execute, situational obstacles to delay

and disrupt enemy counterattacks (see Figure 3-2).

FRONTAL ATTACK

This is the least preferred offensive maneuver. In a frontal attack, the TF uses the most direct route to attack the enemy and generally attacks the enemy where he is most prepared to defend. This attack is normally done when the TF, as part of a larger attack, has the mission to fix the enemy or to deceive them. Frontal attacks, unless in overwhelming strength, are seldom decisive (see Figure 3-3).

FORMS OF OFFENSIVE OPERATIONS

Engineers at all levels find or create a weak point in the enemy's defensive obstacles and assist in suppressing the enemy's fires, isolating the enemy, maneuvering against weak points, and exploiting success.

FMs 71-1 and 71-2 contain a description of each offensive form. The engineers in the TF must understand the principles and organizations of each offensive form to provide appropriate planning and force allocation to support the TF's attack.

MOVEMENT TO CONTACT

The TF conducts a movement to contact (MTC) to make or regain contact with the enemy. The engineer company normally participates as part of the TF. Engineers will be positioned in the TF formation depending on the expected enemy disposition. By definition, the enemy situation during an MTC is unclear. However, enemy analysis will indicate whether it is likely that the enemy is expected to be moving or

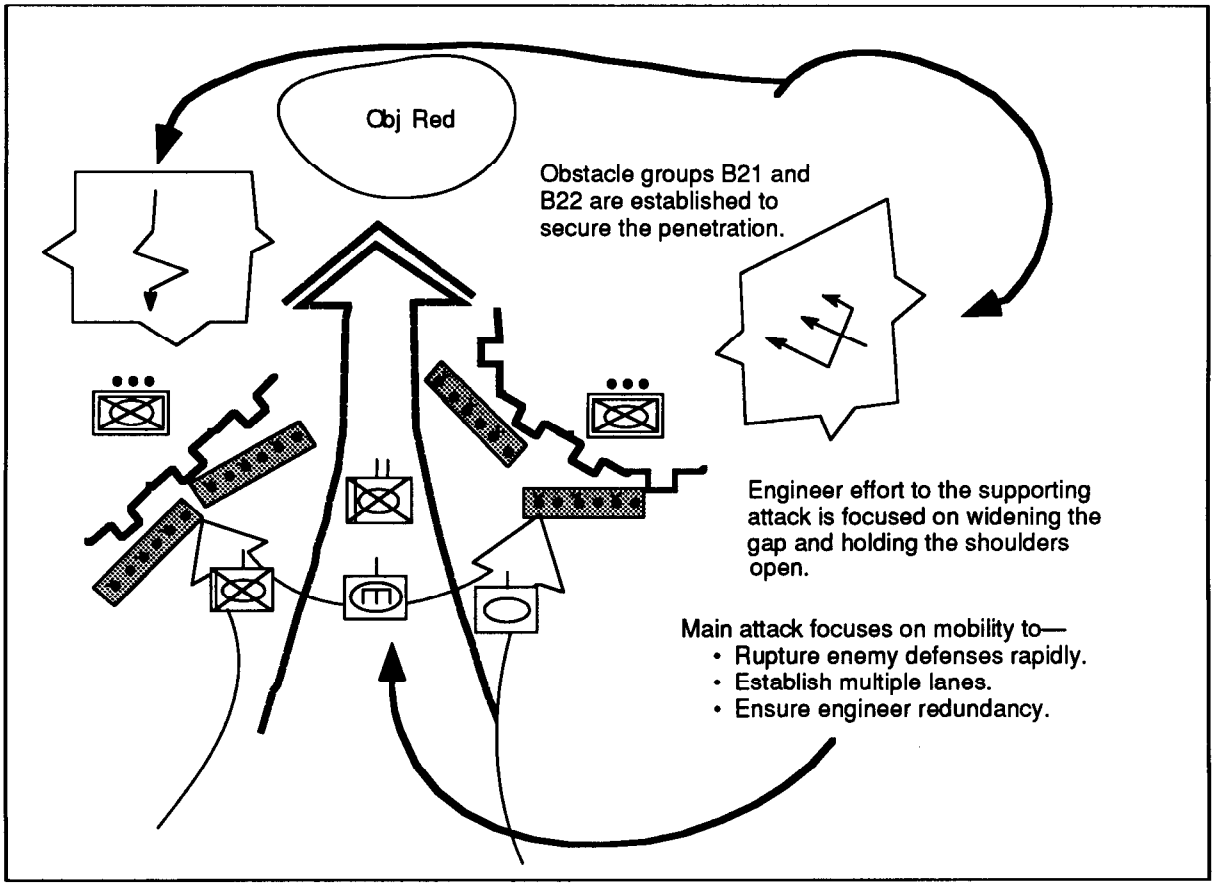


Figure 3-2. Engineer support for penetration

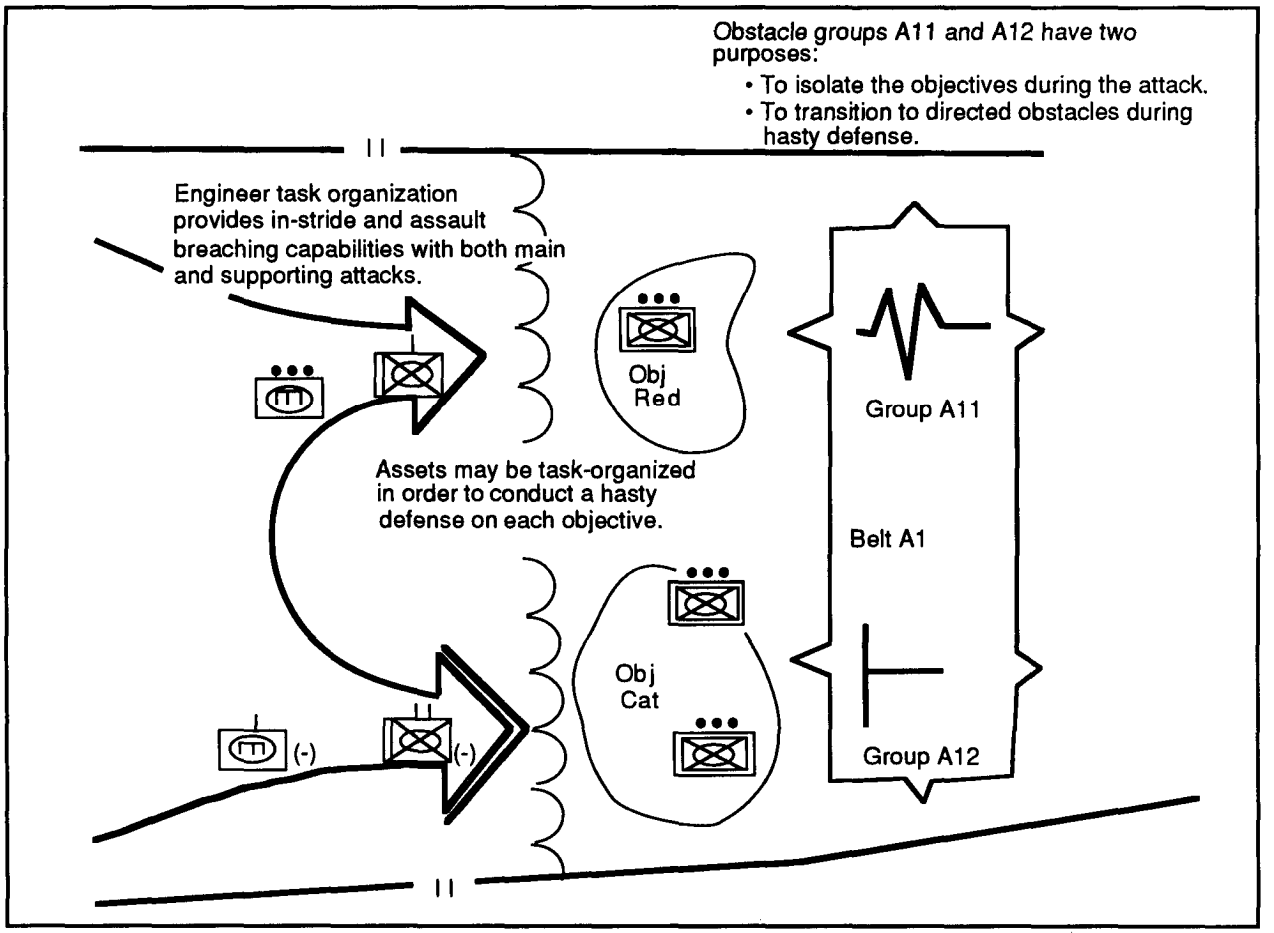


Figure 3-3. Engineer support for frontal attack

stationary. Engineer task-organization guidelines-are discussed later in this section.

The desired result of an MTC is to find the enemy. When this occurs, the TF may deploy and conduct an attack or assume a hasty defense. When the TF attacks, engineers are prepared to breach and support flank security for the attacking force. When the TF assumes a hasty defense, engineers rapidly install obstacles and construct fighting positions to support the defense.

The engineer company must be flexible and prepared to deal with any obstacle that restricts the TF's movement. The engineer company will normally move under the company commander's control to facilitate quick movement to a flank, to emplace situational obstacles, or to quickly breach any unforeseen obstacles. Key planning considerations include movement and task organization.

Movement

The engineer company will orient on the objective as part of the TF along the axis of advance. The company moves consistent with the following factors:

- The speed required by the TF.
- The available AAs.
- The requirements to maintain mobility, security, and situational-obstacle emplacement.
- Bypassing or in-stride breaching, when possible.

- Reacting to contact faster than the enemy.
- Retaining flexibility in the breaching or bypassing location, technique, and organization.

Task Organization

The TF is normally organized with a security force, advance guard, main body, and flank and rear guards.

Engineer elements can be placed with any of the forces mentioned above. Generally, the engineer company travels behind the advance guard. Engineers can be placed with the security force and scouts to gain OBSTINTEL, to conduct route reconnaissance, and to ensure the advance guard's mobility.

The advance guard is initially the TF's main effort. Its task organization is METT-T dependent. The engineer company follows or attaches elements to the advance guard. The advance guard provides security to the TF's main body and attempts to gain contact and develop the situation for the main body to exploit. Engineers with the advance guard rapidly overcome obstacles, allowing the advance guard to develop the situation.

The main body normally moves 1 to 2 km (0.5 mile to 1.25 miles) behind the advance guard, though METT-T considerations drive its exact location. In many situations, the engineer company will be the main body's lead element. The main body must be close enough to the advance guard to respond to the situation, but not be tied down by the advance guard's fight. The engineer company must be able to move rapidly to overcome obstacles, thus allowing the main body to attack. Engineers provide flexibility to the TF, allowing rapid maneuver to the decisive point to destroy the enemy.

Flank and rear guards protect the TF as it moves, keeping it from being attacked from these directions. Engineers support the flank and rear guards with situational obstacles, enhancing the TF's protection and security.

The priority of engineer effort is the TF's mobility. Elements of the engineer company will assist the security forces with reconnaissance. Engineers with the advance guard provide rapid mobility for both the advance guard and the main body. The engineer company moves to the advance guard's rear to provide responsive support to the main effort's movement. Situational obstacles are planned to support the security force and the advance guard.

ATTACK

There are two types of attack, hasty and deliberate. The hasty and deliberate attack differ only in the amount of planning and preparation time. The deliberate attack normally requires extensive planning, rehearsal, and reconnaissance. The hasty attack is usually the friendly force's reaction to the enemy situation.

Hasty Attack

Hasty attacks are conducted as the result of a meeting engagement, when bypassing the enemy has not been authorized, or the enemy is discovered in an unprepared or vulnerable position. There are two types of hasty attacks: against a moving enemy force and against a stationary enemy force. During the hasty attack, the first to react and to maneuver to a place of advantage usually wins.

When attacking a moving force, the advance guard seeks to fix the moving enemy while the TF's main body maneuvers to attack the enemy's flank or rear. The TF must interdict the enemy who seeks to do the same thing. Engineers support the attack by rapidly emplacing situational obstacles to assist the advance guard in fixing the attacking enemy force. At the same time, engineers swiftly reduce enemy situational obstacles, allowing the TF to maneuver into the enemy's flank or rear.

A hasty attack against a stationary force is initiated after the TF reconnaissance elements discover flanks or weaknesses in the enemy's defense. Reconnaissance must be done quickly, before the enemy has a chance to counter. As in the attack on a moving force, the TF attempts to fix the enemy with the advance guard while the main body maneuvers to the flank or rear of the enemy's position.

Engineers support the attack by breaching obstacles to allow the advance guard to move into a position to fix the enemy. As the main body maneuvers, engineers emplace obstacles to protect the TF's flanks, and they breach obstacles to allow the main body to attack into the enemy's position.

Deliberate Attack

The deliberate attack is characterized by detailed planning, reconnaissance, and preparation. It generally includes large amounts of preparatory and supporting fire, main and supporting attacks, and deception.

A deliberate attack requires time to collect information about the enemy and his defensive preparations. Reconnaissance confirms the enemy's disposition and extensive planning develops a scheme of maneuver to defeat him. Generally, obstacle reconnaissance should be done by the soldiers who will breach the obstacles. Engineers will be actively involved in the collection of OBSTINTEL as part of the preparation for the attack. Where engineers cannot actively do the reconnaissance, OBSTINTEL is coordinated with other reconnaissance elements. The TF engineer ensures that OBSTINTEL is planned and that obstacles are critical information requirements.

The TF commander should establish support, breach, and assault forces to overcome the enemy's defensive positions. The engineer company will be employed with the forward elements of the main attack to enhance the TF's mobility. Engineer elements will accompany the TF's breaching force (in some cases, the engineer company is task-organized as the TF's breaching force) and assist in reducing and crossing all obstacles encountered. The decision of who is the breaching force and what type of breach is best is based on careful METT-T analysis. Covert breaching is used to attack the enemy's obstacle system (before the main attack) to gain surprise. Engineers could also task-organize with the assault force to breach enemy protective obstacles and to destroy enemy fortifications. Situational obstacles can be used behind the enemy to prevent repositioning, to delay enemy counterattacks, or to fix the enemy in his defensive positions.

EXPLOITATION

Exploitation is designed to take advantage of the initiative gained from the attack. Exploitation is the desired outcome of a hasty or deliberate attack. This form of maneuver prevents the enemy from reconsolidating an organized defense or conducting an orderly withdrawal. The TF will normally be part of a larger force during an exploitation. The two key components of the exploitation are speed in execution and maintaining pressure on the enemy.

The engineer company supports the exploitation as part of the TF. The engineer's organization is similar to that of an MTC with a responsive, flexible organization that can rapidly overcome any obstacles. Planning and preparation time will be very limited in an exploitation and will require an extremely versatile engineer force that can change organization on the move.

PURSUIT

Pursuit is the natural culmination of a successful exploitation. Pursuit differs from exploitation because it focuses primarily on the enemy force versus a terrain objective. The purpose of the pursuit is to chase the enemy down and kill him.

The engineer company will support the TF through mobility and countermobility. Enemy obstacles must be rapidly overcome

to ensure that the enemy is under constant pressure and is not allowed time to establish a coherent defense. The TF engineer will recommend situational obstacles that fix the enemy in specific areas and disrupt his withdrawal, facilitating his destruction.

ENGINEER OFFENSIVE PLANNING

The engineer estimate provides the planning framework for the TF engineer to synchronize and integrate engineer-company capability into the TF's scheme of maneuver. Examples of the estimate process are found in Appendix A.

The engineer estimate and offensive planning begin when the TF receives its mission from a higher headquarters. The mission, the higher headquarters' engineer annex, and graphics provide information to develop facts and assumptions. The engineer battalion OPORD and the brigade WO will also provide information necessary to start planning.

The engineer company's primary task during offensive operations is mobility. Generally, this consists of overcoming obstacles presented to the TF along its axis of advance or zone. The engineer company must organize to support the TF's rapid transit of these obstacles. FM 90-13-1 covers in great detail the mechanics, tactics, and procedures for all breaching operations. It should be used as the definitive source for breaching operations.

As part of the planning process, the engineer estimate must provide the framework for the synchronization of engineer forces with the offensive plan. The TF engineer's role is to identify missions, allocate resources, and synchronize and command engineer functions.

ANALYZE THE MISSION

During mission analysis, the engineer company will receive the mission. First the company commander must determine facts and assumptions. For the engineer, this is the EBA. The EBA is part of the engineer estimate and is covered in Appendix A in greater detail. The EBA seeks to define three things: the terrain, the enemy engineer capabilities, and the friendly engineer capabilities.

Terrain Analysis

The engineer assists the S2 in steps 1 and 2 of the IPB (define the battlefield environment and describe the battlefield's effects). The engineer analyzes the terrain in concert with the S2, if possible. The engineer ensures that the S2 takes into consideration the terrain products available through engineer channels such as the engineer battalion. The engineer also ensures that the S2 considers friendly force mobility based on critical assets (most breaching vehicles have less mobility capability than typical combat vehicles for various reasons, such as terrain affecting them differently).

Enemy Analysis

The engineer assists the S2 in steps 3 and 4 of the IPB (evaluate the threat and determine threat COAs). The engineer is the expert on enemy engineer capabilities. He provides input on how the enemy will employ obstacles, fortifications, and mobility assets during his defense. The engineer templates the enemy's obstacles and develops a detailed analysis of the enemy obstacle effort based on the time available to the enemy. For example, the engineer should estimate—

- The number and type of obstacles the enemy will use, including SCATMINEs (regardless of the source).
- The number and type of mines the enemy will most likely use.
- The amount and type of fortifications the enemy will use.

The engineer identifies OBSTINTEL and nominates priority intelligence requirements (PIR) for inclusion into the commander's critical information requirements (CCIR). As the IPB continues (throughout the planning process), the engineer is involved in developing the R&S plan, selecting NAIs, and obtaining reconnaissance assets to gain OBSTINTEL.

Friendly Analysis

The engineer prepares an estimate of friendly capabilities. For example, he should estimate—

- The number and type of breach lanes required.
- The number of gap crossings required.
- The number and type of friendly obstacles required.
- The number and type of friendly fortifications required.

ANALYZE RELATIVE COMBAT POWER

The engineer does a comparison of friendly engineer capabilities with the competing enemy capabilities to determine if the mission is tactically feasible. During this process, the engineer must answer the following questions:

- How much breaching/gap-crossing capability do I have in comparison with the existing obstacles and the enemy's obstacle capability?
- How much obstacle-emplacement capability do I have in comparison with the enemy's capability to breach obstacles?
- How much survivability capability do I have in comparison with the numbers of systems I must protect from the enemy?

ANALYZE ENGINEER BATTALION/ MANEUVER BRIGADE MISSION AND INTENT

The engineer analyzes his mission based on the brigade's missions to the TF and the engineer battalion. The company commander must understand both missions regardless of task organization to determine the mission of the engineer company. To properly conduct this analysis, the engineer must—

- Understand the mission and the intent of the next two higher echelons.
- Review the task organization, the engineer battalion's/maneuver brigade's concept of the operation, and the AO.
- Identify specified tasks such as creating breach lanes (brigade in-stride breach); acting as the support, breach, or assault force (brigade deliberate breach); passing follow-on forces; emplacing situational, directed, or reserve obstacles; and constructing survivability assets to dig in brigade assets.
- Identify implied tasks to allow the completion of specified tasks.
- Identify any specified or implied tasks that are mission essential for the TF.
- Identify limitations (constraints or restrictions), including obstacle restrictions, zones or belts, manning or widening lanes, restrictions on using breaching assets, and changes to task organization during the mission.
- Determine any risks the commander may need to accept.
- Conduct a continual time analysis.

NOTE: This process involves information sharing within the staff. The engineer and other staff members may initially work independently, then come together to share information, or the staff may work as a group.

SEEK THE COMMANDER'S GUIDANCE

The engineer needs to seek guidance from the commander on each area of engineer capability if it is not given. He should

request guidance on the use of breaching, obstacle, and survivability assets.

DEVELOP THE COURSE OF ACTION

The engineer participates in the development of the maneuver COA. This ensures his complete understanding of the COA. As each COA is developed, the engineer prepares the supporting SOEO. He must consider integrating engineer capability assets into the operation. He considers the capability he determined during his EBA to ensure that his SOEOs are realistic. A matrix provides a technique for identifying the engineer tasks that support a TF offensive operation. The following example illustrates this technique:

TF 1-1 attacks in zone to seize Objective (Obj) Blue to destroy a defending motorized rifle company (MRC) not later than (NLT) 060400 September 19XX. The TF will move from AA Dog to the LD on Route Nut in a column formation. The TF will cross the LD in a TF box formation. Two companies/teams will occupy attack-by-fire (ABF) positions 1 and 2 and act as the TF support force. A third company/team supported by the engineers will breach vicinity Pop 1. The fourth company/team will assault the Obj. Upon seizure of the Obj, the TF will halt, consolidate, and transition to a hasty defense (see Figure 3-4).

ANALYZE THE COURSE OF ACTION

The staff war-games the COA to determine its viability and to determine the best COA to recommend to the commander. The engineer develops the SOEO within the context of the maneuver COA. There are some specific considerations that the engineer staff officer should consider as he develops his SOEO, including the—

- Breaching capability that makes one breaching technique preferable to another (for example, covert versus

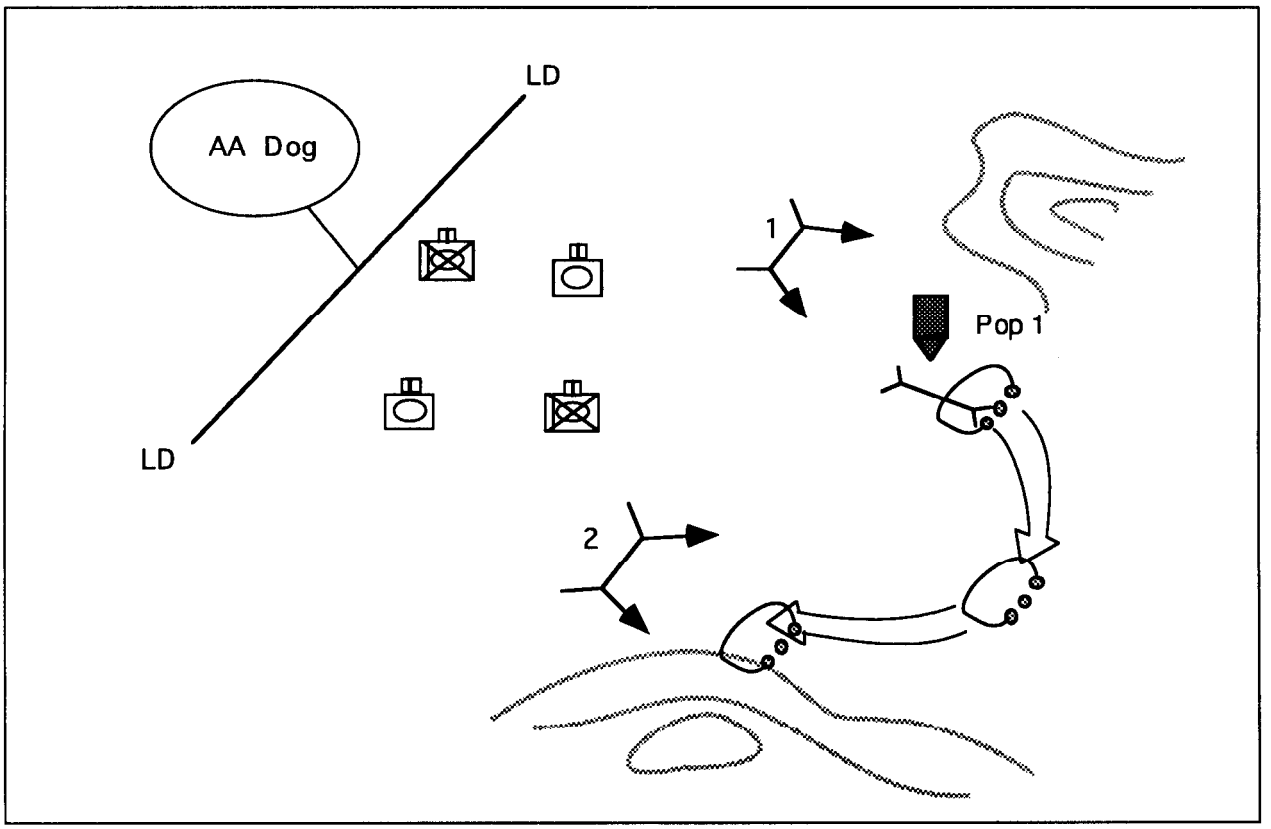


Figure 3-4. COA sketch

in- stride and the mine-clearing line charge (MICLIC) versus the tank plow).

- Obstacle locations that hinder enemy maneuver.
- Enemy's obstacle design and placement within the kill sack.
- Adequate fire-control measures to support breaching. He should coordinate with the FSO for screening/obscuration smoke and suppressive artillery fires to support the breach.
- Locations of suspected enemy artillery concentrations that make one type of breaching preferable to another. He should coordinate with the FSO and consider the location of counterfire radar zones that protect forces in the breach.
- Location and type of enemy situational obstacles that make one type of breaching asset preferable to another.
- Relative locations of friendly obstacle groups that support the attack.
- Friendly reactions at enemy obstacles (breaching capability) versus the desired obstacle effect.
- Friendly force-protection requirements such as hasty position construction required on the objective and protective positions for forces not participating in the attack.

The TF engineer's SOEO recommends the placement of breaching assets and the task organization of the engineer company during the COA analysis phase of the planning process. He must consider all of the TF's breaching assets and their unique capabilities. M1A1 track-width mine plows are not effective in very rocky soils, and the MICLIC will not effectively clear double-impulse mines. These are examples of the considerations the engineer must make to properly develop a SOEO that supports the scheme of maneuver. The engineer must effectively estimate the amount of reduction that the TF is capable of and articulate that to the S3.

The staff adjusts the COA and the engineer adjusts the SOEO, as follows, after war gaming:

- Breaching location changes.
- Suppress, obscure, secure, and reduce (SOSR) synchronization.
- Additional situational-obstacle groups.
- Identification of other mobility requirements.

The engineer also considers the additional mobility requirements associated with the forward passage of follow-on forces. This could require more counterobstacle capability than the initial TF requirement. It is prudent of the engineer to consider the extra effort to ensure rapid commitment of follow-on forces and easy passage through the TF breaches.

DECIDE AND EXECUTE

The engineer will make adjustments to the SOEO based on the hat the commander approves. The engineer then will provide either an oral, written, or graphical order, with sufficient detail to allow the subordinate units to conduct the operation. The engineer provides critical information using—

- The operational overlay.
- The scheme of obstacle overlay (if situational obstacles are to be employed).
- The SITEMP, with an enemy obstacle system.

TASK-FORCE SCENARIO

The following scenario illustrates a TF attack:

The TF must destroy the northern MRC of a defending motorized rifle battalion (MRB) as the supporting attack to the brigade main effort. The TF's purpose is to protect the northern flank of the brigade's main attack. Based on the TF's mission, the commander directs the staff to develop the COA depicted in Figure 3-5. Previously, the S2 and the engineer developed a SITEMP depicting the enemy's defensive posture, including obstacle and fortifications depicted in Figure 3-6. The engineer used the weapons-range fans and enemy obstacle doctrine coupled with a thorough terrain analysis to define the enemy's kill sack, disposition, and potential obstacle plan. The engineer's EBA is a fundamental product to successfully developing a COA.

The COA calls for a supporting attack in the north with two mechanized companies/ teams. These two companies will destroy the enemy combat security outpost, then move to support-by-fire positions to suppress the enemy during the breach. A mechanized team will breach the tactical obstacles in the south and destroy the southern motorized rifle platoon (MRP). The engineer company (-) will reduce the obstacles in the south, allowing the assault force to destroy the remaining enemy platoons.

The SOEO arrays mobility assets for multiple missions. The execution of the envelopment is depicted in Figure 3-7, page 3-14. The mechanized team conducting the supporting attack receives a tank platoon equipped with two tank plows. This is sufficient to breach any protective obstacle around

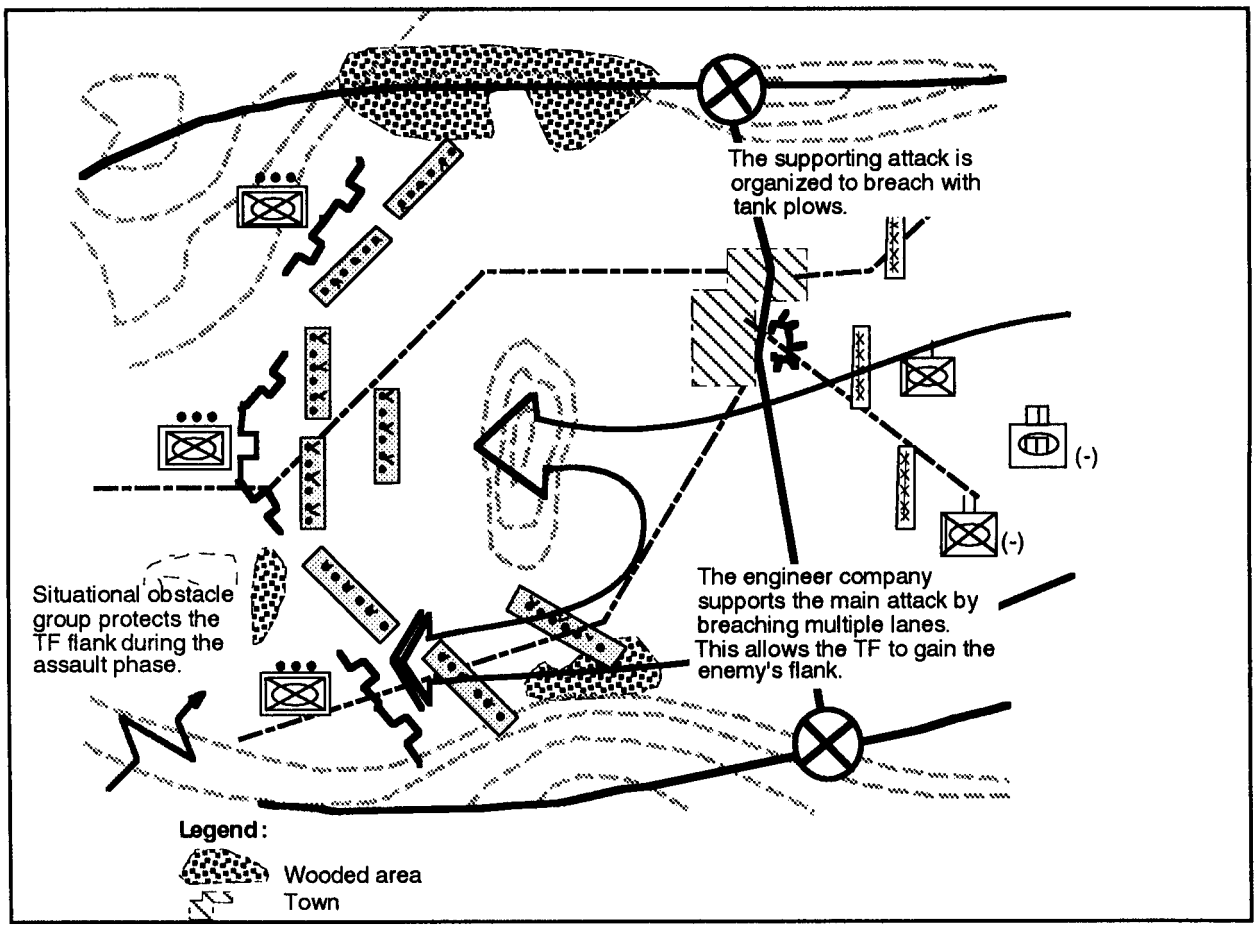


Figure 3-5. TF deliberate-attack scheme of maneuver

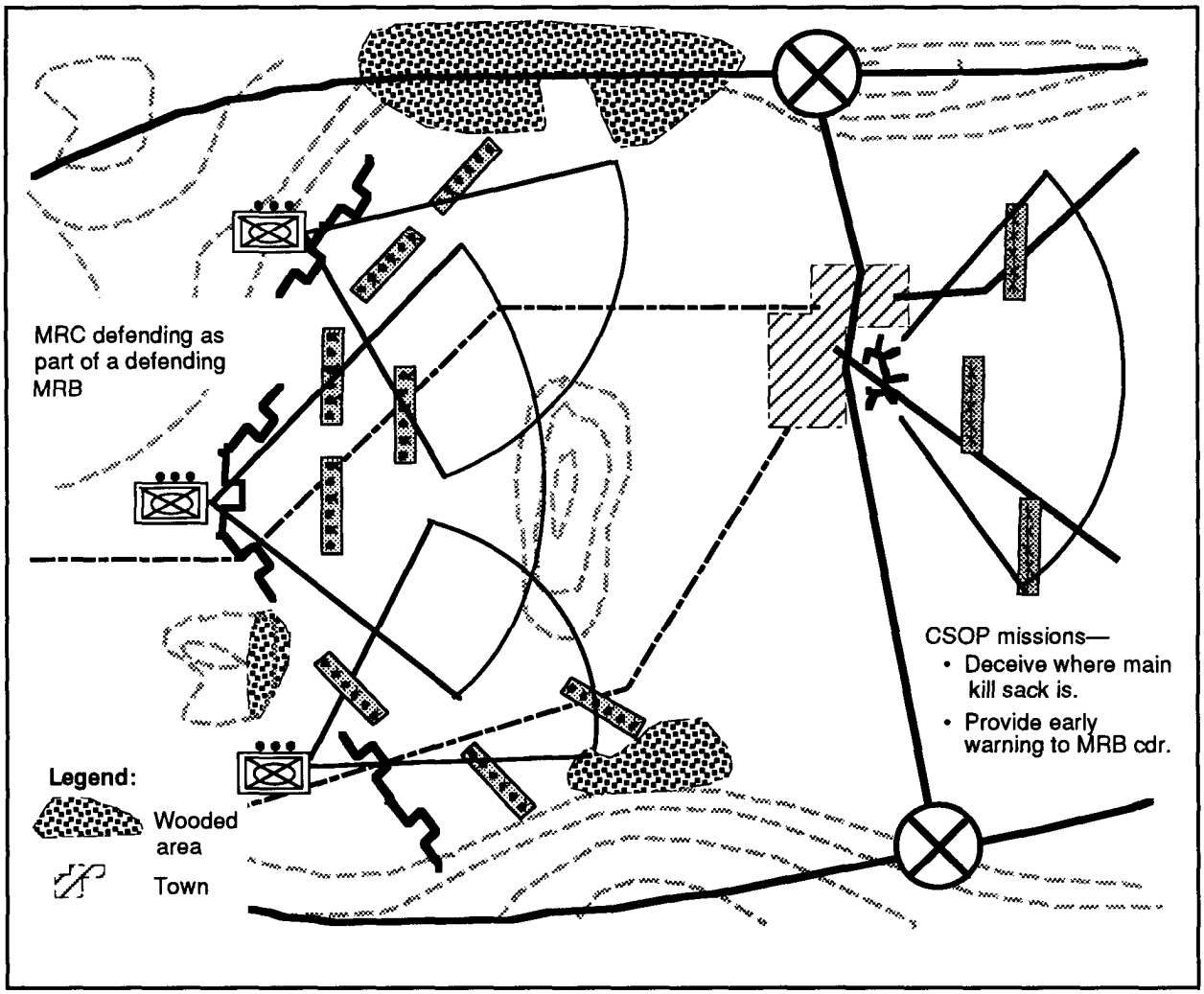


Figure 3-6. Enemy SITEMP with obstacle overlay and weapons-range fans

the combat security outpost and to deal with any obstacles emplaced as part of the enemy's deception. An engineer platoon is cross-attached to the breaching force. This platoon will be equipped with a MICLIC. The breaching team will also have a plow-equipped tank platoon with two plows. The breaching team must create a minimum of four lanes through the tactical obstacles (two lanes in two obstacles) as well as conduct an assault breach of the protective obstacles of the southern platoon. The engineer company (-) follows the breaching team. to widen the four lanes to accept two-way traffic and create additional lanes to recover wounded soldiers and damaged equipment. The engineer company is also responsible for marking these lanes and providing guides for the assault force. Both assaulting companies have tank plows to breach protective obstacles encountered during the envelopment.

A situational obstacle group is planned to protect the TF's flank during the assault phase. On order, the engineer company could reinforce the artillery-delivered obstacle with Volcano or conventional mines. The engineer company will also be prepared to start hasty fortification, should the tactical situation require.

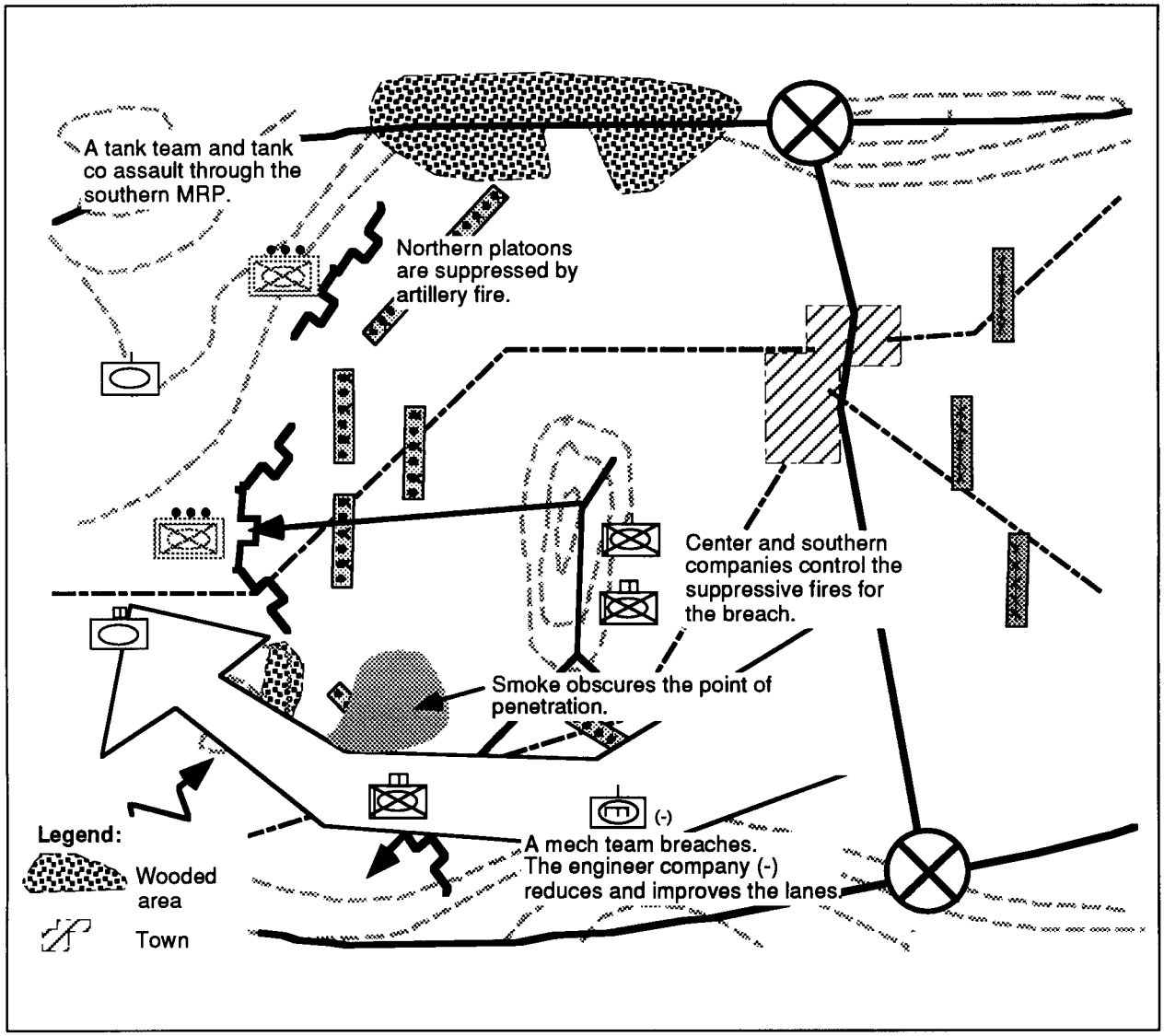


Figure 3-7. TF deliberate-attack execution

CHAPTER 4

DEFENSIVE OPERATIONS

This chapter deals with planning and executing the defense. It does not attempt to deal with all tactical issues facing the defending TF. It focuses on the interface that must be achieved to synchronize the engineer company into the TF's defensive preparations.

DEFENSIVE CHARACTERISTICS

To support the defense, the engineers must understand defensive characteristics and their relationship to engineer operations. The characteristics of the TF's defense are—

- Preparation.
- Security.
- Disruption.
- Mass and concentration.
- Flexibility.

PREPARATION

Defenses have a distinct preparation phase. Engineer synchronization is vital to the TF's success. The engineer company is a critical component in setting the conditions for combat and giving the TF a decisive edge against the attacking enemy.

Engineer planning and preparation must not only provide a centralized focus for the defense but also allow for decentralized integration and execution. Engineer preparations in the defense are time-, manpower-, equipment-, and material-intensive. With no time to waste, the TF engineer must quickly identify engineer requirements. His dilemma is that the details of the TF plan will not be complete until the staff has time to conduct tactical planning and commanders have conducted personal reconnaissances. He must identify those requirements for survivability positions and obstacles that are not likely to change so that he can get engineers to work. As the plan matures, the TF engineer adjusts the supporting engineer plan through clear FRAGOs to his subordinates.

SECURITY

The defending TF provides security to conserve combat power for use elsewhere. The purpose of security in the defense is to coordinate and synchronize the defense, to provide early warning, and to disrupt the enemy attack early and continuously. The TF provides security through counterreconnaissance forces, deception, fortification, and protective-obstacle construction. The engineer company can emplace obstacles to support the counterreconnaissance screen and to disrupt the enemy's advance through the TF's sector.

DISRUPTION

The division and brigade attempt to disrupt the enemy's effort through deep, security, and deception operations. The TF fights as part of these operations. The engineer company constructs directed obstacles to disrupt the enemy forward of the EA and provides breaching capability to assist the TF during the fluid battle. The TF engineer plans and executes situational obstacles to disrupt follow-on enemy forces. Deception operations employ a combination of forces and obstacles to cause the enemy to commit forces prematurely against a falsely perceived weakness.

MASS AND CONCENTRATION

The TF seeks to concentrate its fires to exploit or create an enemy weakness. The

engineer company supports the concentration of fires by constructing obstacles and fortifications and by providing mobility to counterattacks or reserve companies/teams. Obstacles are employed to directly attack the enemy's ability to maneuver. Tactical obstacles are integrated into the TF's direct-fire plan to enhance the terminal effects of those fires. Obstacles turn, block, fix, or disrupt the enemy's formations, allowing concentrated fires to create and exploit enemy weaknesses (see Figure 4-1).

The company also constructs fortifications as the TF emplaces protective obstacles, allowing the TF to survive the enemy's fires and break up his final assault. Defending from survivable positions is a key factor in maintaining concentrated fires until the enemy is destroyed. The engineer company provides mobility to the TF's counterattack or reserve, allowing the TF to exploit a broken enemy attack rapidly.

FLEXIBILITY

The TF must retain flexibility to counterattack or react to a deviation plan. Engineers assist the TF in maintaining flexibility through situational obstacles in the main battle area (MBA), task-organizing for rapid transition to the offense, and providing quick breaching capability for repositioning companies/teams. The engineers plan to use situational obstacles in the main EAs as "be-prepared (B/19 missions." Situational obstacles can be employed separately or can be

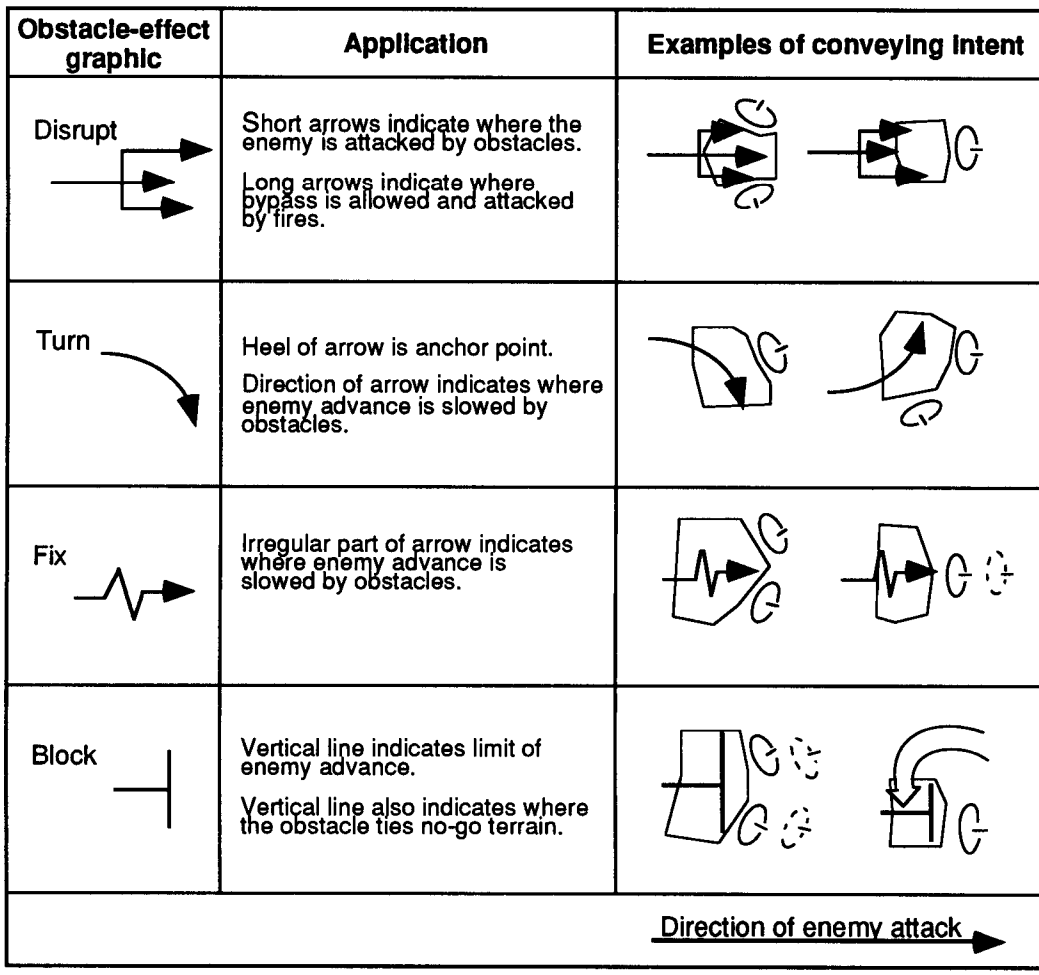


Figure 4-1. Obstacle-effect graphic

used to reinforce existing obstacles in the EA. The TF engineer plans for the TF's mobility by preparing his company for the rapid breaching of enemy situational obstacles or friendly obstacles that impede the TF's offensive transition.

DEFENSIVE PATTERNS

There are two traditional defensive patterns: the mobile defense and the area defense. The fundamental difference between the two is their focus. The TF engineer must understand both defenses to effectively tailor his SOEO to support the TF commander's chosen pattern.

MOBILE DEFENSE

The mobile defense's focus is to destroy the enemy attacker. This defense is organized to allow the enemy to advance to a position where he can be destroyed by a counterattack or a large reserve. This defense trades space for time to achieve a decisive advantage against the attacker. Engineers concentrate on constructing obstacles to attack the enemy's freedom of maneuver and use mobility to preserve the strike-force reserve's mobility.

Obstacle planning is linked to the most likely enemy COA rather than to a specific piece of terrain. Mobile-defense obstacle planning is more restrictive than permissive, and it reduces the flexibility of the companies/teams. This allows massed obstacle effort at areas that are crucial and preserves mobility for counterattacking forces.

Survivability is also tailored to a force-oriented defense. The TF must fight the depth of its sector from multiple battle positions. Fortification efforts must support fighting quick engagements from multiple positions by providing primarily hull-down positions in both primary and subsequent battle positions. Protective-obstacle requirements are concentrated in the final subsequent positions where the penetration must be blunted to allow the counterattack.

The enemy is destroyed in the mobile defense by a large counterattacking reserve. The engineer company supports this reinforced company/team in two ways. First, the engineer company's obstacle-control measures ensure that the TF's obstacle efforts do not limit the mobile reserve's freedom to maneuver. Second, the engineer company ensures that the mobile reserve has the necessary dedicated engineer support to maintain mobility during the counterattack. The engineers that are a part of the counterattack must be able to counter the enemy's situational obstacles or reduce friendly obstacles as required by changes to the situation. The TF engineer must weigh the trade-off between the counterattack and the obstacle and survivability requirements of the TF's MBA when he allocates engineer forces, assets, and resources.

AREA DEFENSE

Area defense focuses on retaining terrain. The area defense is designed to absorb the enemy into an interlocking series of positions from which he can be destroyed. The interlocking nature of defensive fires, obstacles, and small, local reserves are the mechanism for the enemy's defeat. The area defense does not focus on the outright destruction of the enemy, but on denying the enemy key terrain. Frequently in an area defense, the engineer company will concentrate on strongpoint preparation. This operation requires extensive materials and equipment and is characterized by extensive fortification and obstacle construction.

The SOEO focuses on retaining terrain and enabling the TF to concentrate fires from fixed positions. Locating and analyzing key and decisive terrain plays a major role in the organization of the area defense and becomes the focus of the obstacle and survivability effort.

The survivability effort must enable the companies/teams to concentrate fires from

fixed positions. The TF engineer must be sensitive to increased fortification requirements. To fight from fixed positions, the companies/teams may require primary, alternate, and supplemental turret-defilade positions. The heavier survivability effort also requires a larger and more substantial protective-obstacle effort that breaks the enemy's final assault. The tactical-obstacle effort must be well-synchronized between the companies/teams to ensure mutual support and interlocking obstacle groups.

ENGINEER PLANNING FOR DEFENSIVE OPERATIONS

The TF engineer's role is to identify missions, allocate resources, and synchronize and command engineer functions. Countermobility and survivability are the engineer company's primary missions. Therefore, planning for these missions are the TF engineer's initial essential tasks. FMs 90-7 and 20-32 cover in great detail the mechanics, tactics, and procedures for obstacle planning and integration.

The focus of defensive planning is to integrate and synchronize obstacles and fortifications into the TF's direct- and indirect-fire plans. This planning is directive and detailed in nature and focuses on the determination of obstacle groups and the type and amount of prepared positions. Actual obstacle siting and emplacement and position location are the purview of the company/team commander and the supporting engineer platoons.

TF-level defensive planning is part of the tactical decision-making process. The EBA process provides the basis for integrating defensive planning with the decision-making process.

ANALYZE THE MISSION

The key activities during the mission analysis are to—

- Determine facts and assumptions.
- Analyze relative combat power.
- Analyze the engineer battalion's/brigade's mission and the commander's intent.
- Issue the commander's guidance.

DETERMINE FACTS AND ASSUMPTIONS

Defensive planning starts with the receipt of a mission to defend. The company XO and the Battlefield Information Control Center (BICC) (or the TF engineer and the S2) begin by developing a SITEMP that includes a modified combined obstacle overlay (MCOO). The MCOO is a product developed during the IPB process. The MCOO development is a joint effort of the engineer and intelligence sections of the TF's TOC.

The MCOO should define the AAs and mobility corridors within the TF's AO. This information is vital to obstacle planning. Obstacles are placed on AAs to attack enemy maneuver. The AA analysis also details potential EAs. The MCOO also highlights areas where fortification is not feasible because of soil type, terrain restrictions, or limited fields of fire. It also indicates where forces can defend with limited survivability construction because the reverse slope or undulating terrain provides natural concealment and cover.

The threat evaluation and enemy COA development detail how the enemy will potentially attack. They also provide an insight as to what and where the enemy's objective and routes might be. The SITEMP helps the engineer to understand how the enemy will traverse through the TF's sector and allows the engineer to gain an understanding of how and where he can best attack the enemy's maneuver.

The SITEMP also depicts how the enemy's reconnaissance forces will enter the sector. This is especially important to counter the enemy's ability to reconnoiter obstacle and fortification efforts.

The engineer must articulate the current capabilities of the engineer company, its current combat power, and its ability to support the TF. Assumptions on future capability or potential reinforcement by other engineers should be analyzed. Specific characteristics of special engineer equipment and SCATMINE systems are detailed for the staff. An initial Class IV/V supply-point location and operation plan should be developed with the TF staff (note that the TF has responsibility for Class IV/V supply-point operation). The XO/lSG works with the TF and the engineer battalion S4 to ensure that delivery of Class IV/V barrier material is synchronized with the execution.

ANALYZE RELATIVE COMBAT POWER

The engineer compares friendly and enemy combat power and identifies possible obstacle and fortification requirements that offset potential enemy breaching and direct- and indirect-fire capabilities. The actual inclusion of the obstacles normally occurs after COA development. During this phase, the engineer finishes his EBA to gain an understanding for the engineer company's ability to support the TF.

ANALYZE THE ENGINEER BATTALION'S/ BRIGADE'S MISSION AND THE COMMANDER'S INTENT

The staff analyzes and identifies information from the engineer battalion/brigade order and commander's intent that will potentially impact defensive planning. The engineer analyzes the maneuver brigade and engineer battalion commanders' intent to determine potential obstacle placement, obstacle intent, and construction priority based on his concept of the operation. If not given in the higher order, the engineer must determine the intent for the obstacle belts in the higher order as well as the fortification priority.

The TF must identify tasks and limitations imposed from the brigade OPORD. These might include obstacle belts with or without specific intents, obstacle-restricted areas, or restrictions on the type of obstacles. Also, the brigade OPORD might specify reserve, situational, or directed obstacle groups or the minimum level of survivability.

The engineer must identify the TF's total obstacle and fortification capabilities. Available assets include engineer units, SCATMINE systems, and infantry units that can provide additional manpower for obstacle construction. Engineer equipment status and work rates must be considered. Appendix D details the engineer company's defensive planning factors. Time must also be considered.

ISSUE COMMANDER'S GUIDANCE

The TF commander should be as specific as possible with his initial obstacle and fortification guidance. If the commander narrows the COA focus, he may also provide obstacle or fortification guidance. His guidance is a key factor in an early start and must be solicited if not offered.

COURSE-OF-ACTION DEVELOPMENT

Detailed planning begins following the COA development. The engineer focuses on five specifics in his SOEO for the defensive plan, including—

- Direct-/indirect-fire analysis.
- Obstacle-intent integration.
- Obstacle priority.
- Fortification priority.
- Mobility requirements.

DIRECT-/INDIRECT-FIRE ANALYSIS

The direct-/indirect-fire analysis examines how engineers can best use obstacles (within the commander's intent) to enhance the direct-/indirect-fire plan. The COA sketch includes the minimum maneuver graphics for the staff to plan. Fire-control measures indicate where and how the TF's direct-fire weapons mass, shift, or lift to destroy the enemy. The staff should annotate direct-fire weapons-range fans on this overlay to gain an appreciation of the direct-fire coverage. This analysis can be used to formulate obstacle locations with the direct-fire plan. The engineer must have a fundamental understanding of the direct-/indirect-fire and maneuver plans and the TF's organization of the EA to effectively integrate obstacles with the direct-/indirect-fire plan.

The direct-fire plan also illuminates which companies/teams will require fortification based on their position with respect to the terrain. The engineer must understand the purpose of each company/team to determine its fortification requirements. Synchronization of direct and indirect fires with obstacles multiplies the relative effect on the enemy. An obstacle is an excellent location for preplanned artillery and mortar fires. These fires can eliminate dismounted breaching efforts. The indirect fires contribute to the threat's ability to breach, making the obstacle more effective and providing direct-fire systems a higher probability of kill.

OBSTACLE-INTENT INTEGRATION

The engineer determines locations for the directed obstacle groups. Groups are placed on the COA overlay to support the maneuver plan. This location is for planning only and normally will be adjusted after the ground reconnaissance.

Obstacle groups target specific enemy elements based on the SITEMP. The engineer generally allocates an obstacle group against a battalion-sized AA. This approach mirrors the staff's placement of a company/team against the same enemy force. The company's/team's fire responsibility drives the placement of the obstacle groups. The engineer advises the commander on which specific effect each directed obstacle group must achieve. He plans obstacle groups to—

- Disrupt the enemy.
- Turn the enemy into an area where friendly units can mass fires.
- Fix the enemy in the EA and enhance his direct-fire destruction.
- Block the enemy from using an AA.

The engineer integrates directed obstacle groups with the COA. The obstacle effects are shown on the COA overlay using obstacle-effects graphics. The engineer draws the obstacle-group graphic to reflect the location, target, and specific intent of the group as accurately as possible. The engineer should visualize the terrain and how it naturally effects maneuver. Terrain visualization is vital to proper obstacle-group design.

OBSTACLE PRIORITY

The staff determines the priority of each group depicted on the overlay. Priority is established by the commander's intent and the most likely enemy COA. The obstacle priority should reflect the TF's greatest obstacle requirement. The primary obstacle effort can be with an economy of force where the commander needs more obstacles to overcome a shortage of direct-fire systems. The TF engineer should be cognizant of flank protection, weapons types and ranges, and the overall commander's intent for the entire force before placing obstacle priority on the main EA. Priorities assist the engineer in allocating resources and ensuring that the most critical obstacle groups are emplaced first.

FORTIFICATION PRIORITY

The SITEMP, the fire analysis, and the purpose of each company/team provide insight to derive the TF's fortification requirements. Soil conditions and weather must be considered, along with the equipment capability, to

determine the potential number of positions that can be constructed. A company serving as a counterattacking force does not need the survivability effort that a blocking team needs. Soil conditions or terrain could preclude fortification. All of the above must be considered to analyze the TF's fortification potential.

MOBILITY REQUIREMENTS

The engineer identifies the TF's mobility requirements. Obstacle groups should not be arrayed along potential counterattack routes or where there is a potential to hamper unit repositioning. Mobility assets should be used to counter potential enemy situational obstacles and friendly obstacles that might hinder friendly maneuver. The TF engineer must consider the commander's mobility requirements and plan for mobility assets to be ready when and where needed. For example, if the commander has a tank company positioned to attack the enemy's flank, the engineer must ensure that the company can get to the flank. This can be done through planned lanes or obstacle-restricted areas or by placing breaching assets with the company to provide critical mobility and immediate response to enemy situational obstacle threats.

COURSE-OF-ACTION ANALYSIS

The staff war-games the COA to determine its viability and to determine the best COA to recommend to the commander. The engineer refines the SOEO during this process as well. Obstacles and fortifications should be considered within the context of the maneuver COA. Some specific areas that the engineer staff officer should consider are-

- Enemy reactions at the obstacle groups (breaching or bypassing capability) versus the desired obstacle effect.
- Enemy breaching capabilities that make one obstacle type preferable to another (such as a tank ditch versus a minefield).
- Obstacle locations that hinder friendly maneuver.
- The compatibility of obstacle effects and weapons-systems capabilities.
- Adequate direct-/indirect-fire-control measures, as well as targeting that supports the obstacle effect. Effects of artillery and obstacles must be synchronized to gain the desired effect on the enemy's maneuver.
- Locations of suspected enemy artillery concentrations that make one type of fighting position preferable to another.
- Locations and types of enemy situational obstacles that make one type of breaching asset preferable to another.

The staff adjusts the COA after war gaming, including the obstacle and fortification plan, as follows:

- Obstacle-group location changes.
- Obstacle-effect changes.
- Additional situational-obstacle groups.
- Additional reserve-obstacle groups.
- Fortification effort, type, or priority changes.
- Identification of other mobility requirements.
- Refinement of artillery targets based on obstacle group changes.

MOBILITY REQUIREMENTS

The staff determines which obstacles require lanes and the closure criteria for these lanes. They also determine obstacle-restricted areas that support the TF's maneuver. Lanes and bypasses are determined using tactical repositioning requirements developed during the COA analysis. Requirements for rehearsal movement, TRP

placement, and logistical support of forward TF elements are also considered in lane development. Mobility requirements identified during COA development are synchronized and refined during COA analysis. Additional mobility requirements identified during war gaming are resourced and planned for.

Table 4-1. Resource factors

Minefield	Resource Factor
Disrupt	0.5
Fix	1.0
Turn	1.2
Block	2.4

OBSTACLE DESIGN AND RESOURCING

After the COA analysis, the engineer conducts a detailed study of the obstacle plan to determine the resource requirement. Groups are resourced using the width of the mobility corridor and the resourced factors from Table 4-1. The size of the mobility corridor is determined from the MCOO. The corridor width multiplied by the resource factor will give a resource allocation for that corridor and effect. The TF engineer resources the obstacle groups based on their assigned priorities. Once the engineer has developed the resource requirements for the obstacle groups, he plans the individual obstacles within the group.

If time permits, a detailed ground reconnaissance of the obstacle-group location can be conducted. This will allow a more detailed analysis of the obstacle requirement for that AA, and then individual obstacles can be planned by the engineer. However, usually the engineer will only designate the intent to guide the companies/teams. The company/team commanders and their supporting engineers will complete the actual design of the individual obstacles within the obstacle groups.

DECISION AND EXECUTION

The engineer makes adjustments to the SOEO based on the COA that the commander approves. The engineer then provides either an oral, written, or graphical order with sufficient detail to allow the subordinate units to conduct the operation. The engineer provides critical information using the—

- Scheme-of-obstacle overlay.
- Obstacle-execution matrix.
- Survivability matrix and time line.

SCHEME-OF-OBSTACLE OVERLAY

The scheme-of-obstacle overlay depicts the location of the TF's obstacle groups, brigade-directed obstacle groups (if any), and obstacle belts within the TF's sector. The overlay also includes any obstacle restrictions dictated from a higher headquarters. The overlay depicts the obstacle groups using the standardized obstacle-effect symbols shown in Figure 4-1, page 4-2. The overlay does not generally show individual obstacles unless the engineer has had sufficient time to conduct a thorough ground reconnaissance where exact obstacle locations have been identified. The engineer must exercise extreme caution if he uses individual obstacles on the overlay. He must ensure that inexperienced leaders do not attempt to emplace obstacles exactly as shown on the overlay, but instead, properly site the obstacle with the company/team commander. The TF scenario presented later depicts an example of a TF scheme-of-obstacle overlay. The scheme-of-obstacle overlay graphically depicts how the commander seeks to influence enemy maneuver through obstacles.

OBSTACLE-EXECUTION MATRIX

The obstacle-execution matrix includes specific instructions and detailed information concerning the obstacle groups shown on the scheme-of-obstacle overlay. Figure 4-2 shows a directed-obstacle-execution matrix.

Zone/Belt/ Group/ Obstacle Number	Location	Effect	Priority	Emplacing Unit	Owning Unit	Lane Location	Lane-Closure* Responsibility	Materials/Assets Required	Materials Location	Special Instructions
A1A	NK 312568	Turn	1	A 78 Engr	A-1/63 AR	N/A	N/A	1200M15	NK 310568	
A1B	NK 315002	Fix	3	1/B 78 Engr	B-1/63 AR	N/A	N/A		NK 315002	
A1C	NK 311085	Block	2	2/B 78 Engr	C-1/63 AR	NK 311082	Scouts V63AR	360-can. Volcano	NK 311085	Volcano 48-hour duration. Approved by corps commander

*Reference to reserve-obstacle-execution matrix

Figure 4-2. Directed obstacle-execution matrix

A directed-obstacle-execution matrix should include the following information:

- The zone/belt/group designation and individual obstacle numbers, to include situational obstacles.
- The location.
- The obstacle effect for the group.
- The priority of the group.
- The emplacing and owning unit.
- Locations of lanes or bypasses.
- Lane-closure responsibility and closure resource location.
- The material allocation or assets allocated to the group.
- The Class IV/V supply-point responsibility.
- The location of obstacle materials and Class IV/V supply-point locations.
- Any special instructions, such as triggers or firing-party procedures.
- Obstacle repair instructions.

SURVIVABILITY MATRIX AND TIME LINE

The survivability time line includes specific instructions and detailed information concerning the TF's fortification effort. Normally, the A&O platoon leader controls the equipment and ensures that fortification construction is complete according to the survivability matrix and time line. He is the TF engineer's primary agent for construction during defensive preparation. As a minimum, these products should include the following information (see Figure 4-3):

- The survivability priority for the type of position and the type of system.
- The company/team priority.
- The number, type of position, and time allotted to fortify each TF element.
- The location.
- The allocation of equipment.
- The maneuver point of contact (POC) with each element, including the call sign and frequency.
- Any special instructions, such as disengagement triggers, follow-in construction tasks, or equipment rally points.

TASK-FORCE OBSTACLE SCENARIO

The following is a scenario that highlights some considerations for defensive planning at the TF level:

The TF commander has the mission to defend in sector to defeat an enemy regiment. Based on the TF's mission, the commander directs the staff to develop a COA (see Figure 4-4, page 4-12). The scouts will screen forward. Teams A and C and Company D defend from battle positions (BPs) A, C, and D, respectively, to mass direct and indirect fires in EA Dog. Team B defends along a secondary AA in the south from BP B. On order, Team B repositions to a subsequent BP to support the fight in EA Dog.

The engineer develops an obstacle plan to support the COA. First, he analyzes the fire plan to determine the areas where fires are massed to destroy the enemy. He sketches in rough range fans based on the probable weapon systems in each BP. These areas suggest locations where the engineer can integrate obstacles with fires (see Figure 4-5, page 4-12). The engineer selects locations for directed obstacle groups. He confines the obstacle-group locations to obstacle belt A1, which was identified during mission analysis. He uses obstacle-effects graphics to show the relative location of the obstacle groups and to indicate the desired obstacle effect. The obstacle groups target enemy battalion-size formations (see Figure 4-6, page 4-13). The engineer coordinates with the FSO to ensure that indirect fires are planned to support and reinforce the desired obstacle effect. Finally, the TF engineer sets priorities for the obstacle

Start Complete	Location	Priority	Type Position	Number of Positions	Overwatch Unit	Linkup Location, POC, Call Sign, and Frequency	Special Instructions
31 0001- 31 1000	NK 111898	1	2 tier	8	A 1/63	BP1	
31 0001- 31 1000	NK 113890	3	Hull down	14	B 1/63	BP2	CSE plt (DS)
31 0001- 31 1000	NK 104780	2	2 tier hull down	8/4	C 1/63	BP3	A - 78th Engr (DS)
31 1100- 31 1500	NK 112800	4	Modified 2 tier	10	D 1/10	BP4	
31 1800- 31 1900	NK 109800	5	Hull down	2	TOC	NK 109800	
31 2400- 31 0600	NJ 099800	8	Hull down	8	Trains	NJ 099800	
31 0600- 31 1200	NK 104775	7	Dismount crew	8	ADA	NK 104775	
31 1800- 31 2400	NK 111795	6	Hull down	6	Mortars	NK 109800	

Figure 4-3. Survivability matrix

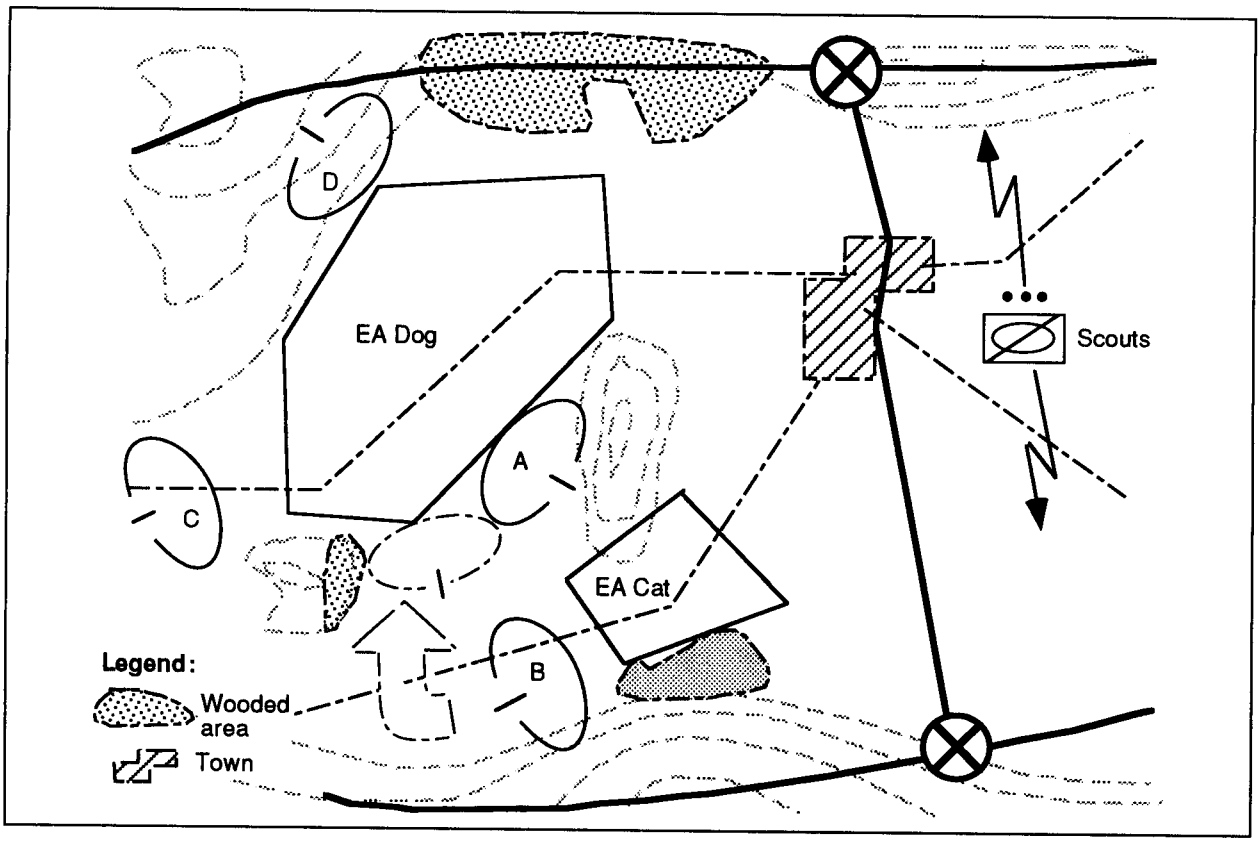


Figure 4-4. TF defense plan

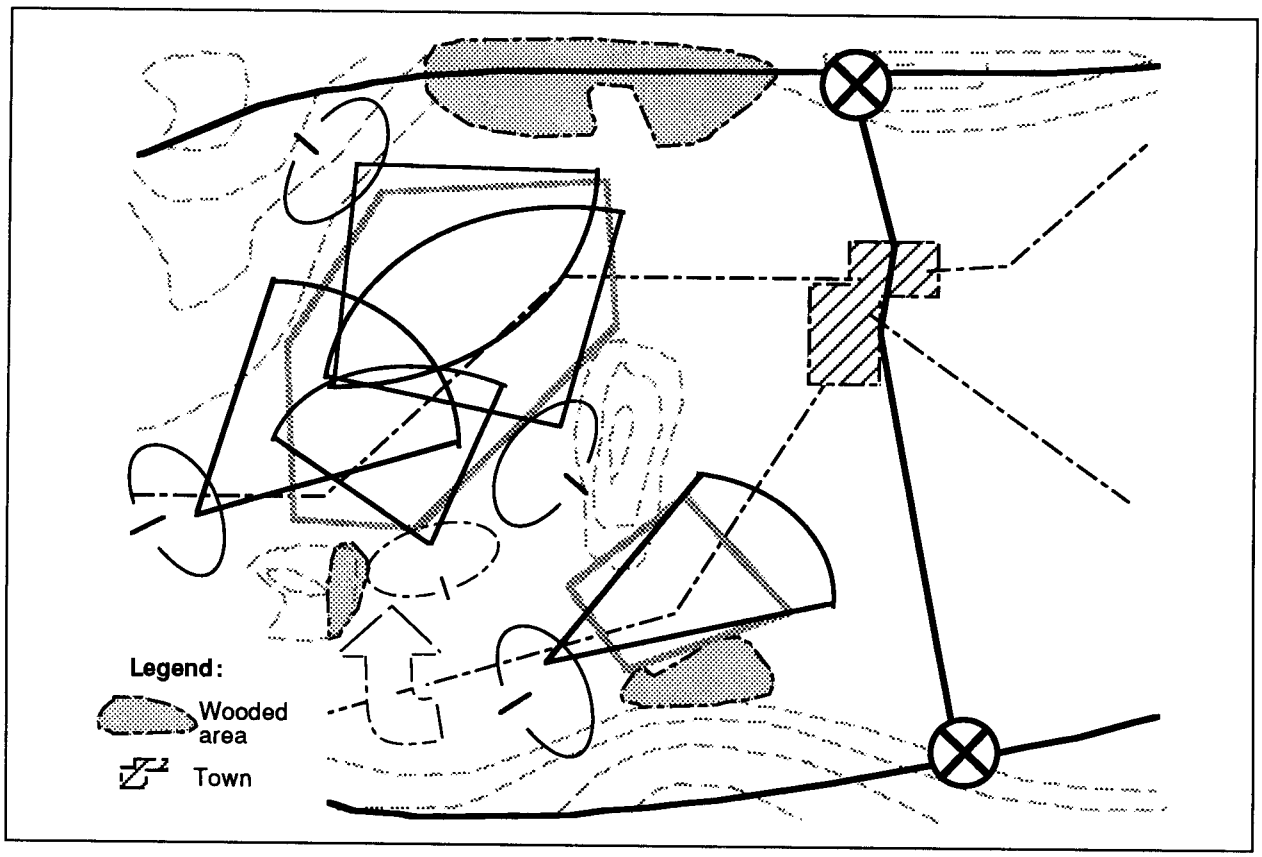


Figure 4-5. TF direct-fire analysis

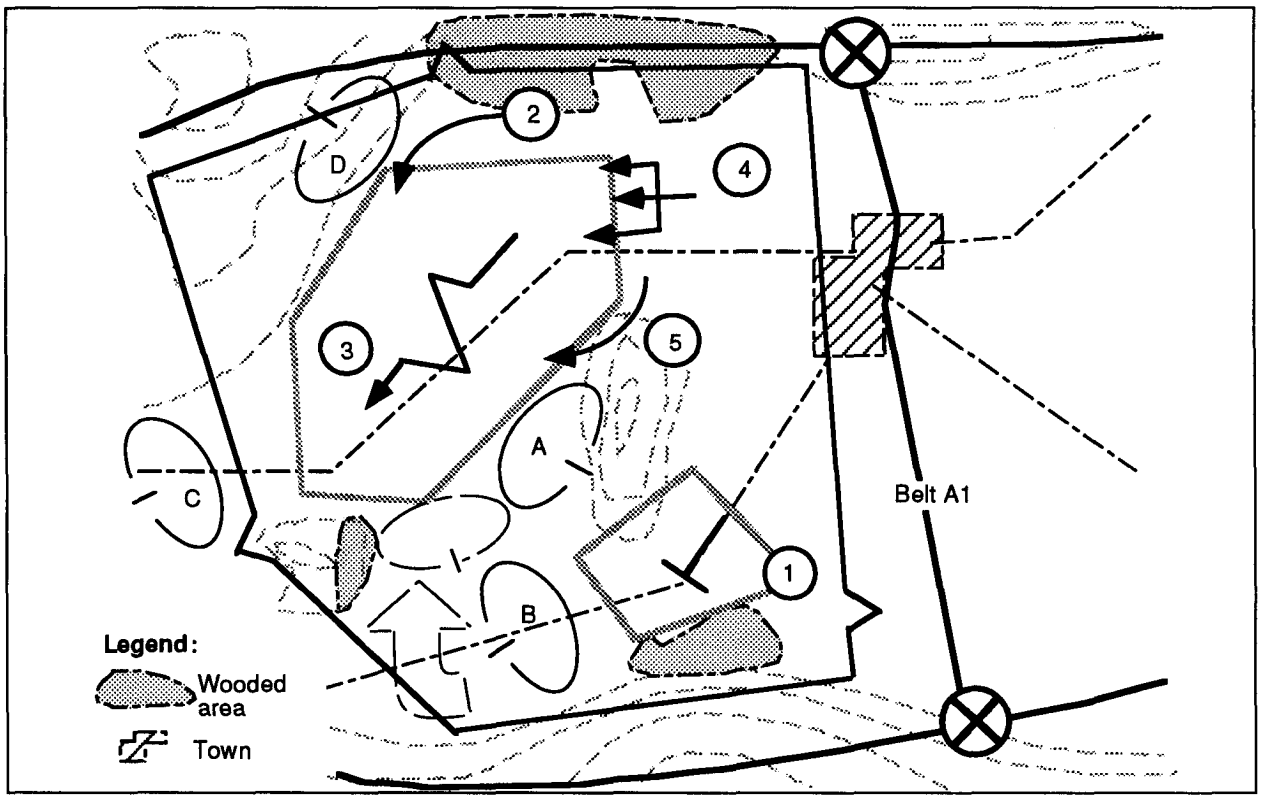


Figure 4-6. Obstacle effects integrated with TF plan

groups based on the importance of the obstacle group to the success of the COA and the commander's guidance on obstacles. Figure 4-6 also shows the priorities that support the commander's desire to stop the enemy in the south, to force him to piecemeal into the EA, and to destroy him in EA Dog.

The engineer also develops a fortification plan and a survivability matrix and time line to support the COA. He prioritizes the fortification effort by maneuver element and allocates equipment, time, and number and type of positions to each maneuver element. Figure 4-7, page 4-14, shows the priorities that support the commander's intent to protect the force while it destroys the enemy entering the EA.

The staff analyzes the COA and makes adjustments based on the analysis. These adjustments include the addition of a situational-obstacle group to support the withdrawal of the scouts. The engineer also identifies mobility requirements. These requirements include lanes for passage of the TF scouts and marked bypasses in the EA to support EA rehearsals. He also recommends that Team B have four tank plows to ensure that they can freely reposition to fire into EA Dog. Figure 4-8, page 4-14, shows the situational-obstacle group and mobility requirements annotated on the obstacle plan. The engineer conducts obstacle design and resourcing for the obstacle plan.

Following the commander's decision to accept the COA as is, the engineer finalizes the obstacle plan. The final plan includes a scheme-of-obstacles overlay and obstacle-execution matrixes. The engineer also coordinates for obstacle overwatch and patrolling with the maneuver team commanders. He also plans for subsequent engineer rally points and *defensive positions, should the enemy attack earlier than expected.*

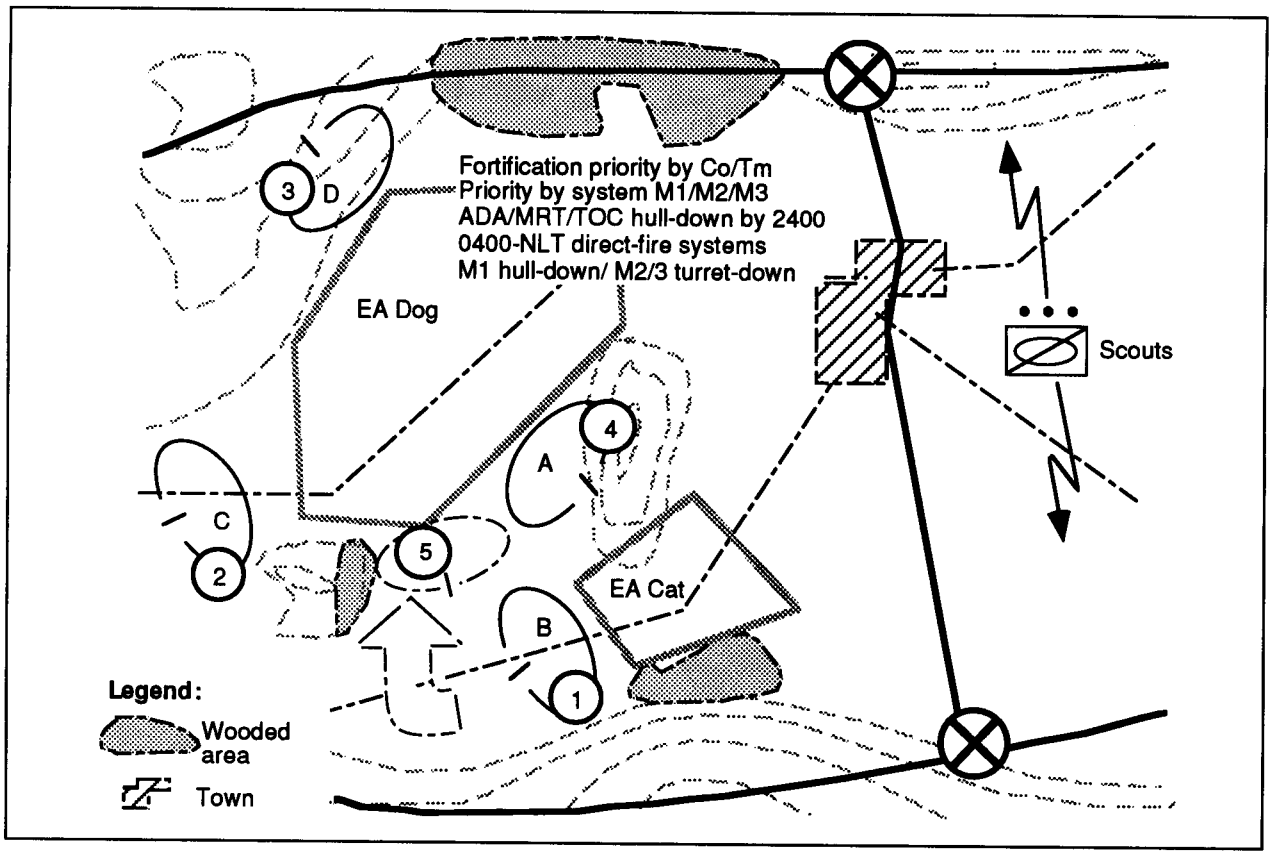


Figure 4-7. Fortification plan

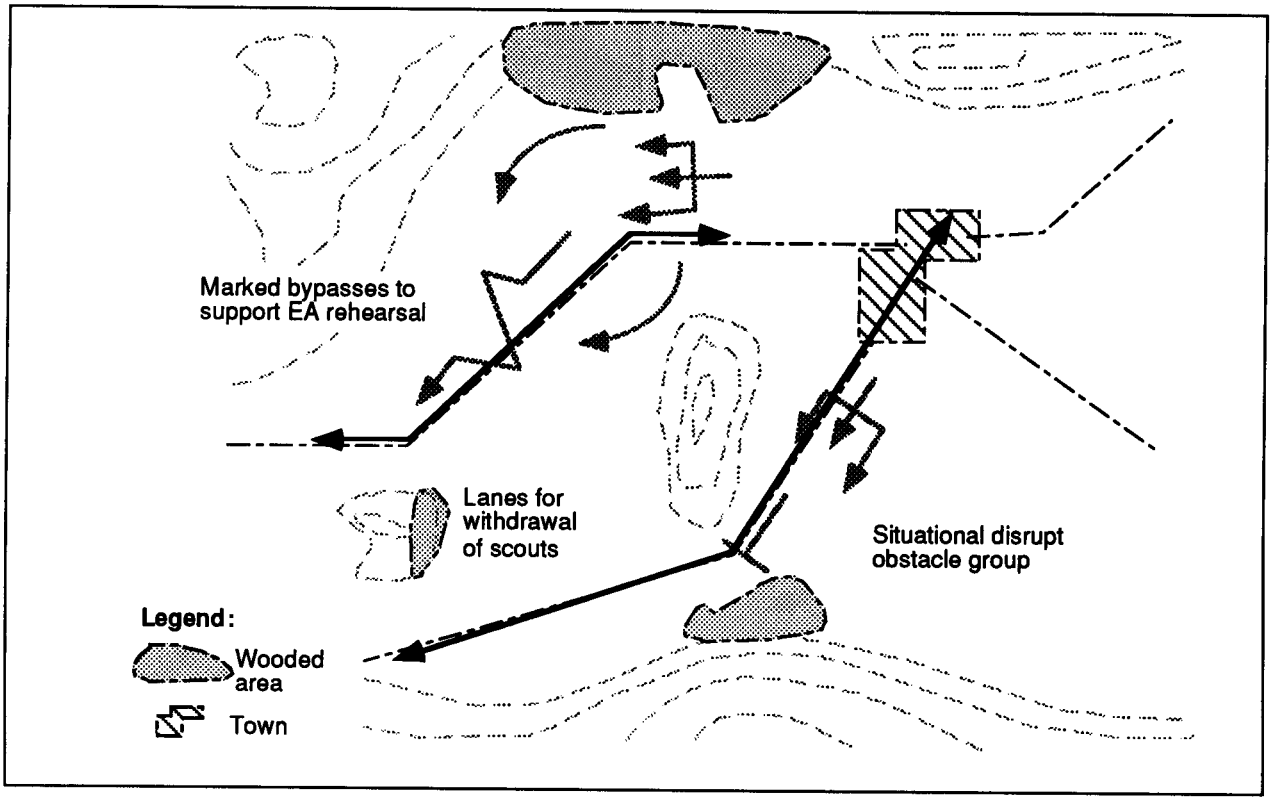


Figure 4-8. Obstacle-plan refinement

PLANNING BELOW TASK-FORCE LEVEL

The following sections outline the principles for siting tactical obstacles and fighting positions to support the company/team. The focal point is the coordination that must occur between the emplacing unit leader (normally an engineer platoon leader) and the company/team commander. This coordination is probably the most vital component of effective obstacle and fortification integration. It is at this level that units directly integrate obstacles and fortifications with the effects and capabilities of weapons and the fire plan. Once the coordination is complete, the emplacing unit physically sites the obstacle and fighting positions with the company/team.

COORDINATING WITH THE MANEUVER COMMANDER

Effective coordination with the company/team commander, who is responsible for the obstacle group, is essential to making the obstacles a combat multiplier. The emplacing engineer is the company/team commander's "team engineer" for the mission. The engineer and the company/team commander work closely to ensure complete integration of obstacles with the company/team plan.

The emplacing engineer and company/team commander use a common set of information when coordinating. The following tools and information will improve coordination:

- The SITEMP.
- The commander's intent, including the unit's task and purpose.
- Maneuver graphics and the fire plan.
- The obstacle-execution matrix.
- The scheme-of-obstacle overlay.
- The fire-support plan.
- CSS graphics.

During coordination, a checklist is used for organizing thoughts and formulating questions. Table 4-2, page 4-16, provides a checklist of some of the considerations used during coordination between the emplacing engineer and the company/team commander. These considerations are organized using the BOSs to provide a logical framework.

SITING THE OBSTACLE

The emplacing engineer and the company/team commander site individual obstacles to achieve synchronization between the obstacle effect and fires. Both must devote sufficient time to the siting effort. It represents the final adjustments to both obstacle location and fire control before emplacement.

To site individual obstacles, certain preconditions are necessary. First, the company/team commander decides where he plans to mass fires and marks the necessary fire-control measures on the ground. The location of these control measures must be clear since they are the basis for obstacle siting. Second, the commander identifies tentative locations for his key weapons within his position or sector. Finally, he and the engineer must both understand the obstacle group's intent.

Obstacle siting concentrates on marking the obstacle group as a whole instead of marking each individual obstacle. However, it may be easier to site individual obstacles in broken terrain. The company/team commander and emplacing engineer use vehicles or soldiers from the company/team, the engineer platoon, or both to simulate the enemy force and do the physical marking. The simulated

Table 4-2. Obstacle coordination checklist

BOS	Considerations
Intelligence	• Enemy AAs and MCs (mounted and dismounted) • Likely enemy COAs and possible reactions to obstacles • Enemy breaching capability • Enemy reconnaissance routes, friendly counterreconnaissance or R&S plans, company/team-level patrols • Likely enemy formations and transitions between formations
Maneuver	• Higher commander's intent • Type of weapons and locations • Sectors of fire/location of TRPs and how they are identified • Mobility requirements for adjacent units, CATK axis, routes for repositioning, employment of reserves, and passage of lines • Obstacle-protection measures
M/S	• Obstacle intents (target, location, and obstacle effect) • Integration of obstacles and fires • Obstacle-control measures and restrictions from higher HQ • Obstacle marking to prevent fratricide • TF mobility requirements (lanes and gaps) • Mutual support between the obstacle location, the fire plan, obstacle effects, and survivability positions
Fire support	• Artillery or mortar targets • Priority targets, what type, and final protective fires • Plan for covering obstacle effects with indirect fires • Indirect-fire-control measures to synchronize direct and indirect fires and obstacles • Fire-registration plan (deconflict with obstacle emplacement) • Fire support if enemy contact occurs during emplacement • ADAM/RAAMS use (lane closure and repair breached obstacles)
Air defense	• Location of the enemy air AAs during emplacement • Update on changes to air-defense warning and weapons-control status • Location of air-defense systems that can cover engineers emplacing obstacles • Method of obtaining and disseminating early air-defense warning
CSS	• Tentative location of the Class IV/V supply point within the company/team position, if used, and routes from the supply point to obstacles • Routes the company/team plans to use to conduct LOGPAC operations • Manpower assistance and material-handling equipment at the Class IV/V supply point
C^2	• Location of commander during defensive preparation • FM net of the supported company/team and means of communication • Unit boundaries affecting obstacle emplacement • Time and place of company/team order • Coordination that must occur with adjacent units • Obstacle reporting and recording requirements • Time and method of obstacle turnover • Lane-closure responsibilities and procedures • Company/team understands obstacle intent

enemy forces move into the EA to the enemy side of the obstacle group. The engineer platoon leader and the company/team commander collocate near the weapons covering the obstacle. As a technique, one or all of the tanks, Bradleys, or other crew-served weapons may occupy their position and contribute to the siting process, All participants in the siting process use a common frequency-modulated (FM) net to communicate during siting.

The simulated enemy forces move into the EA, simulating the enemy's attack. They deploy into a formation of similar frontage as the expected enemy formation. Once they are near the marked fire-control measures, they place markers at intervals as they drive the trace of the obstacle-group effect (or individual obstacles in broken terrain). They remain oriented on key fire-control measures to ensure that obstacle location and effect are synchronized with fires. During the process, each participant verifies that he can cover the obstacle, notes the location of fire-control measures and obstacles, and records the appropriate data on range cards. As the platoon drives the obstacle trace, siting participants also identify dead space and requirements to refine the location of obstacle group and fire-control measures. The siting process may also identify the need for other fire-control measures. Figure 4-9 illustrates how the engineer and the company/team commander work together to site a turn obstacle group.

Once the company/team marks the general limits and orientation of the obstacle group, the engineers can begin marking individual obstacles (if not already done). To mark individual obstacles, the engineer platoon uses the group markers as a guide. As shown in Figure 4-9, the group markers may lend themselves well as the start and end points of individual obstacles; however, this is not always the case. As the engineer platoon refines the group limits into the site of individual obstacles, the platoon can then begin the necessary site layout based on the method of obstacle emplacement.

Siting is not the last thing done during preparations. The time and resources involved in emplacing tactical obstacles require that siting begin concurrently with establishing the defensive position. It is imperative that the unit sites the obstacles as soon as the

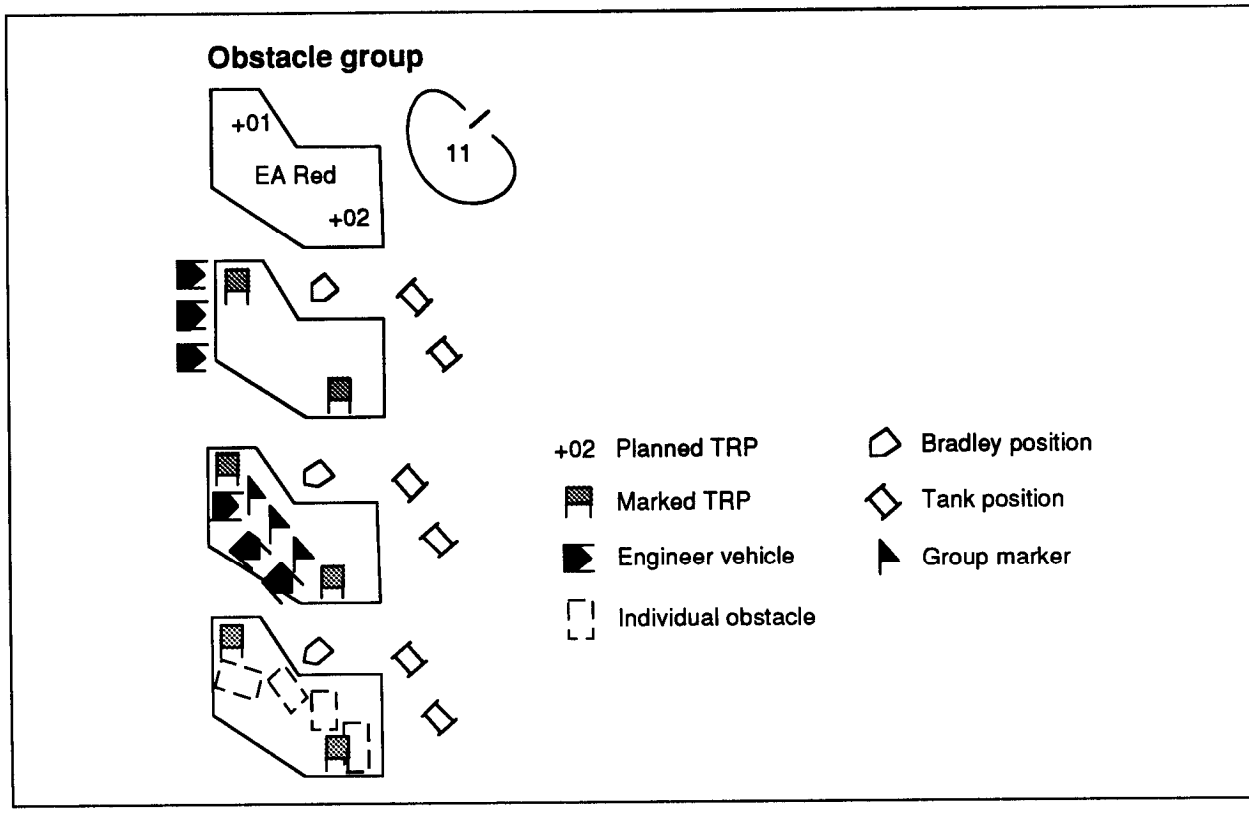


Figure 4-9. Sample obstacle-siting turn-obstacle group

company/team commander has established the EA and identified tentative positions for key weapons. It is not necessary that all weapons are in place and dug in before siting. Normally, well-marked fire-control measures and one known position per maneuver platoon (not dug in) is all that is required to effectively site the obstacles.

OBSTACLE TURNOVER AND TRANSFER

Once an obstacle group is completed, the emplacing unit conducts obstacle turnover with the owning unit. Occasionally, an owning unit will transfer responsibility for an obstacle to another unit. Obstacle turnover or transfer ensures that the commander of the owning unit is familiar with the obstacle and understands his responsibilities concerning the obstacle. The following are some considerations for obstacle turnover and transfer:

- Briefing on local friendly and enemy situation.
- Description of the obstacle, including location, type, marking, and composition.
  - — Conventional minefields: types of mines, fuzing, and AHDs.
  - — Scatterable minefields: types of mines, duration./self-destruct time, and safety zone.
  - — Other obstacles (booby traps and other hazards).
- Information on lanes, including number, locations, marking, and closure plan, or information on the reserve obstacle (if applicable).
- Coordination completed or still required with the fire-support team.
- Transfer of graphics and documentation (minefield records, demolition target folders, orders for the demolition guard, or other written records).
- Guidance on obstacle-protection measures taken or required (counterreconnaissance, targeting enemy breathers, obstacle repair, or phony obstacles).

More detailed information on obstacle turnover can be found in FM 20-32.

SURVIVABILITY PLANNING

The A&O platoon leader must coordinate with the company/team commander in a similar fashion as his line-platoon counterpart. The company/team must first position his direct-fire systems before the A&O platoon leader can direct his equipment to begin construction. Caution must be exercised to prevent this construction process from starting before the systems have been sited in. If the systems have not been positioned, there is a risk that the construction effort will not be in the proper place, wasting valuable time and effort.

After the A&O platoon leader understands where the company/team will place their systems, he can direct his equipment to start work. The A&O platoon leader must monitor the construction effort and keep the engineer informed of his progress. This information is critical for the staff to monitor defensive preparation and will allow them to make informed recommendations to the commander if changes in priority are required.

The A&O platoon leader, maneuver platoon leaders, and combat/section leaders must ensure that the direct-fire systems can see the EA, TRPs, and obstacles once the positions are completed as shown in Figure 4-10. They should immediately inform the company/team commander if they discover a potential problem with this. The A&O

platoon leader also helps to ensure that the quality control of the position's construction is monitored with the company/team leadership. It is a joint responsibility between the builder and occupier of the position to ensure the following:

- That the position is properly positioned.
- That the position is of the proper depth, width, type, and length.
- That is the spoil is removed or camouflaged.
- That the position is test-fitted by the direct-fire system.

The TF plan should seek ways to increase the force's survivability without delaying the construction effort for the companies/teams. The TF engineer should attempt to get ACES forward during the leader's reconnaissance to link up with maneuver commanders at their battle positions. If not,possible, one technique is to concentrate on indirect-fire systems (TF mortar platoon and fire-support team vehicle (FIST-V)), ADA systems, C^2 facilities, or CSS facilities while 'the companies/teams continue to site their direct-fire systems within the framework of the TF's direct-fire plan. This technique will maximize the survivability effort without sacrificing time allocated to the direct-fire positions.

The A&O platoon leader should use equipment teams where possible. This maximizes equipment usage while minimizing C^2. He should mass his equipment for the same

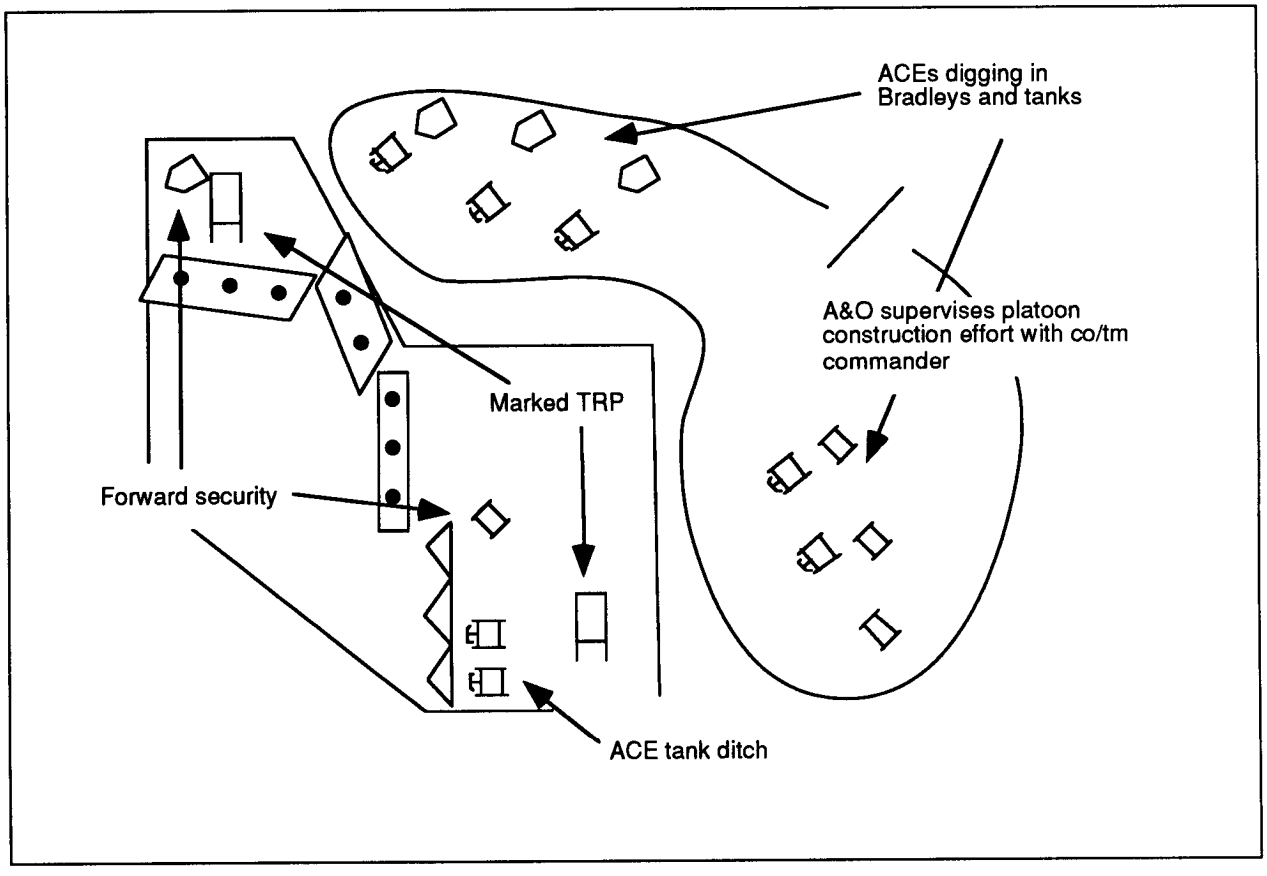


Figure 4-10. A&O platoon coordination with a company/team

reasons. Also, ACE-equipped units can construct hasty fighting positions quickly using ACE teams. These can be upgraded later with bulldozers or, if additional time is available, with extra ACEs. Like the heavy equipment, the A&O platoon leader should mass his small emplacement excavators (SEEs) to dig in critical dismounted fighting positions.

In many situations, the A&O platoon leader and the engineer and company/team commanders will be able to optimize existing terrain features with a small amount of earth moving. Existing folds in terrain, wadis, or ditches can be easily and effectively turned into fighting positions with limited equipment use.

CHAPTER 5

OTHER TACTICAL OPERATIONS

There are several other tactical operations that the engineer company could be involved with. These include retrograde, passage-of-lines, breakout, linkup, river-crossing, and heavy/light forces operations; military operations on urbanized terrain (MOUT); and contingency operations. See Appendix E for formation examples.

RETROGRADE OPERATIONS

A retrograde operation is an organized and controlled movement of forces toward the rear or away from the enemy. Retrogrades are organized to economize forces, create or maintain freedom of maneuver, or avoid decisive combat. The engineer company participates in a retrograde as part of a larger force, typically a battalion/TF.

TYPES OF RETROGRADE OPERATIONS

There are three types of retrograde operations: delays, withdrawals, and retirements. Delays trade space for time, preserve the force, or avoid decisive engagements. Withdrawals break contact with the enemy to conduct other missions. Retirements move the unit to the rear when not in enemy contact.

Delay

A delay is an operation in which the TF trades space for time. The TF must not become decisively engaged. It must emphasize force preservation and mobility maintenance to be successful. The TF may attack, defend, or conduct ambushes to destroy the enemy or slow his forward progress. The TF may delay as the covering force of a larger unit or as an economy-of-force operation that allows others to attack. To control an enemy penetration, the TF could delay, allowing others to counterattack.

A delay's basic concept is to retain freedom of maneuver while forcing the enemy to deploy repeatedly against successive battle positions. Engineers support the delay by attacking the enemy's freedom of maneuver with obstacles and bridge and road destruction. The engineer company builds fortifications that allow the TF to deploy successfully to protected positions. The engineer company's priority is to ensure that the TF can quickly disengage and move to subsequent battle positions.

Maximum use of terrain must be made to protect the force effectively and to gain the maximum effect from obstacles. Obstacles must be used to reinforce natural choke points and existing obstacles. They must slow the enemy's use of high-speed AAs and force him to deploy repeatedly and use his organic breaching assets. Slowing the enemy's forward progress is essential to gain time for the TF to disengage (see Figure 5-1, page 5-2).

Withdrawal

A withdrawal is an operation in which the TF breaks contact with the enemy to conduct another mission. There are two types of withdrawals: in enemy contact and not in enemy contact. Both begin with the TF in enemy contact; however it is preferably made without heavy enemy interference.

A withdrawal not under enemy pressure depends on speed and deception. The engineer company primarily assists the TF by ensuring that it can rapidly overcome any threat to mobility. Engineers help with deception by building false fighting positions and dummy obstacles and by unit activity. Obstacles are normally employed to cover the TF as it breaks contact. Artillery-delivered

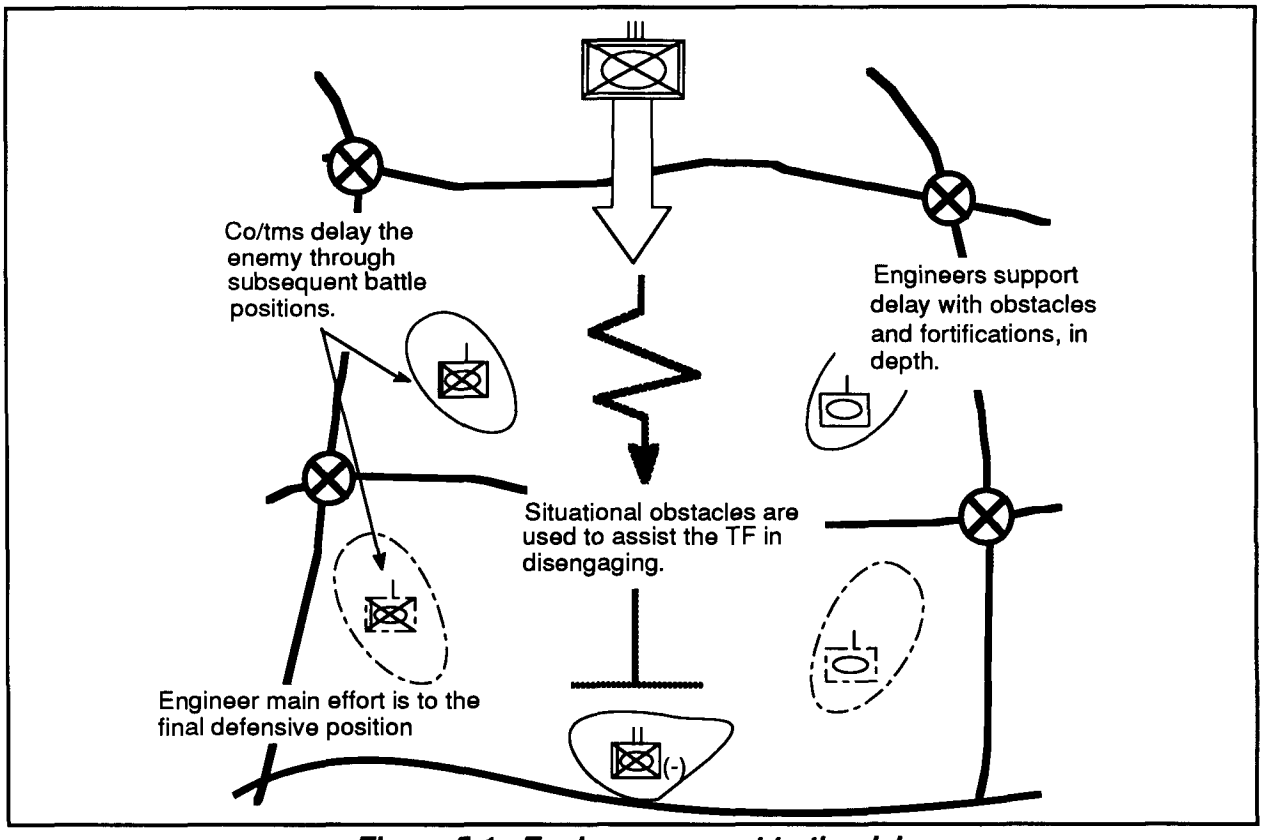


Figure 5-1. Engineer support to the delay

minefield are emplaced on stationary enemy forces or on suspected enemy AAs to delay the enemy's approach. Fortifications are not normally constructed in a withdrawal not under enemy pressure.

A withdrawal under enemy pressure uses firepower and maneuver to break contact with the enemy. Engineer reconnaissance is critical to determine where and what assistance the engineer company must render to the TF to ensure its mobility. Obstacles and fortifications are planned and developed to allow the TF to move to subsequent battle positions until contact can be broken with the enemy. Maximum use of situational obstacles must counter the enemy's maneuver, allowing the TF's rear security element to disengage and break contact. The engineer-emplaced obstacle groups must assist the TF in stopping, disorganizing, or reducing the enemy's ability to pursue effectively. The engineer company must focus its mobility assets quickly, overcoming any enemy remotely emplaced obstacles, battlefield debris, or other impediments to mobility.

Retirement

A retirement is a retrograde operation where the TF *is not in contact* and moves to the rear in an organized manner. This operation is normally conducted at night. A retirement may have an adverse impact on the engineer company's morale. It is imperative that the commander maintain positive leadership and keep his company briefed on future operations and intentions of the chain of command.

The engineer company commander should anticipate a change in task organization during a withdrawal, unless the entire force withdraws. Normally, if only one TF withdraws, the engineer company will be task-organized with another unit in contact or anticipating contact with the enemy. Normally, the TF will retire as part of a larger force.

CONSIDERATIONS FOR RETROGRADE OPERATIONS

All retrogrades are risky and inherently dangerous. They must be well-organized and well-executed to succeed. There are four major underlying considerations in planning and executing retrograde operations. They are—

- Leadership and morale.
- R&S.
- Mobility.
- Battlefield deception.

Leadership and Morale

Leadership and morale are essential for maintaining the offensive spirit. The engineer leaders in a retrograde operation must ensure that soldiers have confidence and do not perceive the retrograde as a preliminary to defeat. The engineer commander must ensure that his soldiers know their purpose and role in the retrograde.

Reconnaissance and Surveillance

The TF must locate the enemy to deny him information about the TF's disposition and to counter the enemy's efforts to pursue, outflank, isolate, or bypass the TF or any of its elements. The TF normally constitutes a security force that is strong enough to secure the enemy AAs; to defeat enemy intelligence-collection efforts; to overwatch retrograding units; and to provide rear-guard, flank, and choke-point security.

The engineer company supports the security force through the construction of obstacle groups that limit the enemy's maneuver, lane closure, situational-obstacle emplacement to protect the security force, and hasty fortification that affords the security force additional protection.

Mobility

The engineer company's primary mission in a retrograde operation is ensuring that the TF can quickly complete the retrograde. Engineers improve the TF's mobility by—

- Conducting route reconnaissance.
- Positioning mobility assets at critical points.
- Improving routes and providing guides through friendly obstacles along the retrograde routes.
- Rehearsing lane closure, situational-obstacle emplacement, and movement.
- Acquiring, treating, and medically evacuating casualties rapidly.
- Evacuating recoverable supplies and materials and excess equipment before the retrograde.
- Displacing nonessential company assets early in the operation.

Engineers degrade the enemy's advance by—

- Constructing obstacles at choke points or on routes not used by the TF.
- Fortifying construction for forces occupying key terrain that dominates high-speed AAs.
- Destroying roads, bridges, and rafting on avenues not required by the TF.
- Improving existing obstacle groups with conventional or SCATMINE systems.
- Planning situational obstacles to delay and disrupt the enemy's maneuver.

Deception

Deception targets the enemy force to cause indecision and to delay the enemy attack. It is essential to the retrograde's success. Engineers must ensure that their preparations do not give away the TF's intention. Dummy obstacles, deception fortification, equipment

movement, and camouflage can all be used as part of the TF's deception efforts. Situational obstacles are normally planned but not executed until required. This ensures that the TF's deception plans are not compromised by premature obstacle emplacement.

PASSAGE OF LINES

A passage of lines is an operation where the TF moves through another unit. Passages of lines are characterized as either forward or rearward. The considerations for the engineer company are similar and differ only if the TF is stationary or passing. The major considerations for the engineer company are the exchange of information between passing engineers and the passing force's mobility. The company, if part of the stationary TF, assists in the control of the passage, particularly in regard to the passage of any emplaced obstacles.

Passage control between the passing and stationary TFs is a key consideration in a passage of lines. Normally, both TFs' TOCs will collocate. This allows both engineer company CPs to also collocate. Collocation allows both CPs to control the engineer passage and exchange scheme-of-obstacle overlays and allows the passing engineer company the necessary information required to assume control of the obstacle effort in sector.

Both engineer companies must jointly plan and closely coordinate to ensure the passage's success. They exchange information that includes individual obstacle locations and their markings, situational obstacles planned, cleared routes through the sector, and standards for lane marking. Details of reserve obstacles and situational-obstacle triggers and execution criteria are also exchanged.

The stationary TF is responsible for the passing TF's mobility. The stationary engineer company normally provides guides through existing obstacles and positions breaching assets to move the passing TF through quickly. In a rearward passage, the stationary engineer company is prepared to close obstacle lanes after the passage of the rearward moving unit (see Figures 5-2 and 5-3).

The passing TF generally organizes for in-stride breaching before starting its passage. The passing force must be prepared to breach enemy remotely delivered mines rapidly during passage as well as breach any friendly obstacles that do not have lanes. **NOTE: Creating lanes through the stationary unit's obstacles requires permission from the stationary force and should only be done in extreme situations.** Authority to reduce obstacles may be delegated to subordinate units of the passing force in the coordinating instructions of the brigade OPORD. Any breaching required or undertaken by the passing force must be reported so that the stationary unit can repair the obstacle. This is especially important during a rearward passage of lines.

BREAKOUT OPERATIONS

A breakout is an operation performed by a bypassed or encircled TF. The TF conducts a breakout to regain freedom of maneuver or to regain contact with friendly units. Encirclement does not imply that the TF is surrounded by strong enemy forces (see Figure 5-4, page 5-6).

Regardless of initial command/support relationships, all forces encircled become attached, including the engineer company with the TF. The TF organizes for the breakout with four forces: the rupture force, the reserve force, the main body, and the rear guard.

Engineers support the breakout in a similar fashion as they would a deliberate breaching operation. The engineer company organizes

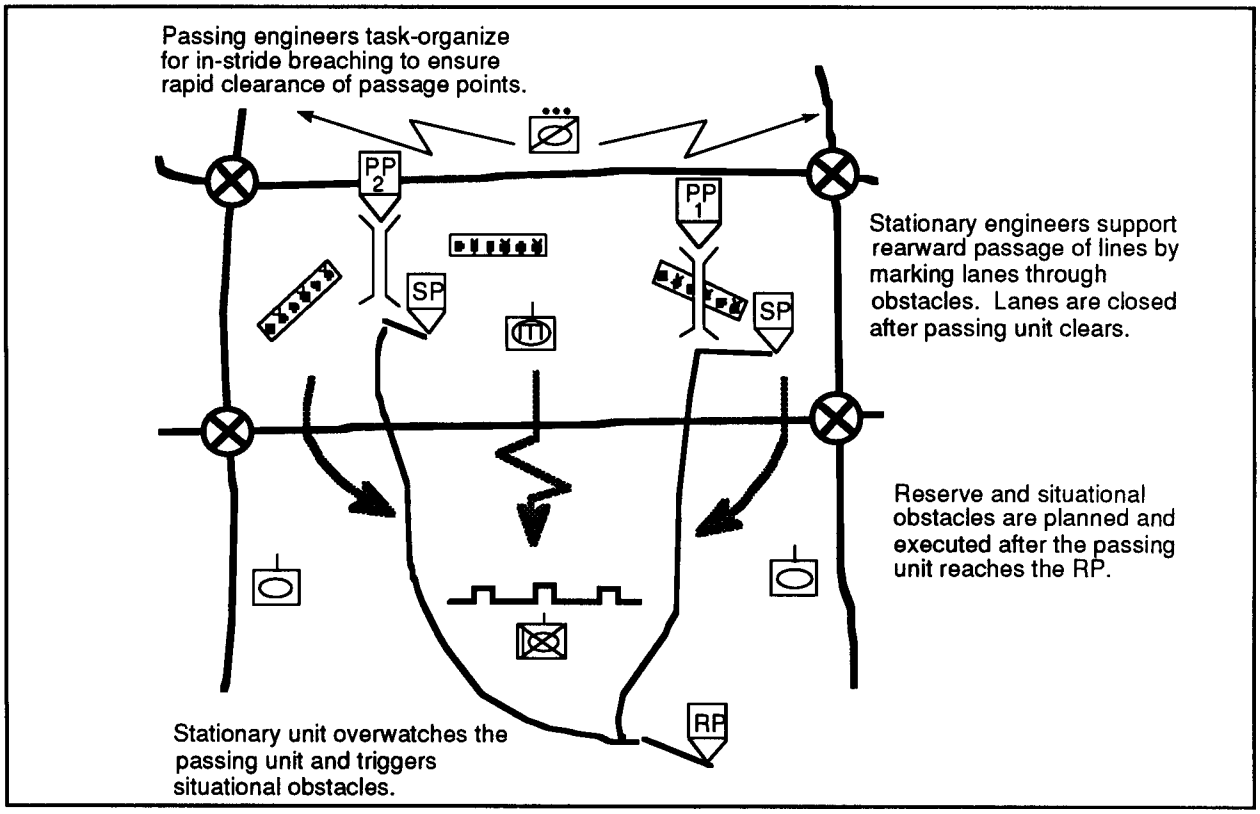


Figure 5-2. Rearward passage of lines

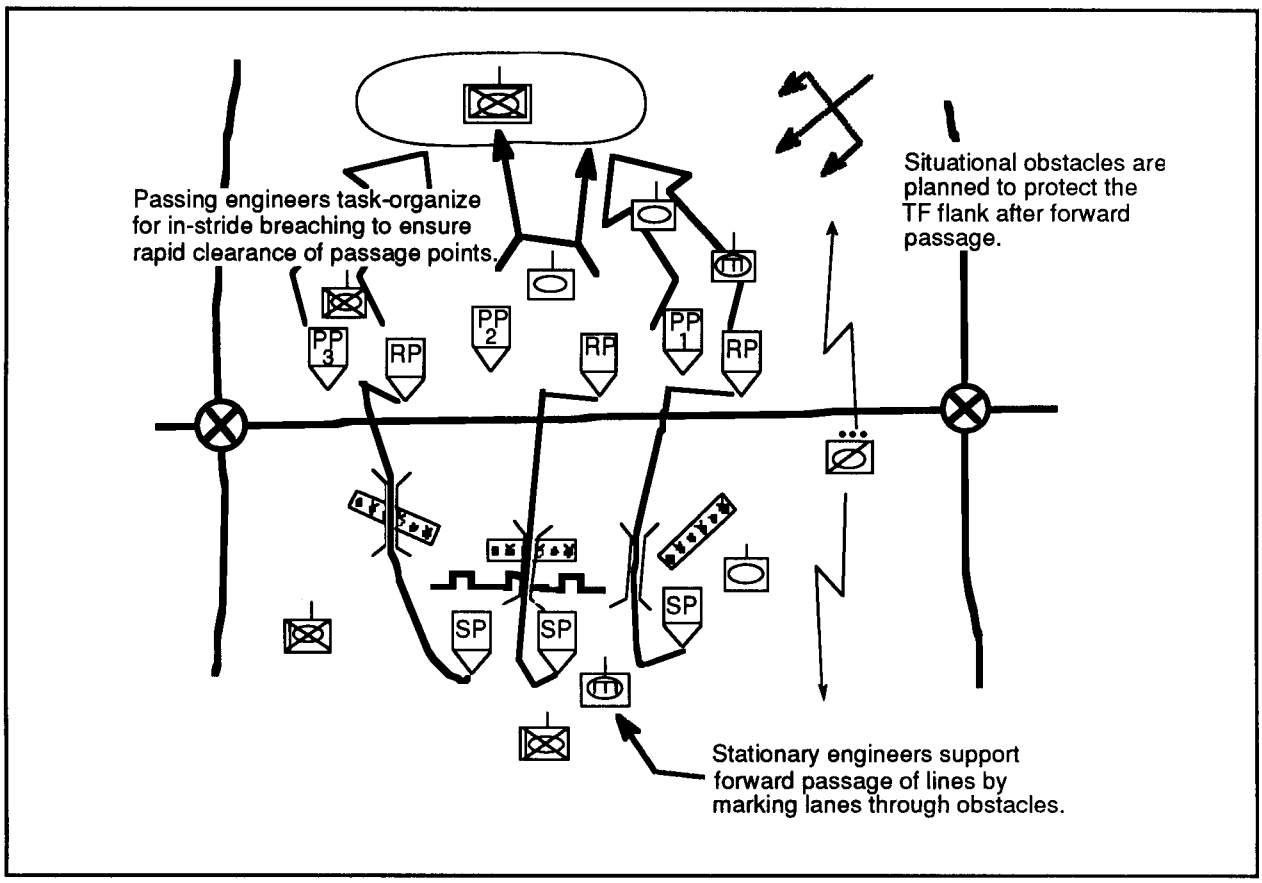


Figure 5-3. Forward passage of lines

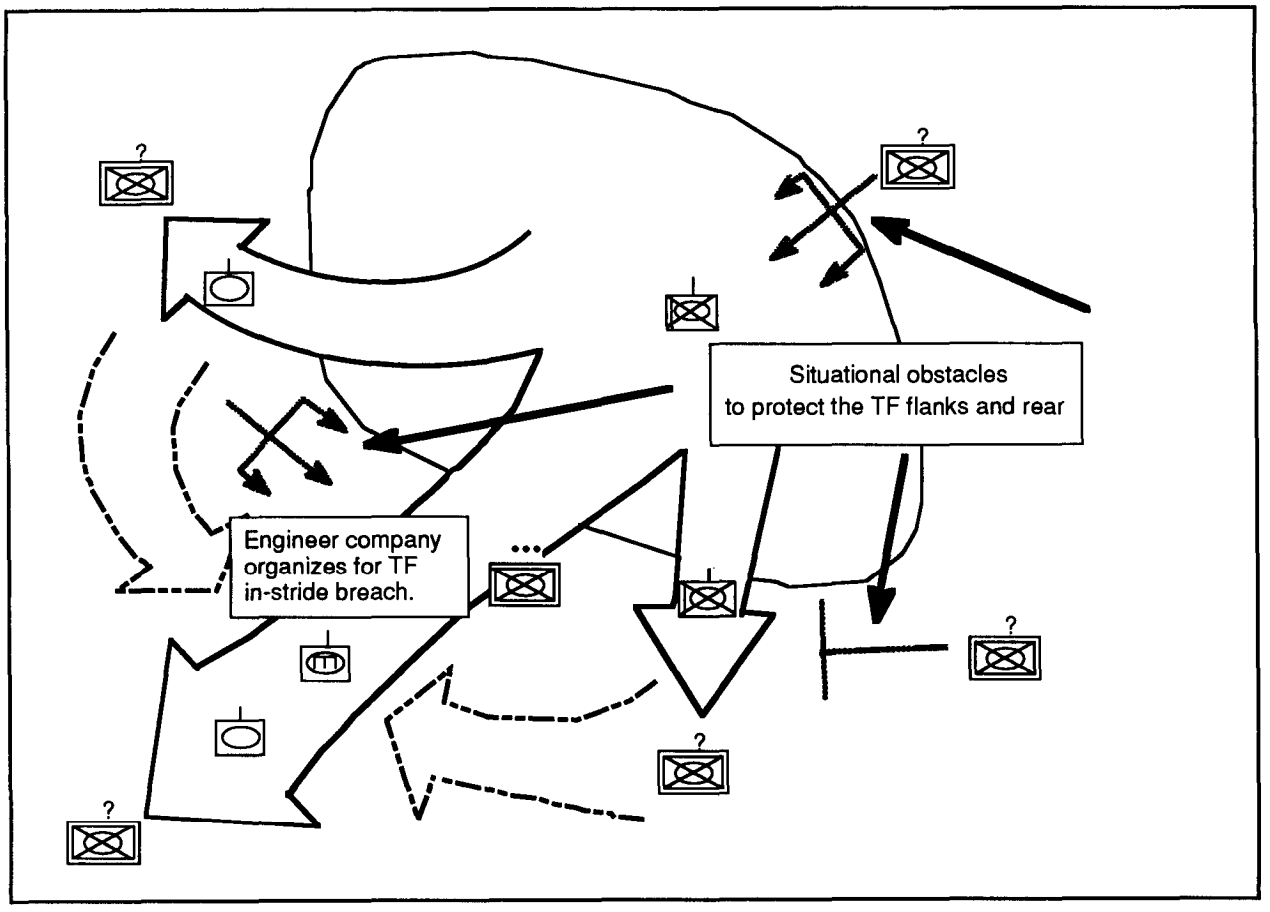


Figure 5-4. Breakout

to support the four breakout forces as follows:

- The rupture force must penetrate the enemy positions and open a gap for the remainder of the TF to pass. The engineer company must ensure the mobility of the rupture force and be prepared to rapidly breach any obstacle the rupture force encounters. Once the gap is opened, the rupture force must hold the shoulders of the gap until the TF passes. Situational obstacles are normally planned to protect the TF's flanks as they pass through the penetration. The rupture force would trigger any obstacles emplaced.

- The reserve force follows and assists the rupture force. The reserve force normally passes through the rupture force to maintain the momentum of the breakout. The reserve force would also organize to breach any obstacles encountered following the initial rupture of the encirclement.

- The TF's main body consists of the command group, the main CP, and CS and CSS assets. The engineer company assets that are not actively involved with the breakout are in the main body (specifically, the A&O platoon and the engineer company trains element).

- The rear guard protects the TF's rear as it moves through the rupture and links up with friendly forces. The rear guard would also employ situational obstacles to assist in disrupting and delaying the enemy's pursuit.

LINKUP OPERATIONS

The TF will conduct a linkup as part of a larger force. The engineer planning considerations are similar to those of the passage of lines. The engineer must carefully plan situational obstacles so that their execution will not interfere with the linkup operation. Also, the linkup may require the moving force to breach obstacles emplaced by the stationary force.

RIVER-CROSSING OPERATIONS

There are three types of water crossings that can be conducted by a battalion/TF: hasty, deliberate, and retrograde. Hasty crossings are done by the TF with its organic assets. Hasty crossings normally include fording, crossing on existing bridges, and swimming vehicles. The engineer company assists in hasty crossings by improving fords, emplacing armored vehicle-launched bridges (AVLBs), and providing a thorough crossing site reconnaissance.

The TF participates in deliberate or retrograde river crossings as part of a larger force. FMs 90-13 and 71-2 provide detailed explanations for planning these operations. Generally, the TF organizes for in-stride breaching during these operations to facilitate rapid transition through the crossing area.

The TF approaches a hasty water crossing in much the same way as an in-stride breaching operation. FM 71-2 details the following characteristics of a hasty crossing:

- Speed, surprise, and a minimum loss of momentum.
- Decentralized operations with organic, existing, or expedient resources.
- Weak or no enemy defenses on both banks.
- Minimum concentration of forces.
- Quick continuation of the operation.

The engineer company provides AVLBs to cross relatively narrow gaps. The AVLB can also be used to improve river bottoms for fording. The engineers can also improve both entrance and exit banks for the TF with the ACE.

HEAVY/LIGHT FORCES OPERATIONS

The engineer company must prepare to support, and be supported by, light forces in a variety of situations. An armored or mechanized TF could receive a light infantry company for both offensive and defensive operations. Normally, the light forces will augment the armored or mechanized TF during operations in restricted terrain. Similarly, the engineer company could be augmented by a light engineer platoon or squad. Finally, the engineer company, or one of its subordinate elements, could be task-organized to support a light infantry brigade.

There is an overlap of situations where both heavy and light engineers can operate. The integration of heavy and light engineers capitalizes on the enemy's force structure to attack its weakness and then seize the initiative (see Figure 5-5, page 5-8).

SUPPORT TO A LIGHT INFANTRY COMPANY ATTACHED TO A TASK FORCE

The light infantry company offers the TF commander unique capabilities in both the offense and the defense. However, with those unique capabilities comes a corresponding set of requirements for engineer support.

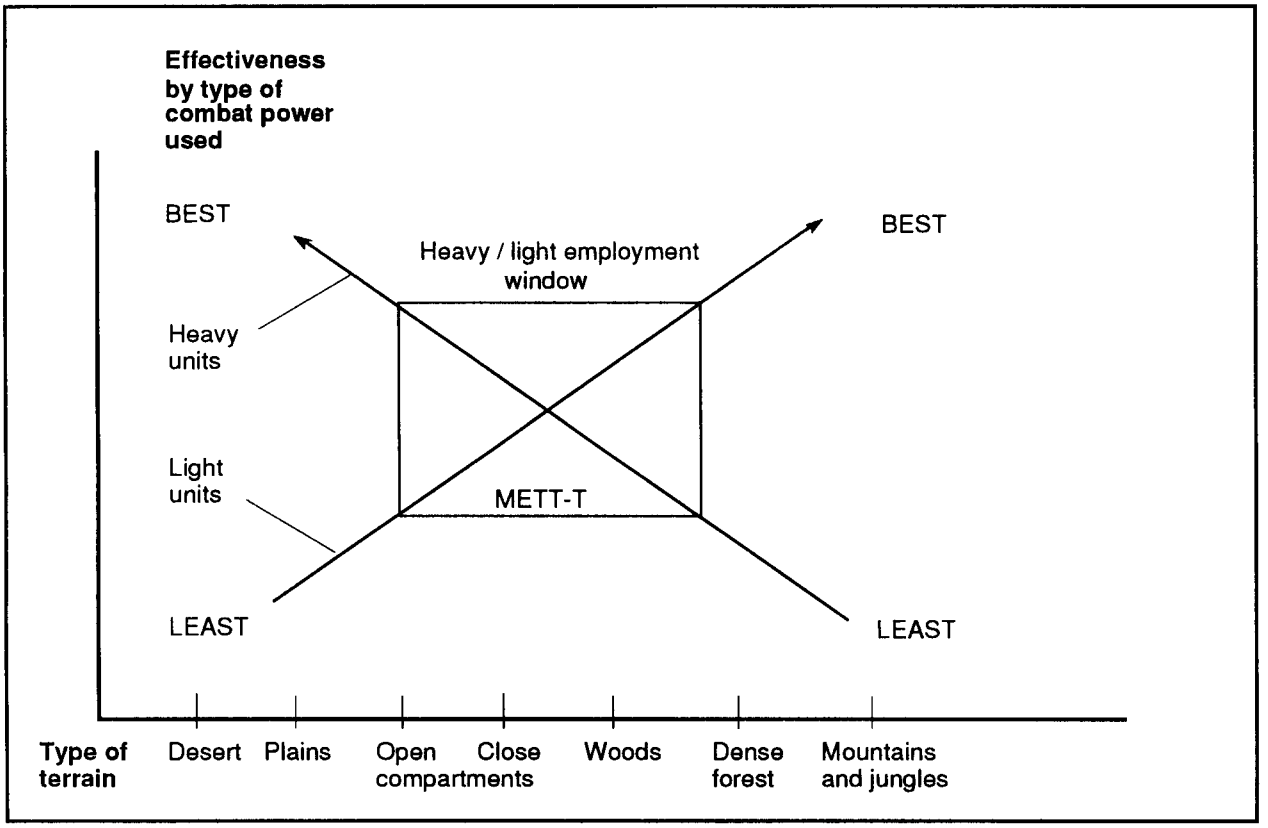


Figure 5-5. Heavy/light employment window

Normally, a light infantry company attached to an armored or mechanized TF will not have any light engineers. The TF engineer must be aware of the distinctive requirements and capabilities of the light infantry company. He must also plan and allocate engineer assets to provide optimum support to the TF as a whole.

Defense

In the defense, light infantry forces will normally defend in restrictive terrain. Obstacles in restrictive terrain will usually be point obstacles emplaced in depth to support antiarmor ambushes. In less restrictive terrain, the light infantry forces will normally be employed in strongpoints integrated throughout the defense. These light infantry strongpoints are ideal for providing anchor points for turning or blocking obstacle groups.

Regardless of the type of terrain, obstacles must support the capabilities of the light infantry company. The light infantry company has few antitank (AT) weapons and must destroy enemy vehicles from within small-arms ranges using flanking and rearward fires. Obstacles must be constructed so that flanking fires from the light force can stop the enemy and force him to dismount to breach.

The light infantry force will also require substantial fortification for sustained combat. The TF engineer must plan for providing mechanical digging assets for the preparation of individual and crew-served weapon positions. The TF engineer must also plan to allocate and transport hand tools, construction materials, and obstacle materials to allow the light infantry to build and improve their own fortifications and to construct protective obstacles.

Offense

In the offense, light infantry forces fight best in restrictive terrain. If employed in less

restrictive terrain, they should be employed during periods of limited visibility.

The light infantry can be very effective during covert breaching operations. They bring to the TF an expanded dismounted capability as well as a broader experience base for dismounted, covert operations. This capability allows them to create or prepare lanes through enemy tactical obstacles which can be exploited by rapidly moving mounted forces. Light forces employed in this manner may require additional allocations of demolitions or hand tools. More importantly, the TF engineer must ensure that the TF covert breach plan includes contingency plans. These contingency plans should include transition to a deliberate breach or extraction of the light forces if the covert breach is unsuccessful or is prematurely discovered by the enemy.

The light infantry company is also extremely effective at providing close-in, far-side security during mounted breaching operations. They are an ideal force for neutralizing enemy dismounted strongpoints that serve as anchor points for enemy obstacles. The light forces must be provided the time to properly infiltrate and establish positions to support the breaching site. Fire-control measures must also include restrictions to prevent fratricide.

LIGHT ENGINEER AUGMENTATION

In some situations, the engineer company may receive a light engineer platoon or squad in attachment. If the light engineers are supporting a light infantry unit, the relationship between the light infantry and light engineers should be maintained. This increases the likelihood that the infantry commander will have an engineer advisor that he is familiar with.

The light engineer platoon normally has limited vehicular haul capability (at best, utility trucks). Care must be taken when supplying light units with Class IV/V barrier material. The TF engineer must ensure that the plan drops small loads to specific points along the obstacle group that the light platoon is emplacing. This will facilitate obstacle construction without overtaxing the platoon's haul capability. The light platoon could also require transportation assistance if the TF if forced to move. The TF engineer must be aware of the light platoon's capabilities and limitations when planning operations.

ENGINEER COMPANY SUPPORTING A LIGHT INFANTRY BRIGADE OR TASK FORCE

An engineer company may find itself supporting a light infantry brigade or TF in one of three situations. First, it may be supporting an armored or mechanized TF task-organized to a light infantry brigade. Second, one of its subordinate elements may be supporting an armored or mechanized company/team that is in support of a light infantry brigade or TF. Third, the engineer company may be supporting a pure light force which requires additional augmentation by engineers.

The engineer company supporting the armored or mechanized TF will operate much the same as it does in a heavy environment. The engineer company, however, must ensure that it is a sustainable force between its own attached or organic assets and those of the supported TF. The light infantry forward support battalion (FSB) is unlikely to be able to provide sustainment assets to either the TF or the engineer company.

Similarly, if an engineer platoon is supporting an armored or mechanized company/team in support of a light brigade or TF, the CSS element with the company/team must be capable of supporting the platoon, or the platoon must operate at distances that allow support from the engineer company. Additionally, because of its greater firepower, the armored or mechanized company/team is frequently given light TF-level missions. Armored or mechanized TFs often provide additional staff to assist in planning and to provide liaison between the company/team

and the light brigade or TF. In the same way, the engineer company commander may augment the supporting engineer element with a LO who can assist in planning and liaison.

If the engineer company is supporting a pure, or primarily, light force, the engineer company must go to the light force as a fully self-sufficient organization. The company commander should coordinate with the light brigade to develop common mobility, countermobility, and survivability plans. The light brigade has limited capability to haul barrier material for the engineer company. The light brigade will require additional haul assets from its division to accomplish this. The TF engineer should also adjust his plans to fit the supported light force. The light infantry TF or brigade will require extensive survivability support. They will require numerous dismounted weapons, AT, artillery, mortar, and C^2 positions to stand and fight. The mechanized engineer company is also more mobile than the supported light unit and may be used as a reserve to rapidly emplace mines or to protect the brigade's support area or artillery. These contingencies are predicated on the company's command/support relationship. Normally, the engineer company will be DS to the light infantry to prepare defensive positions and construct obstacles. After completion, they will return to the engineer battalion's control for other missions and tasks.

MILITARY OPERATIONS IN URBANIZED TERRAIN

Operations in a MOUT environment are planned, coordinated, and executed in the same fashion as an operation in any other type of environment. Urbanized terrain does not change the nature of the operation, but rather it causes the company commander to plan, coordinate, and execute using additional considerations. The following paragraphs address additional planning considerations for the company commander and the platoon leader:

The **company commander—**

- Secures blueprints of buildings and sewer, electrical, and water systems.
- Determines the location of utilities (power, water, telephone system, mass transit hubs, and mass fuel locations) through subterranean analysis (subways and sewers) and by using local city and road maps.
- Determines the availability of host-nation (HN) equipment, construction, and fortification resources, civilian workforce assets, and HN civilian subject-matter experts (SMEs) (guides, electricians, and so forth).
- Determines the unexploded ordnance (UXO) characteristics in the AO (type, number, density, and location).
- Considers centralized planning and decentralized execution.
- Determines how the rules of engagement (ROE) affect engineer capabilities and missions.
- War-games engineer support during the following phases:
  - — Isolate the area.
  - — Control dominant terrain (no traffic or resupply in or out).
  - — Seize a foothold.
  - — Clear the urban area.
- Establishes common obstacle-control measures.
  - — Obstacle marking.
  - — Obstacle-lane marking.
- Establishes demolition blast signals (visual and audible).

- Establishes common route markings.
- Ensures that engineers breach or reduce tactical obstacles and the infantry breaches or reduces protective obstacles.
- War-games SOSR in MOUT and ensures rehearsals.
- Plans for mobility teams (task-organized based on METT-T).
- Plans in three dimensions (above ground, ground, and below ground).
- Plans an engineer contingency mission for explosive ordnance disposal (EOD).
- Plans for a hasty defense.
- Plans for follow-on engineer requirements.
- Plans and resources route-clearance operations.
- Addresses special obstacle-reduction requirements.
- Addresses and requests engineers to support TF general-engineering tasks.
- War-games and plans for the contingency of MOUT-peculiar follow-on mission requirements.
- Addresses and resources the increase of demolition / Class V requirements in MOUT.
- Plans for additional "bunker-busting" capabilities.
- Requests special mission-essential equipment, such as 120-foot rope and grapnels.
- Plans for the procurement of additional materials (locally fabricated, if required), such as—
  - — Satchel charges (field expedient, if conventional satchel charges are not available).
  - — Rope ladders and ladders.
  - — Marking materials (paint, chalk, engineer tape, and chemical lights).
  - — Bangalore torpedoes.
  - — Fragmentation or concussion grenades.
- Determines and disseminates booby-trap-neutralization equipment and techniques.

The **platoon leader—**

- Identifies special-equipment needs for the platoon.
- Plans for the continuous resupply of engineer-specific logistics, especially demolition.
- Ensures that combined-arms rehearsals are conducted for all operations.
- Teaches infantry demolition / breaching techniques.
- Plans for decentralized operations (team-leader level).
- Ensures that every soldier understands the ROE and how they affect engineer support of the operation.

CONTINGENCY OPERATIONS

Organizing and training for war fighting remains the primary mission of the engineers. However, the company can be called upon to conduct contingency operations. The commander quickly identifies situations that may require contingency operations. This facilitates planning and execution based on METT-T. Force-projection

planning includes the possibility that forces committed to the contingency operation may become involved with combat operations. The engineer company may participate in a wide variety of contingency operations, including—

- Attacks and raids.
- Combating terrorism.
- Disaster relief.
- Humanitarian assistance.
- Nation assistance.
- Support to insurgency and counterinsurgency.
- Noncombatant evacuation operations (NEOs).
- Peace operations.
- Demonstrations and shows of force.
- Support to civil authorities.
- Support to counterdrug operations.
- Countermine operations.
- Force-protection operations.

All engineers cooperate fully with and act in support of federal, state, and local civil authorities during domestic contingency operations. Overseas, the company could be part of a unified effort with joint and multinational forces and with the HN's civil, military, and police agencies.

ENGINEER SUPPORT TO CONTINGENCY OPERATIONS

Engineer support is fully integrated with the TF or engineer battalion contingency-operation planning processes. Versatile engineer forces provide unique personnel and equipment capabilities that can effectively support complex and sensitive situations in any contingency operation. All contingency-operation situations relate directly to wartime engineer missions and tasks. In many cases, the only difference between a wartime engineer mission and a contingency-operation engineer mission is the threat level. The basic engineer tasks remain the same in both environments.

Attacks and Raids

The TF conducts attacks and raids for specific purposes other than gaining or holding terrain. The TF conducts them to—

- Create situations that permit seizing and maintaining political initiative.
- Place considerable pressure on governments and groups supporting terrorism.
- Damage, destroy, or seize high-value targets (HVTs), equipment, or facilities that threaten national-security interests.
- Demonstrate US capability and resolve to achieve a favorable result.
- Support counterdrug operations by destroying narcotics production or transshipment facilities or by supporting HN activities in this arena.

Engineers construct rehearsal sites for the force involved in attacks and raids. The engineer company may participate in the mission and require refresher training in specialized skills such as air-assault techniques, MOUT, or reorganization to fight as infantry. During attacks or raids, engineers may be tasked to—

- Protect flanks, withdrawal routes, and landing zones.
- Emplace and man roadblocks.
- Breach obstacles.
- Move or destroy captured equipment.
- Use captured equipment to perform missions.

Combating Terrorism

Combating terrorism has two major components: antiterrorism (defensive) and counterterrorism (offensive). The company combats terrorism mainly through antiterrorism. This includes those active and passive measures taken to minimize vulnerabilities to terrorist attack. Antiterrorism is a form of force protection. Counterterrorism is the full range of offensive operations against terrorists or those who support terrorists. The engineer company rarely participates in counterterrorism operations.

Engineers may become targets for terrorists because of how and where they perform their missions, especially construction projects and other wide-area missions. Equipment parks and supply yards are large and difficult to defend. Soldiers operating equipment or hauling materials are vulnerable to ambush by direct and indirect fires, mines, and booby traps. Engineer leaders support antiterrorism by—

- Developing a good IPB and EBA of threat forces.
- Establishing and enforcing sound operating procedures.
- Organizing security elements.
- Constructing secure Class IV/V supply points and CPs.
- Constructing protective shelters for key facilities.
- Emplacing vehicle barriers.
- Clearing standoff zones around facilities.
- Erecting predetonation screens to protect units and installations.

Disaster Relief

The engineer company participates in disaster-relief operations to promote human welfare and to quickly reduce the loss of life, pain and suffering, and destruction of property as a result of natural or man-made disasters. These operations may be a combination of joint, multinational, and interagency support. FM 100-19 provides further details for domestic support operations.

The engineer company can provide personnel and equipment capabilities that are extremely useful during disaster-relief operations in the following areas:

- Removing debris.
- Rebuilding lines of communication (LOC).
- Assisting with the distribution of aid, including food and clothing.
- Building temporary facilities and structures for displaced persons.

Humanitarian Assistance

The engineer company can respond to emergencies that are caused by natural or man-made disasters or other endemic conditions such as human pain, disease, famine, or privation in countries or regions.

Engineer assistance may include constructing and repairing rudimentary surface-transportation systems, basic sanitation facilities, and rudimentary public facilities and utilities. Other tasks may include constructing feeding centers and disposing of human and hazardous waste.

Nation Assistance

Nation assistance includes the civil and military assistance actions (other than humanitarian assistance) rendered to a nation by the engineers within that nation during war, conflict, and peace. Typical engineer company missions in support of nation-assistance operations include the following:

- Engineers visit and exchange engineer SMEs between the US and the foreign nation to discuss specific engineer topics.

- Companies deploy to perform multinational engineer training with the HN's military.

Support to Insurgency and Counterinsurgency

Engineer support to insurgency forces is limited to providing topographic products and constructing special operations forces (SOP) operating bases located outside the AO. Engineer missions for counterinsurgency operations are similar to those for humanitarian and nation assistance. They include water supply and sanitation improvements, road and airfield construction, and multinational training.

NEOs

NEOs are conducted to evacuate threatened US and authorized HN or third-country citizens from locations in a foreign nation or a safe haven. A NEO involves swift, temporary occupancy of an objective. It ends with a preplanned withdrawal. If the use of force is involved, the minimum amount of force to accomplish the mission will be used. A NEO is normally conducted as a joint operation and sometimes involves multinational forces.

Engineers that support a NEO generally operate as part of a joint force and may conduct a wide variety of tasks, including—

- Constructing temporary facilities and protective structures in country or in another country for either US forces or the evacuees.
- Conducting route reconnaissance and mobility operations for land evacuation.
- Repairing airfields and clearing helicopter landing zones for use in air-evacuation operations.

Peace Operations

Peace operations encompass three types of predominantly diplomatic activities: preventive diplomacy, peacemaking, and peace building. It also includes two complementary, predominantly military activities—peacekeeping and peace enforcement. The engineers' involvement in shows of force, preventive deployments, military-to-military relations, and security-assistance programs all support preventive diplomacy and peacemaking efforts. Engineers support peace building primarily through postconflict missions such as repairing utilities and roads. FM 100-23 provides further details for peace operations.

Peacekeeping Operations. Peacekeeping operations support diplomatic efforts to establish or maintain peace in areas of potential or actual conflict. They are undertaken with the consent of all belligerents. Peacekeeping forces monitor and facilitate the implementation of an existing truce or cease-fire and they support diplomatic efforts to reach a long-term political settlement. Strict appearance of neutrality, an adequate means of self-protection, and the availability of timely and effective support are critical. The engineer company may be tasked to conduct peacekeeping operations over a considerable time period, under multinational control (such as the United Nations [UN]), or under a unilateral peacekeeping umbrella.

Engineer missions in peacekeeping operations range from facilities construction to minefield clearance. Although the requirement for combat engineers may be small, there is a possible need to construct barriers, provide assistance and training in engineering skills, or conduct countermine operations, either in contested areas or along peacekeeping-force patrol routes.

Combat-engineering tasks (such as mobility, countermobility, and survivability tasks) may be conducted by US engineer units in support of peacekeeping operations. Engineer missions specifically related to peacekeeping operations include—

- Constructing CPs, bunkers, and OPs.
- Constructing force-protection structures such as earth revetments, wire obstacles, and defensive positions.

- Clearing fields of observation.
- Demolishing fortifications.
- Clearing or marking minefield (including minefield-fence maintenance).
- Clearing mines and booby traps.
- Providing backup support for identifying, marking, removing, or destroying explosive ordnance.

Peace-Enforcement Operations. Peace-enforcement operations are military intervention operations in support of diplomatic efforts to restore peace or to establish conditions for conducting peacekeeping operations. Peace-enforcement operations are intended to halt violence and restore more normal civil activities. The engineer company's mission during peace-enforcement operations will be the same as their normal wartime tasks.

Demonstrations and Shows of Force

Demonstrations and shows of force portray American resolve in a situation vital to our national interests to potential adversaries. They can take the form of multinational training exercises, rehearsals, forward staging of units, or force buildup in the AO. Engineer support to demonstrations and shows of force is normally a joint and multinational effort.

Support to Civil Authorities

These operations provide temporary support to domestic civil authorities when permitted by law. They are normally taken when an emergency overwhelms the capabilities of civil authorities. The type of support is divided into four categories: disaster relief, environmental assistance, community assistance, and law enforcement.

Engineer forces may be called upon to support civil authorities in various missions such as fighting forest fires, removing snow, removing hazardous waste, providing riot control, and constructing emergency bridges and airfields. FM 100-19 describes in detail how engineers support civil authorities.

Support to Counterdrug Operations

Because of US Code restrictions, combat engineers do not normally participate in domestic counterdrug operations. National Guard units may participate in counterdrug operations while under the state's control.

Engineers supporting domestic counterdrug operations perform missions focused on supporting local law-enforcement agencies. Engineers are sensitive to the legal aspects of support to civilian authorities and abide by the Posse Comitatus Act. They are also aware of the capabilities of the threat, which is primarily heavily armed narcotics traffickers. Typical support tasks include—

- Constructing or rehabilitating law-enforcement target ranges; helipads; and fuel-storage, billet, CP, and maintenance facilities.
- Constructing or upgrading access roads for drug-interdiction patrols.
- Clearing observation fields for counterdrug teams.

Countermine Operations

It is estimated that there are more than 100 million uncleared land mines spread throughout 62 countries. This equates to approximately one land mine for every 50 people on our planet. Land mines are cheap and easily obtained or constructed. They have become the third world's weapon of choice. They directly threaten civilian populations and forces during contingency operations. US forces do not conduct demining operations; they clear mines only as required for military operations (see Appendix F for more information). It is critical that the engineer company ensures that the following functions are accomplished when providing countermine support to a contingency operation that is threatened with land mines:

- Work closely with the S2 to determine the land-mine threat in the contingency

operation's AO. Exploit all sources of intelligence to identify mined areas in the contingency operation's AO.

- Ensure that the company is trained to identify, mark, and report encountered land mines.
- Ensure that engineers are fully confident in the employment of countermine equipment and that the equipment is operational. Conduct land-mine detection, marking, and removal training for soldiers conducting countermine missions.
- Provide necessary individual protective equipment and mine-resistant vehicles to soldiers conducting countermine operations.
- Establish, disseminate, and enforce route and area land-mine clearance and marking procedures for the contingency operation's AO. Include these procedures with established ROE.

Force Protection

Engineers have unique equipment and personnel capabilities that can be used to support deployed force-protection efforts during contingency operations. Engineers construct protective facilities, bunkers, emplacements, vehicle barriers, fences, and other structures needed to protect the force. The engineer ensures that the following functions are accomplished when providing force-protection support to a joint TF (JTF) or Army forces operation:

- Establish with the JTF or Army forces commander the required level of protection needed in the contingency operation's AO, based on the expected threat.
- Develop force-protection construction standards for operating and life-support bases, including the need for security fencing, lighting, obstacles, and guard posts.
- Ensure that adequate force-protection construction materials are provided to early-entry forces.
- Establish facility security-inspection procedures with military and local law-enforcement personnel to quickly identify and repair breaches.

ENGINEER CONSIDERATIONS

Contingency operations are joint, multiagency, and multinational efforts. Effective engineer liaison with all involved military units and civilian agencies is critical to mission success. The engineer company commander tailors his support plan based on mission requirements. This support may be radically different than for supporting combat operations.

ENGINEER ASSESSMENT

An early, on-the-ground assessment by the engineer company is critical. The following are critical considerations for the contingency-operation engineer assessment:

- Threat engineer capabilities in likely lodgment areas, including combat-engineering requirements for force protection, countermine, counterobstacle, and early-entry force-support operations.
- Existing topographic product availability and requirements for new terrain-visualization products.
- Specialized engineer requirements such as prime-power, fire-fighting, water-detection, and well-drilling support.
- Engineer liaison requirements, including linguists and civil-affairs personnel.
- Mission objectives and end-state, mission-success, and liaison procedures.

CHAPTER 6

COMBAT SERVICE SUPPORT

CSS begins at the engineer company level. The engineer company has an organic supply section. All other CSS is under the engineer battalion's control. The battalion has the burden of logistics support. This frees the company commander to concentrate on fighting to accomplish the tactical mission.

The engineer company's CSS responsibility is to report and request logistics requirements and to ensure that the supplies and support provided arrive at the company and are properly executed. The XO and 1SG normally perform these functions. They send the personnel and logistics reports and other required information and requests to the rear.

Other than the company supply section, all of the engineer company's CSS support is assigned to headquarters and headquarters company (HHC). Personnel and equipment from the medical section, maintenance platoon, and support platoon are designated to support each engineer company's combat operations.

COMMAND AND CONTROL

The company commander is responsible for integrating CSS into the engineer company. During combat, the XO, the 1SG, and the A&O platoon leader assist the commander with his CSS responsibilities. The XO is the logistics planner and coordinator. During the preparation of the TF order, he anticipates special logistical requirements of the engineer company (for example, extra petroleum, oil, and lubricants [POL] assets for extended fighting-position construction or MICLIC reloads for complex obstacle reduction) and requests these assets from the battalion/TF (depending on the command/support relationship). See FM 71-2 for more information on TF CSS assets and operations.

The XO coordinates with the 1SG to determine what CSS the engineer company requires and ensures that arrangements are made for CSS to support the tactical plan. The XO—

- Determines the general location for the company resupply point.
- Receives periodic maintenance updates from the platoon leaders and sergeants, the 1SG, and the maintenance-team chief.

The 1SG is the engineer company's CSS operator. He executes the company's logistical plan and directly supervises and controls the company trains. He receives CSS reports from the platoon sergeants, provides information to the XO, and helps the XO complete CSS preparations and plan and conduct CSS operations. He can be assisted by the A&O platoon, depending on the tactical situation. The 1SG—

- Receives, consolidates, and forwards all administrative, personnel, and casualty reports to the battalion/TF combat trains.
- Directs the medical evacuation section and company maintenance support team (MST) forward when the situation requires.
- Establishes and organizes the company resupply point.

- Meets logistics packages (LOGPACs) at the LRP, guides the LOGPAC to the company resupply point, and supervises resupply operations.
- Orients new personnel to the company and assigns them to platoons.
- Supervises the acquisition, treatment, and evacuation of casualties.
- Supervises the evacuation of enemy prisoners of war (EPWs) and damaged equipment.
- Maintains a personnel roster for the company.
- Attends the CSS rehearsal as the company representative.

The supply sergeant is the engineer company's representative in the battalion field trains. He assembles the company LOGPAC and moves it forward to the LRP under the control of the support platoon leader. The supply sergeant follows the 1SG to the company resupply point and assists the 1SG with LOGPAC supervision. The supply sergeant also—

- Requests Class II, IV, VII, and IX items.
- Coordinates with the battalion/TF support platoon leader for Class I, III, and V supplies.
- Maintains individual supply and clothing records.
- Picks up personnel replacements at the engineer battalion field trains and in-processes them into the company.
- Receives and evacuates killed in actions (KIAs) to the graves registration point in the brigade support area (BSA).
- Returns the LOGPAC with EPW and damaged vehicles to the BSA for further disposition.

The MST chief is assigned to HHC but supports each engineer company. He can be attached when required. He—

- Organizes and supervises the MST by—
  - — Conducting battle damage assessment and repair (BDAR) procedures.
  - — Performing mission-essential maintenance-only procedures.
- Advises the XO, the 1SG, and platoon leaders on vehicle recovery, repair, and destruction.
- Ensures that requests for repair parts are prepared and forwarded to the battalion/TF UMCP.
- Distributes repairs when they are received.
- Supervises exchange and cannibalization when that authority is delegated to him.
- Coordinates with the platoon sergeants for maintenance status' of their platoons (if not already provided by the 1SG).
- Takes responsibility for recovery operations to the UMCP or other designated maintenance collection points.

The medical team is assigned to HHC but attached to the company. They—

- Supervise the triage of the wounded and ill (both friendly and enemy).
- Advise the commander on the command's health.
- Evacuate seriously wounded personnel under the direction of the 1SG.
- Provide emergency medical treatment and stabilize injured soldiers for evacuation.

- Control, issue, and request resupply of Class VIII supplies, including nerve-agent antidote injectors.
- Train soldiers and combat lifesavers in first-aid procedures.
- Take responsibility for the medical evacuation-team operations.
- Advise the chain of command on field sanitation measures.

COMPANY TRAINS

During combat, the company normally operates with the maintenance and medical teams forward (company combat trains). The remaining CSS assets operate from the TF or engineer battalion combat trains, the UMCP, or the field trains in the BSA. The 1SG is responsible for all of the company trains, but he normally supervises the combat trains if the company is so organized. The supply sergeant is the lSG's principal assistant and supervises the company's CSS assets that are located in the TF or engineer battalion field trains.

The company trains normally operate between 500 to 1,000 meters (547 to 1,094 yards) (or one terrain feature) behind the engineer company. This allows the 1SG to provide immediate recovery, combat health support, and maintenance support to the company. During defensive missions, the engineer company is typically working across the TF's sector. The 1SG should attempt to locate the company trains where they can best support the platoons as they prepare the barrier and fortification plan.

During battle, the 1SG continually monitors the company command net and sends combat health and maintenance support forward to the platoons. He must have an armored vehicle (wheeled or tracked) with compatible communications to control the company combat trains effectively. He keeps the TF and engineer battalion combat trains command posts (CTCPs) informed on a continuing basis on the engineer company's logistics status.

SUPPLY FUNCTION

The supply sergeant is responsible for obtaining and delivering supplies to the engineer company. He delivers small items and depends on the support platoon to deliver large or frequently expended items (for example, complete Class V unit basic-load replenishment). The company commander, in his estimate of the situation, will set priorities for supply delivery. The company XO will develop the logistics plan, but the combat mission requirements will generally dictate Classes I, III, and V supplies as critical to successful operations. The supply sergeant will also receive and distribute mail as part of the LOGPAC. Generally, he will deliver the incoming mail to the 1SG and return outgoing mail to the field trains.

Class I items are rations and health, morale, and welfare items. Meals, ready-to-eat (MRE) are kept on each company vehicle in a basic load (normally three to five days). MRE and water are delivered daily to the company from the field trains by the supply section. Hot meals should be served whenever the tactical situation allows. Water is delivered in the company water trailer brought forward by the supply sergeant. Water is more critical than food and must be delivered daily. Rations are automatically requisitioned and issued to the engineer company by the S4 based on the previous day's strength reports submitted to the S1. (The command/support relationship determines whether the engineer or the TF CTCP will receive these reports.)

Class II items include clothing, individual equipment, tentage, tools, and administrative equipment and supplies. These items

are requisitioned through the S4 based on requirements from the company supply sergeant. The supply sergeant receives these supplies from the field trains and transports them forward with the LOGPAC.

Class III items include POL. Class III bulk products are delivered with each LOGPAC from the battalion support platoon. The company refuels its vehicles and equipment daily as a minimum. If the engineer company has a fuel tanker attached, it will return to the Class III supply point in the BSA to refuel after the company refuels. During extensive defensive preparations, the company will require additional mission loads of Class III for support fortification construction.

The company normally keeps a basic load of Class III package products (hydraulic fluid, motor oil, and vehicle lubrication) stored on each combat and tactical vehicle. Package products are replenished as they are used from stockage brought forward daily with the fuel tanker during LOGPAC distribution.

Class IV items include construction materials. Combat units normally carry small, basic loads of Class IV materials such as overhead cover material (sandbags and lumber) and concertina wire for individual fighting positions and protective-obstacle construction.

The Class IV/V (barrier material and mines) items for extensive defensive preparations will normally be pushed forward by division or corps transportation assets to a maneuver brigade or TF-controlled supply point. This supply point is managed by the maneuver unit with engineer representation.

Class V items include ammunition. Class V material is based on reported ammunition expenditures submitted to the field trains by the 1SG. The engineer company's ammunition is delivered daily with the LOGPAC. Special-purpose ammunition can be prepositioned or delivered as part of the company LOGPAC or separately to a predetermined site, depending on the mission (MICLIC reloads for the offense or mines for defensive preparations).

Class VI items include personal-demand items available through the post exchange. These items are requested through the S1 by the 1SG.

Class VII items include major end items. These items are requisitioned through the S4. Crews are assigned and the replacement combat vehicles normally come forward with the LOGPAC. Engineer-specific equipment replacement is normally received through the engineer battalion regardless of the command/support relationship.

Class VIII items include medical supplies. These items are provided by the TF's or engineer battalion's medical platoon, depending on the command/support relationship. Requests for medical supplies to replenish aid bags for the company medics and combat lifesavers are submitted to the TF's aid station by the company senior aidman.

Class IX items include repair parts and documents for equipment maintenance. Repair parts are requested through the prescribed load list (PLL) clerk. They are delivered with LOGPAC or picked up by the MST at the UMCP.

RESUPPLY OPERATIONS

A LOGPAC is a resupply element based on the requirements of the company. Normally, it consists of a POL truck; an ammunition truck (Class IV/V items); and a supply truck that carries rations, water, mail, repair parts, and other requested items and pulls a water trailer. LOGPACS are—

- Assembled in the BSA and then led by the supply sergeant with a TF or

engineer battalion support platoon to an LRP.

- Picked up by the 1SG at the LRP and moved forward to a secure area behind the company's position to feed, fuel, and resupply the company.
- Returned by the 1SG to the LRP where the supply sergeant takes control of it and moves it back to the field trains under the control of the TF or engineer battalion support platoon.

LOGPACs are usually distributed by the service-station method, the tailgate method, or the modified tailgate method or through the maneuver unit. Generally, the service-station method is established by the 1SG in a centrally located and secure site. Sequentially, each platoon moves to the LOGPAC distribution site. Each squad or crew passes through various stations before the final inspection and returns to the work site or position. Normally, the stations include maintenance, fuel (POL), food, water, mail, personnel actions, medics, and other CSS assets as required by the SOP and METT-T. Figure 6-1 shows a graphic illustration of the service-station method.

The tailgate method differs from the service-station method in two major aspects (see Figure 6-2, page 6-6). First, the 1SG brings the LOGPACs to each platoon's general location. Second, the tailgate LOGPACs are usually not as comprehensive as the service-station LOGPACs because the tailgate resupply is more mobile and spends more time in transit. The tailgate method takes more time for the 1SG but interferes least with the platoon work effort. The platoon does not have to spend time moving to the LOGPAC distribution site.

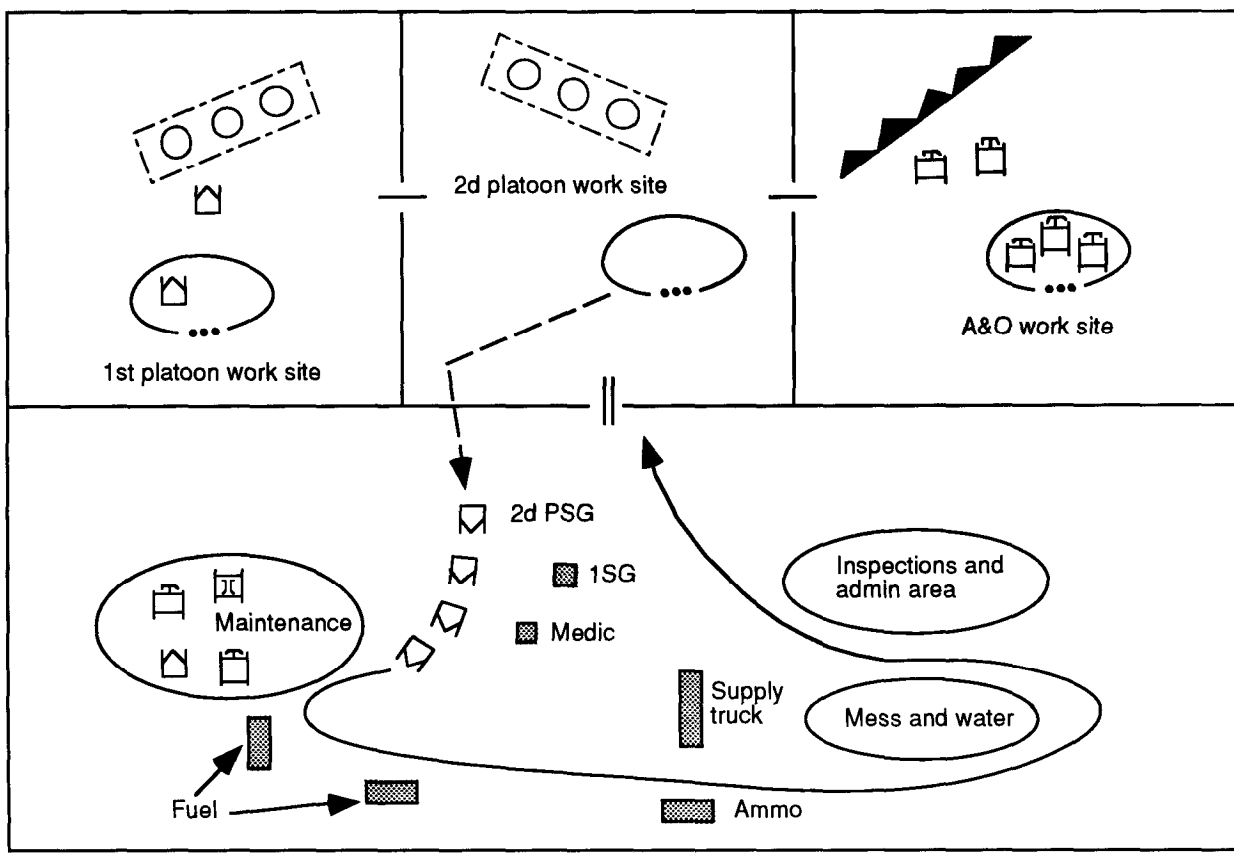


Figure 6-1. Service-station LOGPAC

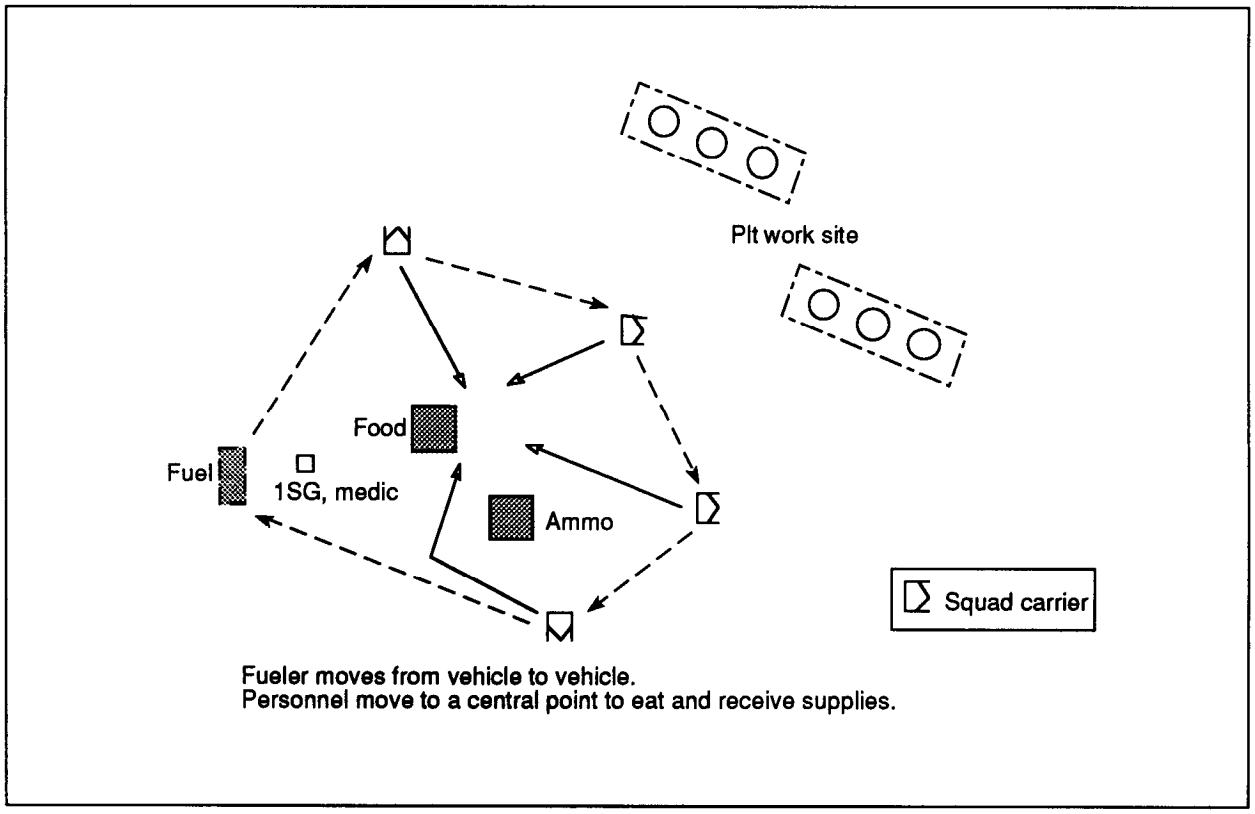


Figure 6-2. Tailgate LOGPAC

The modified-tailgate method organizes the LOGPAC into separate platoon packages which are picked up at the company resupply point by the platoon sergeants and then delivered to the platoon work sites. This method is particularly effective during defensive preparations because it minimizes platoon travel and allows the soldiers to resupply at their work sites. However, this type of LOGPAC distribution requires special coordination with the S4 and HHC commander to be configured into platoon packages (see Figure 6-3).

The platoons may receive LOGPACs with the maneuver companies/teams as a method of resupply. This method is also effective during defensive preparation, especially for the A&O platoon. The A&O platoon will typically spend a great deal of time in each company BP preparing vehicle and crew-served weapons positions. This method also requires very close coordination to ensure that the engineer platoon is working in the maneuver company/team location when they receive their LOGPAC. Care must also be taken to ensure that the engineer platoon's rations, supplies, ammunition, and fuel are included with the company's LOGPAC.

The LOGPAC can be distributed by a combination of these methods. The company, minus one platoon, may get resupplied through the service-station method while the other platoon may get resupplied through the tailgate method or through the maneuver unit.

COMBAT HEALTH SUPPORT

The medical team attached to the company provides emergency medical treatment (EMT) and medical evacuation (MEDEVAC). The team provides medical treatment of minor diseases and nonbattle injuries and EMT to stabilize seriously injured or wounded soldiers for

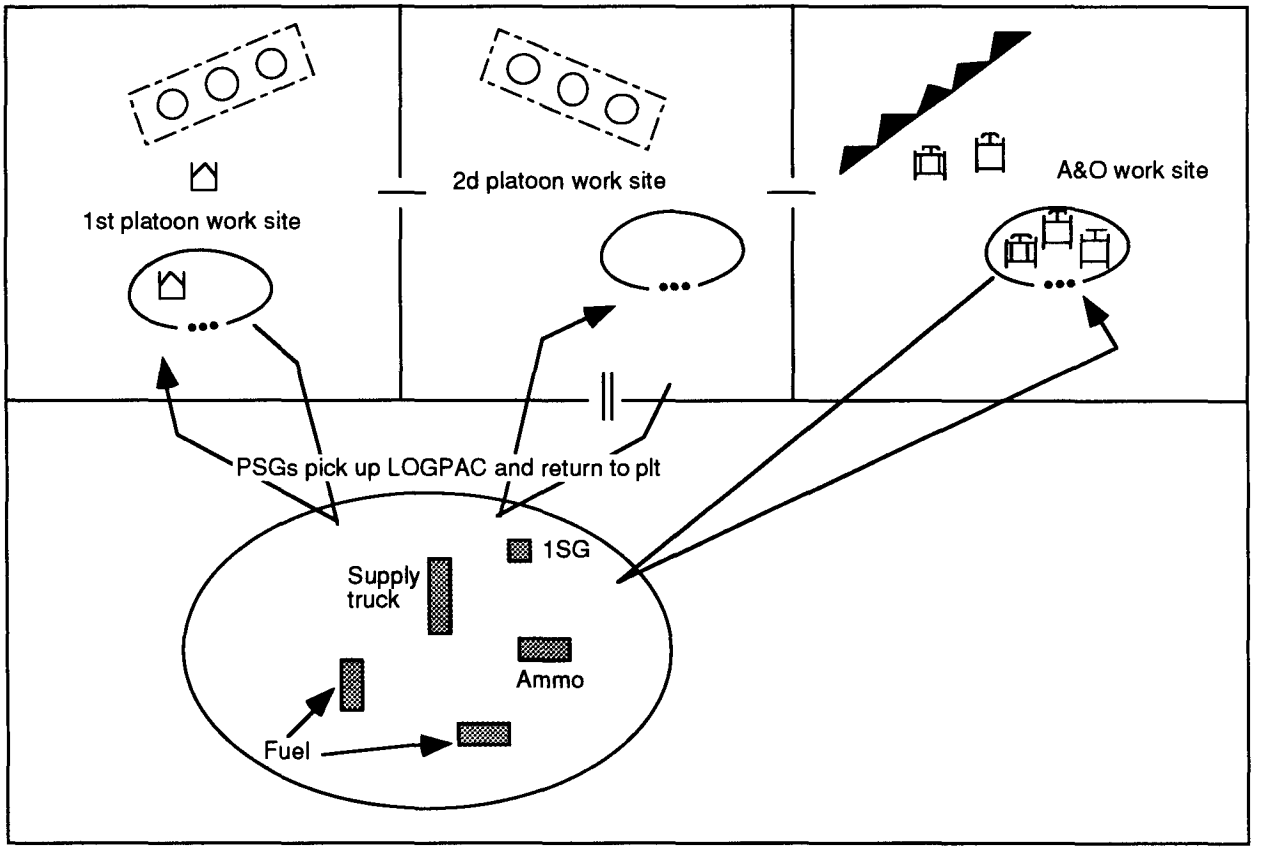


Figure 6-3. Modified-tailgate LOGPAC

evacuation. The combat medic is assisted by the combat lifesaver. Generally, there is one combat lifesaver per squad or section. The combat lifesaver is a nonmedical soldier who has received enhanced first-aid training. The medical team supervises the forward acquisition, treatment, and evacuation of the wounded to the TF or nearest battalion aid station. When numerous casualties are anticipated, patient-collecting points are established to facilitate patient acquisition. The 1SG dispatches the armored ambulance to meet and receive patients being transported by nonmedical vehicles. The 1SG arranges for additional evacuation assets when the number of seriously wounded soldiers exceeds the evacuation capability of the company medical team. Less seriously wounded soldiers can be transported by nonmedical transportation assets to the nearest aid station. Weapons and military equipment are generally not evacuated with the wounded. However, the wounded keep their mission-oriented protective posture (MOPP) gear and personal items.

MAINTENANCE

When the TF provides logistical support to the engineers, organizational maintenance support comes from the TF. This causes no particular problem for common equipment. However, no engineer-specific equipment repairers exist in the maneuver unit's maintenance platoon. The engineer company normally receives an MST from the engineer HHC; this alleviates the problems associated with low-density, specialized engineer

equipment. When the engineers provide the logistical support, they provide organizational maintenance.

Doctrinally, recovery is the owning unit's responsibility. This becomes virtually impossible for the engineer vehicles working in the TF's area. In the defense, the TF provides recovery support at least back to the UMCP located near the combat trains. If repairs cannot be made at the UMCP and the time and situation permit, the engineer's maintenance team can come forward and recover the disabled vehicle. The engineer battalion should provide further recovery back to the BSA for repairs. The engineer BMO or technician must ensure that each BSA has DS mechanics capable of repairing engineer equipment.

In the offense, the TF recovers the vehicle to the main supply route (MSR). Depending on the situation, the TF either turns the vehicle's recovery over to the engineers or the vehicle is picked up by recovery assets from the BSA. It must be clear in the TF's SOP or OPORD which maintenance team has recovery responsibility for the engineer vehicles. The priority that the TF commander places on the engineer assets determines in what priority they are recovered.

The engineer company's maintenance contact team routinely visits work sites. The communications repairman and armorer accompanies this maintenance team to help anticipate problems and provide support before the mission is jeopardized.

Maintenance starts with preventive maintenance by the vehicle's operator and crew and continues through repair by mechanics. It is a continuous process. The engineer operators must be able to perform preventive maintenance on their equipment at any time and in any situation. This is especially important given the lower densities and higher maintenance levels of specialized engineer equipment.

Maintenance and recovery are initiated by the vehicle's operator and crew. They identify the problem through preventive maintenance. Faults are annotated on DA Form 2404 and submitted to the 1SG daily during distribution before receiving rations. If the MST chief is present during distribution, the DA Form 2404s are submitted to him. Typically, the Unit-Level Logistics System (ULLS) clerk will be forward to support the company. Normally, he will be integrated with the TF UMCP. Maintenance and repair requiring the MST should be performed as far forward as possible.

After the crew identifies a fault, they report to the platoon leader and platoon sergeant the status of the fault, the location of the vehicle, and the circumstances of the fault. The crew and the chain of command make an estimate to determine the maintenance support requirements (self-recovery, fix forward, assistance from nearby vehicles or units, or assistance from the battalion.

If the repairs needed are beyond the crew's ability, the platoon notifies the 1SG. He then notifies and dispatches the MST to the vehicle. If the repair takes longer than two hours, the 1SG requests additional support from the BMO.

If the vehicle cannot be fixed forward, it is evacuated to the TF or engineer battalion UMCP. If the engineer company is attached, the TF attempts to fix the vehicle. If the repair is beyond the TF's capability, the engineer battalion dispatches recovery assets forward to either repair the vehicle in the TF's UMCP or further evacuates the vehicle to the BSA (this is normally required if special tools or parts are required for the equipment).

If the vehicle is unrepairable or cannot be recovered, personal items, radios, crew-served weapons, ammunition, and other serviceable items and parts are removed. The automotive and remaining weapons systems

are damaged or destroyed to preclude their use by the enemy. **NOTE: The destruction or disabling of friendly equipment is only done on the order of the commander.**

The MST, when attached, normally travels to the rear of the engineer company during the offense. If a vehicle becomes disabled, the crew moves the vehicle as far off the march route as possible and guides passing vehicles around. If the crew cannot make repairs, they report and wait for the MST to assist them.

During the defense, the MST normally collocates with the A&O platoon. This ensures that critical engineer equipment is repaired quickly without degradation to the construction of fighting positions.

CHAPTER 7

ENGINEERS IN CLOSE COMBAT

Combat engineers are combat-arms soldiers. When employed in the forward TF area, the engineer company often employs close-combat skills, using fire and movement to accomplish its engineer mission.

On the modern battlefield, the enemy has the capability to detect, move toward, and engage engineer forces quickly without regard to their location. Consequently, all engineers are organized, trained, and equipped to fight and destroy the enemy. Combat engineers also have the secondary mission of reorganizing into infantry units and fighting as infantry. This chapter addresses aspects of engineers in close combat, whether organized to fight as engineers or infantry.

FIGHTING AS ENGINEERS

Combat engineers are organized, trained, and equipped to engage in close combat to accomplish their engineer mission. They may have to fight—

- As part of a maneuver formation to accomplish the TF's mission.
- To assist the TF in defeating an unexpected attack.
- To protect a critical demolition target that must be kept passable until friendly forces are able to withdraw.
- To maintain security at a work site.
- For self-protection in bivouac or on the march.

The enemy will attempt to kill combat engineers as well as infantry or armor. It is imperative that engineer forces are trained to be physically aggressive and tactically competent.

ENGINEER ORGANIZATION FOR COMBAT

The combat-engineer soldier is trained to accomplish the same basic tasks as the infantryman. He specializes in the engineer-unique tasks, as the infantryman specializes in the infantry-unique tasks; however, the difference is simply a matter of emphasis. Engineer squads and platoons are trained to move rapidly and fight violently-either by themselves, or as a part of a combined-arms formation.

Mechanized combat-engineer squads are organized around the armored personnel carrier (APC) and are armed with small arms, grenade launchers, light AT weapons, and explosives. Within the platoon, they carry a basic load of conventional mines sufficient to emplace a minefield to support a platoon defense.

All engineer squad carriers are usually encumbered by trailers *except* when moving as part of a combined-arms formation. The squad must cache its trailer before it can effectively maneuver or employ mounted fire and movement. Typically, the A&O platoon will be responsible for the six squad trailers until they are needed. During defensive operations, the trailers allow the squads to carry mines, extra explosives, and equipment required for defensive preparation.

ENGINEER COMBAT CAPABILITIES

During offensive operations, combat-engineer companies are normally task-organized with and are integrated into a battalion/TF. The engineer company is designed to provide mobility, survivability, and countermobility to the TF. The engineer company

fights with explosives and mines as well as with organic weapons. Regardless of the mission, engineer APCs are combat vehicles that provide a significant contribution to the TF's combat power. The engineers fire and maneuver as necessary to accomplish the mission under the formation commander's direction.

When involved in an assault, engineers fight dismounted on the objective and focus on breaching the protective obstacles, including demolition tasks against positions and dug-in vehicles. Demolition charges produce significant shock and concussion effects on defenders as well as destroy critical positions and combat vehicles. The engineers use fire and movement against defenders as necessary to accomplish their engineer mission.

The CEV also fights in the assault. With its demolition gun, machine guns, and dozer blade, it can be very effective in close combat during the final stages of overrunning an objective.

Combat engineers employed on reserve demolition targets are primarily responsible for executing the technical procedures necessary to ensure target destruction. However, the engineer demolition party responds to enemy contact, assisting the demolition guard in the target's defense to hold it open or to gain the necessary time to ensure its destruction. The engineer force may also assist in target defense by installing antipersonnel (AP)/AT mines to support the defensive scheme.

Engineer units engaged in emplacing obstacle systems provide their own local security. They employ close-combat techniques against attackers to the limit of their capability to ensure that the obstacle system is completed.

The following is an example of fighting as combat engineers:

A *combat-engineer platoon is constructing a series of minefield as part of a turning obstacle group (see Figure 7-1). Group AIB is*

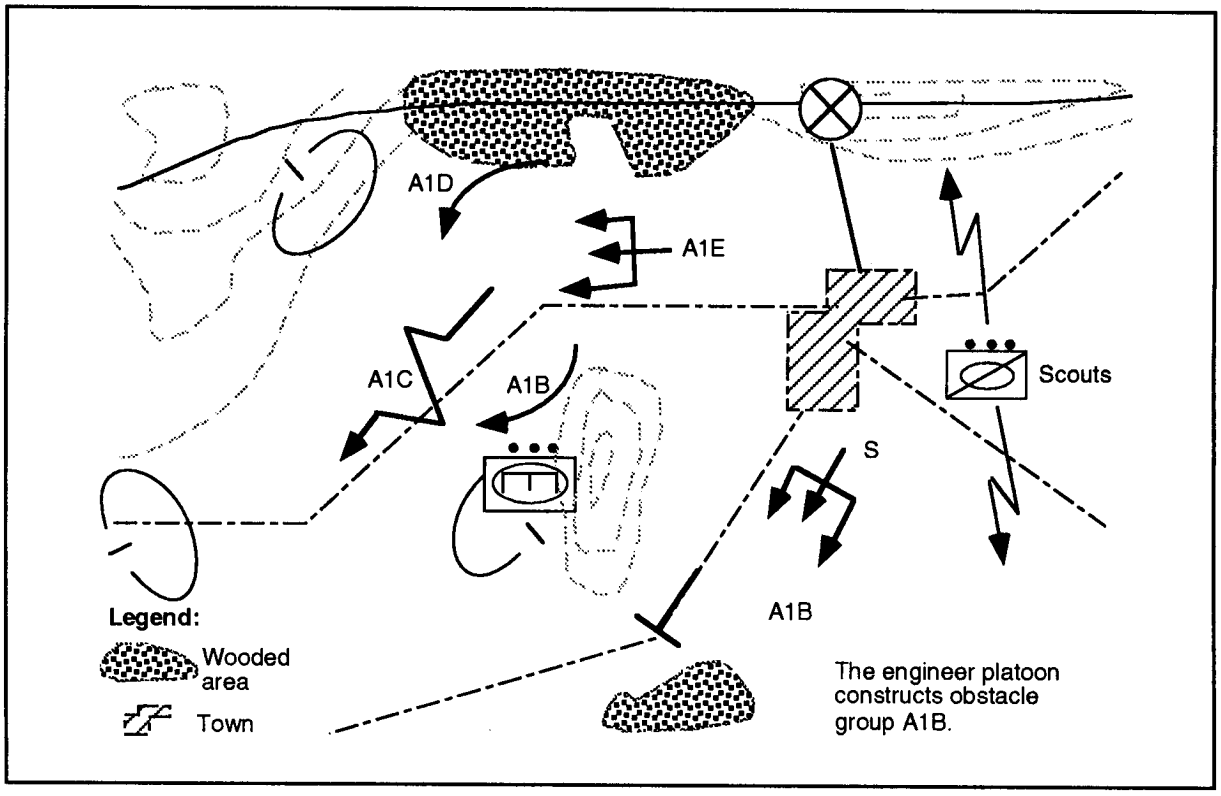


Figure 7-1. General situation

located on the southern side of the TF's EA. The engineer platoon leader was warned (during the OPORD) that enemy reconnaissance would try to transit the TF's sector near his platoon work site.

At 0010 hours, the platoon leader receives a radio message from the engineer company commander warning him of possible enemy contact. An enemy reconnaissance element has slipped by the TF's security screen. The company commander advises the platoon leader to increase the platoon's vigilance (see Figure 7-2).

The platoon leader places a combat-engineer vehicle (CEV) (which was attached to assist the platoon) to cover the most likely enemy AA. He coordinates his platoon's exact location with the maneuver team that he is supporting (he must ensure that the maneuver team does not mistake the engineers for the enemy reconnaissance element). He informs his squad leaders of his actions and the platoon continues to work.

At 0130 hours, the CEV operator reports that he has an unidentified vehicle forward of the platoon work site and requests permission to fire. The platoon leader orders the CEV operator to observe, but not fire until ordered. He quickly checks with the maneuver team to ensure that no friendly forces are in the area and to warn them of the approaching vehicle.

The maneuver team replies that there are no friendly forces forward of the engineer platoon. The CEV operator reports that the vehicle is a BMP (an amphibious infantry combat vehicle) and again requests permission to fire. The platoon leader orders the CEV operator to engage with the main gun and orders his

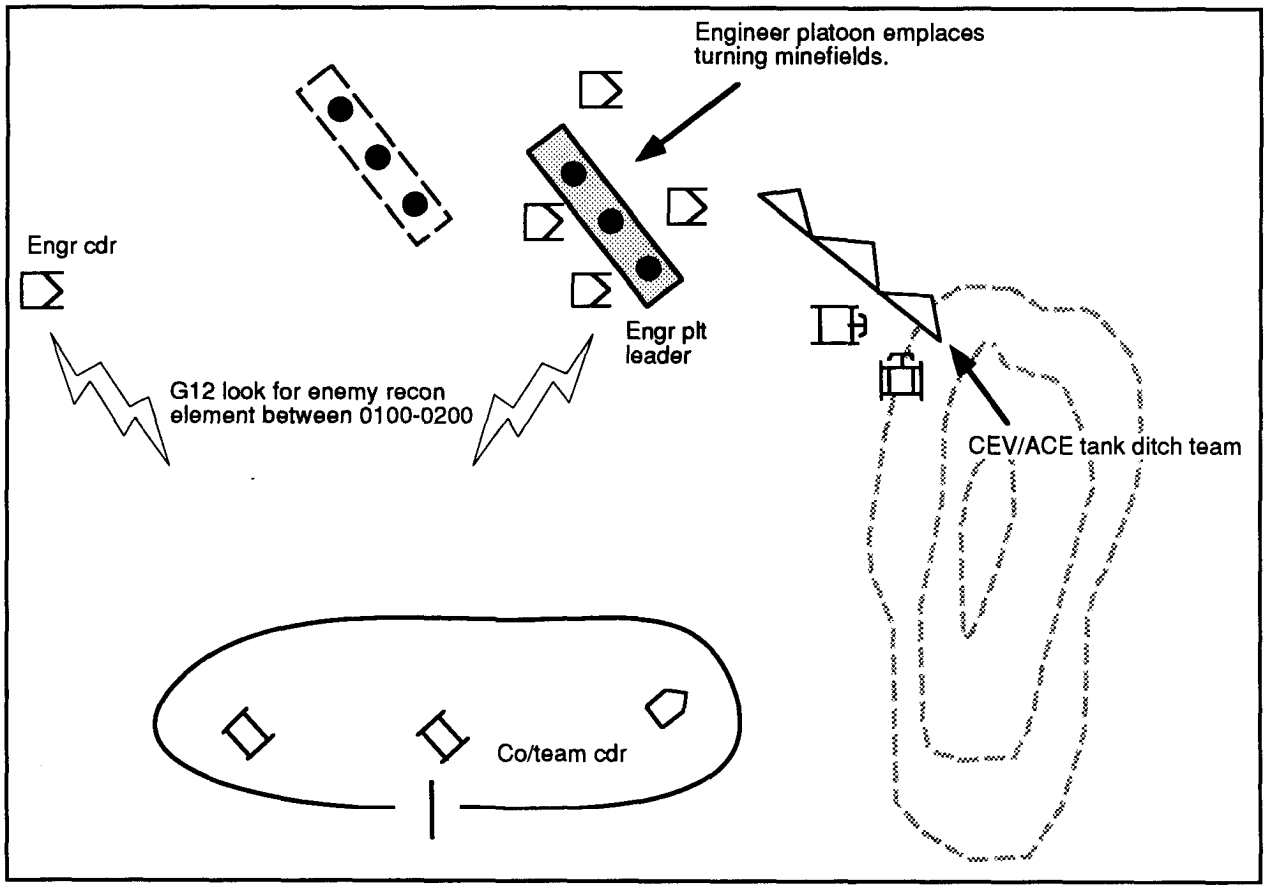


Figure 7-2. Engineer platoon receives threat warning

squad carriers to orient their weapons on the enemy BMP. He gives a platoon-directed fire order (see Figure 7-3). The platoon destroys the enemy reconnaissance BMP. After the platoon secures the area and reports, it reor - ganizes and continues work on the obstacle system.

In this case, the engineer platoon fought as engineers. All of the skills demonstrated by the platoon (such as directed fires, establishing local security, and engaging in close combat) are engineer skills. The engineer platoon must master these skills to work effectively and to survive in the forward MBA. The engineer platoon effectively achieved two things during this engagement—they killed an enemy reconnaissance asset, preserving the TF's security, and they stayed alive to finish a key obstacle group for the TF's defense.

FIGHTING AS INFANTRY

Engineer units have historically performed their secondary mission well—to organize and fight as infantry. This mission still exists for today's combat-engineer company. While engineers fight continually as engineers, their employment as infantry requires serious consideration. The following paragraphs address the employment of combat engineers as an infantry unit. It is important to remember that the engineer unit will

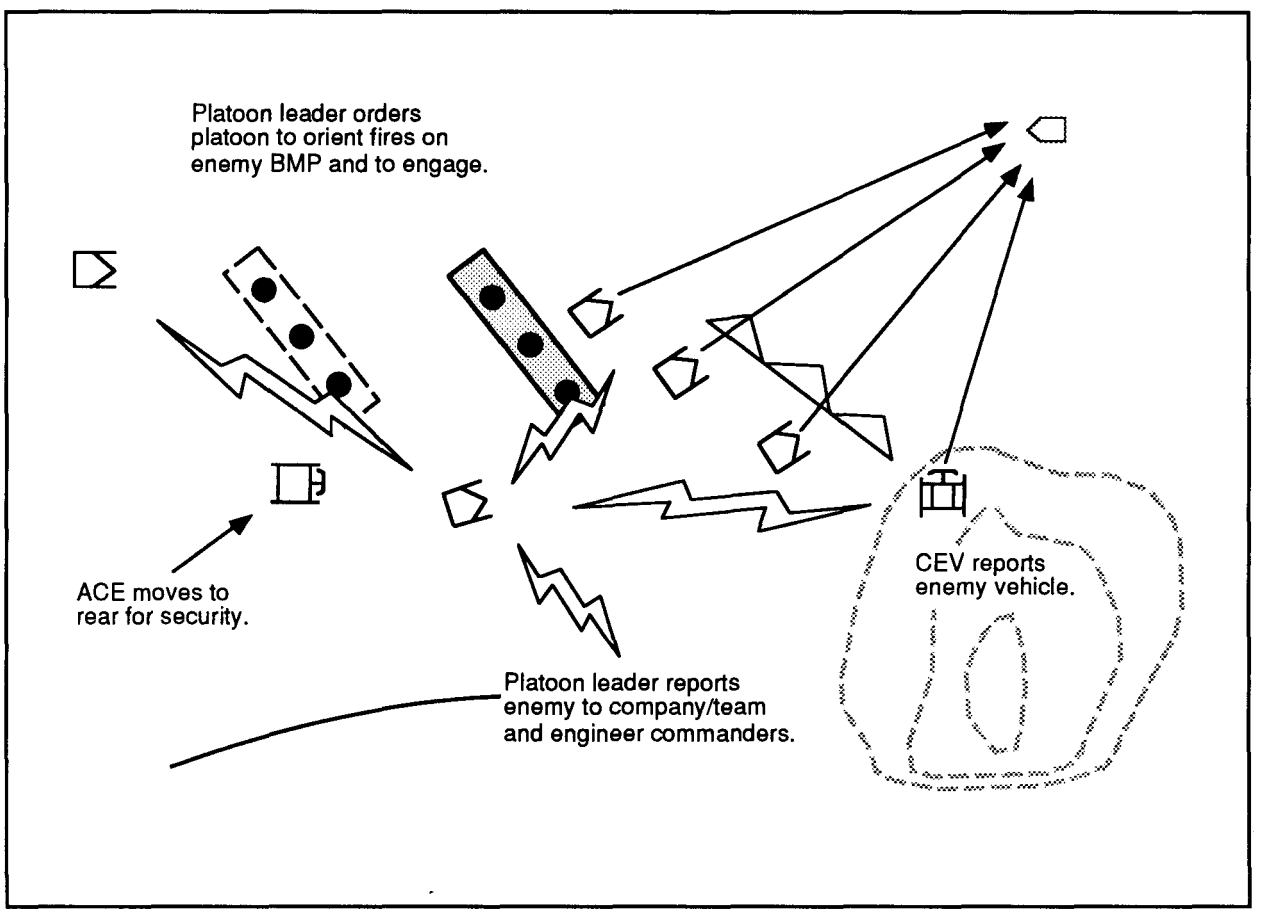


Figure 7-3. Engineer platoon destroys enemy BMP

physically cease to exist as an engineer organization and will become infantry.

EMPLOYMENT CONSIDERATIONS

According to FM 5-100, the TF commander, unless otherwise prohibited, has the authority to reorganize the engineer company as infantry if engineers are in a command relationship with the TF. Normally, this authority is retained by division and corps commanders. In his decision, he must carefully weigh the gain in infantry strength against the loss of engineer support. The engineer company provides him far more combat power in its primary configuration than as infantry. Stopping the engineer work may reduce the combat power of his entire force. Because of the long-term impact, the commander employing an engineer unit as infantry has the responsibility to notify the next higher headquarters of his action.

The decision to employ an engineer unit as infantry is made by the commander after careful analysis considering both demands for infantry and for engineers. An immediate requirement for infantry does not require reorganization—the engineers are simply committed to the fight. Maintaining unit integrity is an important consideration. Engineer soldiers should never be used as individual infantry replacements but committed as reorganized infantry units (such as platoons or companies). Reorganization takes place when there is adequate time to move unnecessary engineer elements and equipment from the battle area and to augment the engineer structure with additional capabilities. The commander normally considers reorganizing when he forecasts a shortage of infantry before a future operation or phase of an operation. The decision is taken after weighing METT-T factors and determining an acceptable level of risk. Available time to prepare is critical. Normally, the situation is extremely urgent when engineers must be converted to infantry; consequently, time to reorganized completely is rarely available.

REORGANIZATION CONSIDERATIONS

The commander must consider several important factors before he converts the engineer company to infantry. These include the—

- Situation's urgency.
- Result of losing engineer support.
- Reaction time required.
- Engineer combat capability or potential to fight as infantry.
- Engineer training level.
- Engineer mission, if committed as infantry.
- Engineer support requirements of the force after the commitment of the engineers as infantry.
- C^2 of engineer assets not committed as infantry.
- CS assets the engineer company will need for their infantry mission (such as FIST-V, ambulances, air defense, and so forth).

Engineer companies are generally task-organized throughout the division area and are normally integrated with battalions/TFs. Engineers in combat vehicles or dismounted formations fight as required under the formation commander's command. Engineers preparing defenses fight from those positions with the defenders, if attacked. The engineers retain the ability to use their close-combat skills as infantry in unforeseen emergencies.

The commander directing this employment should provide early warning to allow the unit time to assemble, reorganize, and prepare before commitment. The engineer company must provide immediate liaison to the gaining maneuver command to facilitate planning and integration. This generally requires about 24 hours to accomplish, unless the unit has previously prepared for a similar mission.

When the engineer company is employed as infantry, one major consideration for the commander is the disposition of major items of engineer equipment such as ACEs, AVLBs, and SEEs. Equipment not used in the infantry role may be attached to other units for C^2 purposes or to accomplish other engineer tasks. This is METT-T driven and is generally based on the overall concept of the operation.

The commander directing the employment should augment the engineer company unit with air-defense and fire-support teams. The unit should also be augmented with heavy AT weapons and additional medical personnel, if available.

ORGANIC COMBAT POWER

Commanders with the authority to direct the employment of engineers as infantry must be aware of differences in combat power between engineer and infantry units. Engineer units provide the following:

- Combat-engineer platoon (mechanized). Organized as mechanized infantry, the platoon consists of four APCs, carrying a headquarters and three rifle squads. Each squad has a squad leader, a carrier team, and a dismount team.

- Combat-engineer company (mechanized). The forward elements of a reorganized engineer company consist of the company headquarters, two rifle platoons, and the A&O platoon. Engineer equipment not needed for the infantry mission will be further task-organized to support the maneuver mission or reorganized with the engineer battalion. The A&O platoon is not equipped to be mechanized infantry, but can be used to augment the other two platoons or as dismounted infantry. The CEVs should remain forward with the company; they provide a significant fire-power advantage to the company.

UNIT CAPABILITIES

Engineer units employed as infantry do not have the same capabilities as conventional infantry units. At the squad and platoon levels, engineers normally operate in organizations similar to infantry and have the same basic small-arms weapons. However, the mechanized-infantry platoon is equipped with the M2 Bradley fighting vehicle and has a marked advantage over the APC-equipped engineer platoon.

The engineer company can effectively control other arms as a company/team because it normally works closely with them. The company is best suited by training for defensive operations. To be fully effective, the engineer company needs heavy AT weapons augmentation and the normal CS provided to any infantry unit.

The most likely requirement for reorganizing engineers into infantry results when the force's reserve has been committed and it is necessary to reconstitute the reserve. As a reserve, the engineer company can be used to reinforce TF units in contact or as a blocking force to stop enemy penetration or counterattack. They can best accomplish this by building and occupying a strongpoint. Other uses include—

- Augmenting an armored battalion with infantry to build a TF.
- Augmenting an infantry battalion with an additional infantry company.
- Operating separately in an economy-of-force role or as a part of a brigade defense.
- Providing air-assault forces for seizing critical terrain.
- Replacing reconnaissance forces or scout platoons within the TF.

The above list can also be accomplished while fighting as engineers. Given today's unit organization, converting engineers to infantry is undesirable and formal reorganization is likely to be time-consuming.

APPENDIX A

ENGINEER ESTIMATE

The engineer estimate is an extension of the military decision-making process (see FMs 5-100, 5-71-3, 71-2, and 90-7). It is a logical thought process conducted by the engineer concurrently with the supported maneuver force's tactical planning process. The engineer-estimate process generates early integration of the engineer plan into the combined-arms planning process. It drives the coordination between the engineer, the supported commander, and other staff officers and the development of detailed engineer plans, orders, and annexes.

Each step of the engineer-estimate process corresponds to a step of the decision-making process. Like the decision-making process, the engineer estimate is continuously refined. Table A-1 shows the relationship between these two processes. A more detailed discussion of each step of the engineer-estimate process is found below.

RECEIVE THE MISSION

The engineer quickly focuses on several essential components of the basic order and engineer annex when he receives the mission. These components are the enemy situation, the mission paragraph, the task organization, the logistics paragraph, and the engineer annex. From these components, he determines the—

- Type of operation (offensive or defensive).
- Current intelligence picture.
- Assets available.
- Time available (estimated).

Table A-1. Relationship between the military decision-making process and the engineer estimate

Military Decision-Making Process	Engineer Estimate
Receive the mission	Receive the mission
Develop facts and assumptions	Conduct the IPB/EBA
Analyze the mission	Analyze the mission
Issue the commander's guidance	Develop the SOEO
Develop COAs	War-game and refine the engineer plan
Analyze COAs	Recommend a COA
Decide on COAs	Finalize the engineer plan
Issue orders	Issue orders

CONDUCT AN INTELLIGENCE PREPARATION OF THE BATTLEFIELD/ENGINEER BATTLEFIELD ASSESSMENT

Developing facts and assumptions is a detailed and sometimes lengthy process. The engineer must maintain his focus on the information required by the maneuver commander and his battle staff to make decisions. Facts and assumptions pertain to the enemy as well as the friendly situation. The engineer uses the EBA as the framework for developing facts and assumptions. The EBA consists of three parts (see Table A-2). They are—

- The terrain analysis.
- Enemy mission and mobility/survivability (M/S) capabilities.
- Friendly mission and M/S capabilities.

Table A-2. EBA

Component	Description
Terrain analysis	Analyze the terrain's impact on the battle using the OCOKA framework: • Observation and fields of fire. • Cover and concealment. • Obstacles. • Key terrain. • Avenues of approach. Analyze the advantages/disadvantages that the terrain offers the enemy and friendly forces. Analyze the conclusions on the terrain's impact on accomplishing the mission.
Enemy mission and M/S capabilities	Anticipate enemy engineer operations and their impact on the battle. Consider the enemy's mission and doctrinal employment of engineers in battle. Estimate the enemy engineer capability based on— • The S2's order of battle. • Threat engineer organizations. • Manpower/equipment capabilities. • Recent activities. Plot the enemy engineer effort based on— • The S2's situational template. • Doctrinal engineer employment.
Friendly mission and M/S capabilities	Evaluate the friendly engineer capability and its impact on accomplishing the mission. Consider the friendly mission. Estimate the engineer assets available based on task organization of— • Maneuver forces. • Engineer forces. • Higher engineer HQ. • Adjacent engineer units. Consider the availability of critical resources. Estimate the total engineer capability based on engineer planning factors.

To analyze the terrain and the enemy, the engineer commander uses the IPB and the EBA. The engineer XO uses the same process to assist in developing the TF's SITEMP and the engineer estimate. The IPB is a tool used to see the terrain and the enemy. The first two steps of the EBA do the same, but with an engineer focus. For example, the EBA will detail how the enemy engineers will modify terrain and develop EAs. This is critical information needed to complete the TF's SITEMP. However, the IPB process is used by the engineer to develop his "engineer-specific" IPB. The IPB is only two-thirds of the EBA process. The friendly engineer capability must be analyzed to complete the EBA. The TF engineer must use all assets and resources available—the TF S2, the brigade engineer, and the engineer battalion staff—during the IPB/EBA process.

The EBA is a continuous process that is continually refined as the situation becomes clearer. Each time new information is collected or the conditions change, the engineer must evaluate its impact on the mission and refine the facts and assumptions as necessary.

To do a proper EBA, the engineer company planner must understand the IPB process. The following paragraphs detail the IPB process and the engineer contribution to the completed product. For more information on the IPB, see FM 34-130.

INTELLIGENCE PREPARATION OF THE BATTLEFIELD

The IPB has four steps: define the battlefield environment, describe the battlefield's effects, evaluate the threat, and determine threat COAs.

Define The Battlefield Environment

Step one is the analysis of the AO, the battle space, and the area of interest. The TF engineer and company XO analyze the entire TF area, but focus in more detail on the AO. Additionally, the engineer company commander looks at the area directly affecting the engineer company. This step allows the engineers to focus their analysis efforts to a particular area.

Describe The Battlefield's Effects

Step two evaluates the effects of the environment with which both sides must contend. This environmental assessment always includes an examination of terrain and weather. It also includes an engineer-specific study of the area's infrastructure, facilities, equipment, and the framework needed for functioning systems, cities, or regions.

Specifically, weather analysis determines the effect of the weather on the mission. Weather affects terrain, equipment, visibility, and soldiers. Snow, dust, humidity, and temperature extremes all have an impact on soldier efficiency and limit the potential of weapons and equipment. Poor visibility affects obstacle placement. Normally, inclement weather will favor an attacker but will degrade his mobility and C^2. Defenders are less likely to be alert and weapons less effective. The attacker can close with the defender with greater ease in limited visibility conditions. Table A-3, page A-4, summarizes the effects of weather.

Terrain analysis is a major component of the IPB. The objective of the terrain analysis is to determine the impact that the terrain (including weather) will have on mission accomplishment. The engineer supports the intelligence officer in this process. Using the OCOKA framework (see Table A-4, page A-4), the engineer determines what advantages or disadvantages the terrain and anticipated weather offer to both enemy and friendly forces. This process has a direct impact on planning engineer operations. Table A-4 shows examples of how the components of OCOKA may impact engineer support.

Observation and Fields of Fire. Terrain and vegetation affect the friendly and enemy

Table A-3. Weather effects

Weather Condition	Element Affected
Temperature	Soldiers, gunnery, and equipment
Humidity	Soldiers and equipment
Precipitation	Soldiers, trafficability, and equipment
Visibility	Observation and obstacle placement
Light data	Observation and obstacle construction rate

Table A-4. OCOKA and sample M/S effects on planning

OCOKA		Examples of Effects on Engineer Support
Observation and fields of fire	Offense	Planning the obscuration/location of the support force for breaching operations.
	Defense	Obstacle distance from direct-fire systems (might also affect obstacle composition with reduced standoff). Limited fields of fire might limit certain obstacle effects (for example, fix and block).
Cover and concealment	Offense	Planning obscuration/assault positions for breaching operations. Impacts feasibility of conducting a covert breach.
	Defense	Required effort for survivability and deception operations.
Obstacles	Offense	Task-organizing special engineer mobility assets (such as AVLBs and ACEs). Plotting enemy countermobility effort, tying into existing obstacles.
	Defense	Tying in a reinforcing obstacle to existing obstacles might require an increased countermobility effort.
Key terrain	Offense	Targeting indirect-fire suppression and obscuration for breaching operations.
	Defense	Obstacle intents tied to how valuable the key terrain is for retention.
Avenues of approach	Offense	Capability to conduct in-stride, deliberate, and covert breaching operations. Focusing countermobility effort in a transition to a hasty defense. The need for flank protection.
	Defense	Focusing specific obstacle effects in a specific location in an AA. Size of AA impacts on required countermobility effort.

forces' capabilities to observe one another and engage each other with direct-fire weapons. Dead space is normally covered by indirect fire or sensors. Observation and fields of fire are used to identify potential EAs, defensible terrain, and specific system positions and to identify where maneuvering forces are most vulnerable to observation and fires.

In the defense, a potential mission for the engineer company is to improve fields of fire by cutting down trees, power lines, and vegetation. Intervisibility and unobstructed view from one point to another are other factors of observation and fields of fire. The analysis of both are critical to obstacle siting.

Cover and Concealment. Cover is protection from enemy fire. Concealment is protection from enemy observation. Both describe the viability of key terrain and the AA. Advances in technology, such as thermal sights, have affected the availability of concealment. The evaluation of concealment and cover aids in identifying defensible terrain, possible approach routes for breaching, assembly areas, and deployment and dispersal areas.

Obstacles. Obstacles are classified as both existing and reinforcing. Existing obstacles are further broken down into natural and cultural classes. Reinforcing obstacles include tactical and protective obstacles emplaced by soldiers to multiply combat power through terrain reinforcement.

The obstacles analyzed during the IPB/EBA process include both existing and reinforcing, but focus on existing obstacles. However, any reinforcing obstacles in the battlefield environment are included in the analysis. Obstacles define the AAs. They create cross compartments in the AA and can turn, fix, block, or disrupt maneuver. The following are examples of natural obstacles:

- Swamps.
- Dense forests.
- Deep, steep-sloped ravines.
- Rivers and streams.
- Hills or mountains with excessive slopes.

The following are examples of cultural obstacles:

- Urban areas.
- Quarries.
- Railroad beds.
- Built-up or elevated roads.

Reinforcing obstacles are those constructed, emplaced, or detonated to enhance existing obstacles or the terrain. Some examples of reinforcing obstacles are—

- Minefields.
- Tank ditches.
- Abatis.
- Tank walls.
- Road craters.
- Wire entanglements.

Built-up areas, rivers, steep elevation, and old friendly or enemy obstacle systems are normally analyzed for their effect on the AAs. A technique used to display the cumulative effects of obstacles is a graphical product that depicts areas of terrain as unrestricted, restricted, and severely restricted in terms of their effects on mobility.

Unrestricted terrain is fairly open and presents no hindrance to ground movement. Nothing needs to be done to enhance the force's mobility. Unrestricted terrain is a function of the type of unit moving on the terrain. Table A-5, page A-6, depicts the terrain that is considered to be unrestricted (favorable).

Restricted terrain hinders ground movement. Little effort is needed to enhance mobility. Restricted terrain is also a function of the type of unit traversing the terrain. Table A-6, page A-6, depicts terrain that is considered to be restricted and Table A-7, page A-7, depicts terrain that is considered to be severely restricted (unfavorable).

Key Terrain. Key terrain is any locality or area that affords a marked advantage to whichever combatant seizes, retains, or controls it. It is not necessarily the highest hill in the area. It could be a piece of high ground where a force can overlook low ground, a major road junction, or even a river or stream crossing site. Key terrain can be controlled by fire, obstacles, or the relative positioning of friendly forces. It is often selected for

Table A-5. Unrestricted terrain

Terrain	Unrestricted Criteria
Built-up areas	None
Hydrology	Rivers and streams are fordable along their length
Slope	30% or less
Vegetation	Trees less than 2" thick with 20 ft or more between them
Elevation	Variations from 0 to 100 meters per kilometer
Obstacles	None
Roads and trails	2 or more hard-surfaced roads per kilometer*
* Slope has priority over roads. Roads negate vegetation unless obstacles are used.	

Table A-6. Restricted terrain

Terrain	Restricted Criteria
Built-up areas	None
Hydrology	Rivers, streams, lakes, and flooded areas that can be forded at several places
Slope	30% to 45% uphill
Vegetation	Trees 2" thick with less than 20-ft intervals (mounted forces only)
Elevation	Variations from 100 to 200 meters per kilometer
Obstacles	None
Roads and trails	1 hard-surfaced road or 2 trails per kilometer*
* Except in open areas. Mounted forces only. Roads negate vegetation unless obstacles are used.	

battle positions or objectives, Some examples of key terrain are—

- Terrain which gives good observation over AAs.
- Terrain which permits the defenders to cover obstacles by fire.
- Important road junctions which affect the use of reserves, sustainment, or LOC.

AAs. Understanding AAs is the basis of military terrain analysis. The engineer should identify enemy battalion and regimental avenues and friendly company- and platoon-sized AAs. These approaches contain mobility corridors and cross compartments. AA analysis also offers potential EAs. The intersection of two or more AAs delineates a potential EA.

Table A-7. Severely restricted terrain

Terrain	Severely Restricted Criteria
Built-up areas	Wider than 500 meters or cannot be easily bypassed by mounted forces
Hydrology	Rivers, streams, lakes, swamps, and bogs that cannot be forded or spanned by an AVLB and that are not frozen. Hard, vertical banks higher than 4 feet will stop tanks as will streams more that 4 feet deep.
Slope	Slopes of 45% or greater uphill.
Vegetation	Trees, 6 to 8" thick and with less that 20-foot intervals (mounted forces only).
Elevation	Terrain with elevation variation of 200 to 400 meters per kilometer.
Obstacles	Minefields, tank ditches, tree blow down, and barriers (may be directional).
Roads and trails	One trail per kilometer and no hard-surfaced roads except in open area (mechanized or armored forces only).

Mobility corridors are areas within AAs that permit movement and maneuver. These are mostly open areas with good routes for rapid movement and mutual support. When existing or tactical obstacles cross an AA, they form lines of resistance called cross compartments. Table A-8 depicts the frontages that determine the size of the unit that can deploy along each mobility corridor.

Table A-8. Frontage

Unit Size	Frontage
Regiment/brigade	2,000 to 3,000 meters
Battalion	1,000 to 1,500 meters
Company	500 to 1,000 meters
Platoon	100 to 200 meters

Evaluate the Threat

Threat evaluation is the doctrinal capability of the enemy. The engineer analyzes the enemy's capability to fight as well as his engineer- specific capability. The enemy's capability to build obstacles and fortifications and how he doctrinally employs these capabilities are detailed and included in the intelligence estimate. Enemy weapons capability and how the enemy integrates obstacles into his defenses, fortifies defensive positions, and breaches obstacles are examples of engineer threat evaluation. The goal of threat evaluation is the development of a doctrinal enemy engineer template that shows how the engineer forces will be used and their capability in an unconstrained manner. Figure A-1, page A-8, shows an example of an MRC doctrinal template with obstacles. Figure A-2, page A-8, shows a typical MRB march formation.

Engineer threat evaluation should provide the TF S2 with the number of obstacles that the enemy can build (by type), the amount of fortification he is capable of, and how many breaches the enemy can complete given his equipment and doctrine. The engineer must

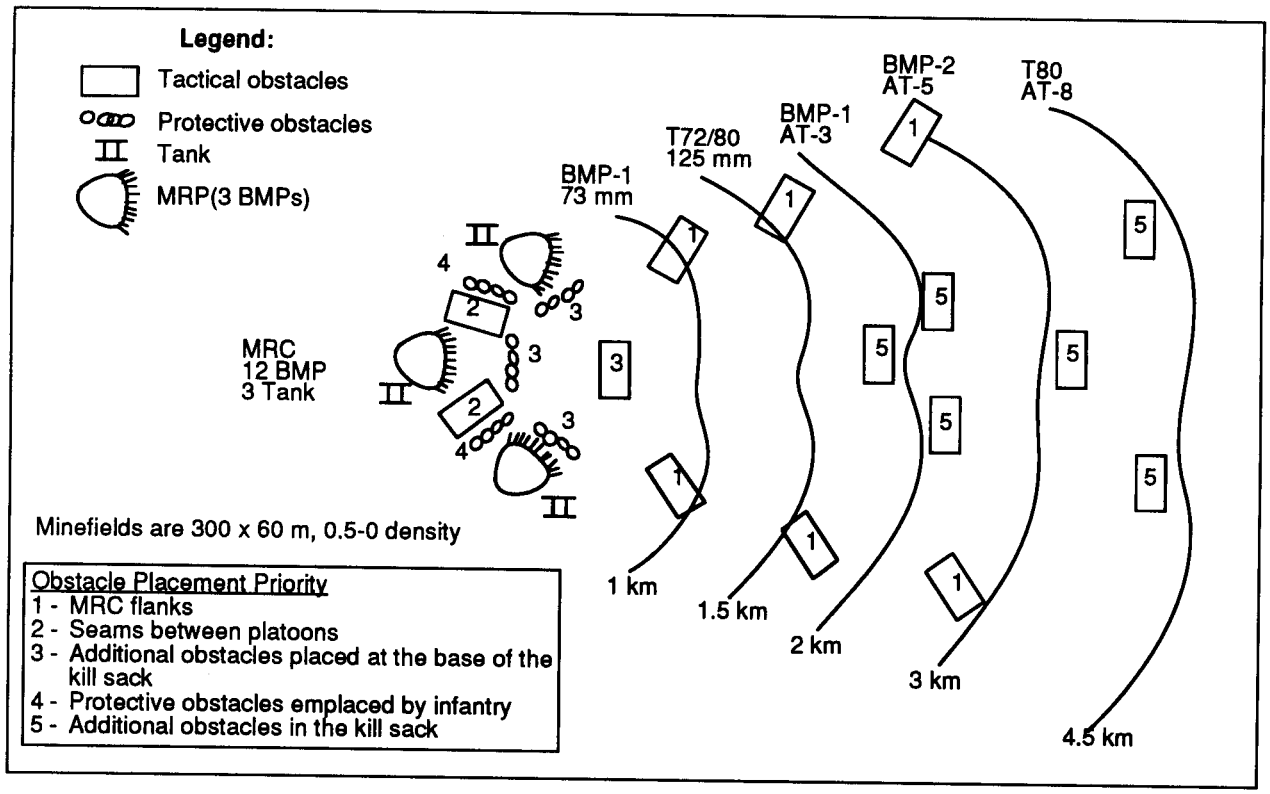


Figure A-1. MRC doctrinal template with obstacles

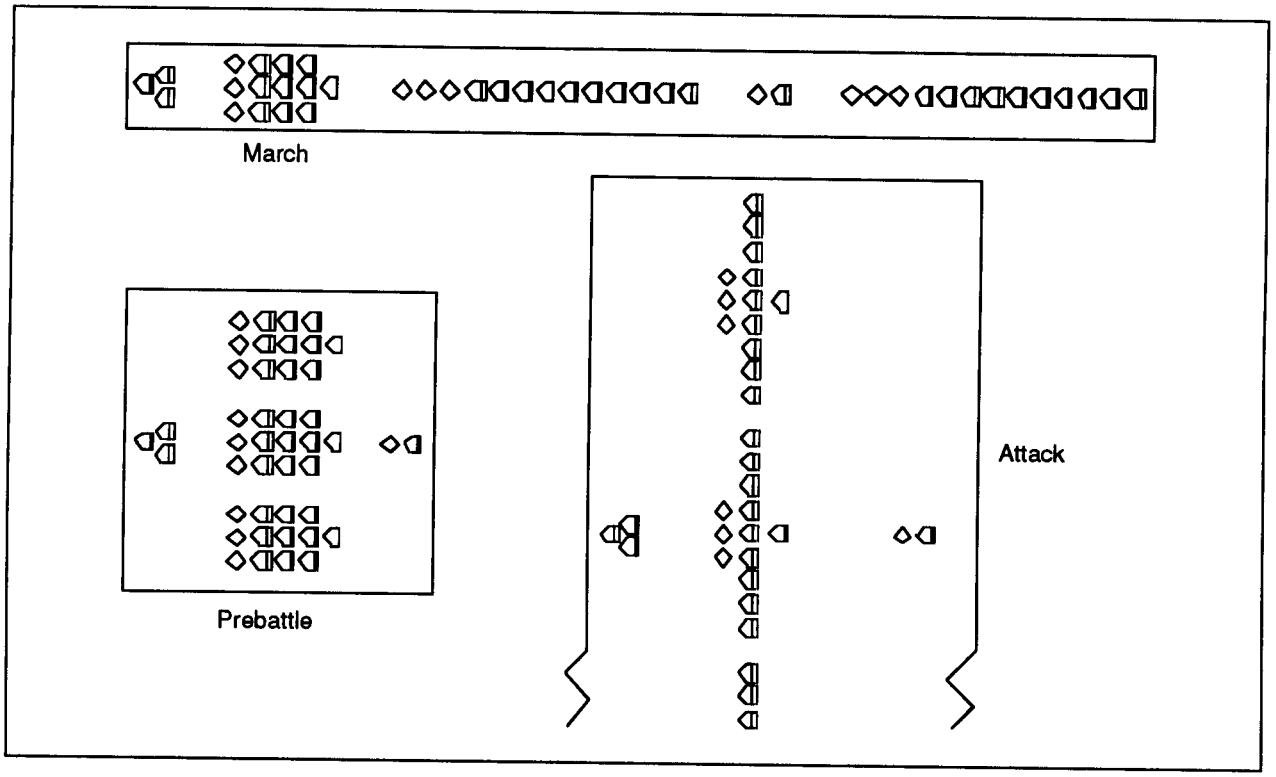


Figure A-2. Typical MRB march formation

ensure that these analyses are incorporated into the TF's SITEMP.

Determine Threat Courses of Action

The engineer, along with the TF S2, combines the doctrinal enemy template, the terrain analysis, and the other battlefield effects to gain an appreciation of how the enemy will use the terrain to fight. During this process, the enemy engineer capability (obstacles and fortifications) is graphically portrayed on the SITEMP. The engineer analyzes where the enemy has fortified positions, obstacles, potential counterattack routes, and so forth. The ultimate outcome of the threat integration is the SITEMP.

Threat analysis and integration are also major components of the IPB. Enemy mission and engineer capability are subcomponents of the threat-analysis and -integration process. The engineer supports the intelligence officer during the threat evaluation by focusing on the enemy's mission as it relates to enemy engineer capability. When executing this component of the EBA, the engineer must first understand the enemy's anticipated mission (attack or defend) and consider how enemy engineers will be doctrinally employed. He then develops an estimate of the enemy engineer capabilities. To do this, he uses the S2's order of battle and knowledge of enemy engineer organizations and other assets (such as combat vehicle self-entrenching capabilities) that may impact engineer operations. The engineer must also consider confirmed intelligence pertaining to recent enemy engineer activities.

The engineer then uses the S2's SITEMP and the enemy-capability estimate to plot the enemy's engineer effort and its location. Coordinating with the S2, the engineer recommends PIR and the engineer force necessary to augment the reconnaissance effort. Enemy engineer activities must be organic to the total combined-arms R&S plan. Table A-2, page A-2, contains a quick summary on enemy mission and engineer-capability analysis.

In the defense, the engineer plots the—

- Enemy's mobility capabilities and location in the enemy's formation.
- Enemy's use of SCATMINEs.
- Enemy engineers that support the reconnaissance effort.
- HVT recommendations (such as bridging assets, breaching assets, and SCATMINE delivery systems).
- Enemy's countermobility and survivability capabilities in a transition to a defense.

In the offense, the engineer plots the enemy's—

- Tactical and protective obstacle effort,
- Use of SCATMINEs.
- Survivability and fortification efforts.

ENGINEER BATTLEFIELD ASSESSMENT

At this point, the engineer has completed his IPB. He can now finish the EBA by analyzing the capability of the engineer company to support the TF.

The third component of the EBA estimates the friendly engineer capability and its impact on mission accomplishment. To perform this function, the engineer uses the information he developed in the first step of the engineer estimate (receive the mission).

Knowing the type of operation, the engineer quickly prioritizes the development of capability estimates. He considers engineer forces task-organized to his supported unit as well as the assets that other members of the combined-arms team have (such as mine plows) to determine the assets that are available. Assets under the control of the higher engineer headquarters and adjacent engineer units should be noted for future reference in the event a lack of assets is identified during SOEO development.

Having determined the assets available and having already estimated and refined the time available with the S3, the engineer uses standard planning factors or known unit work rates to determine the total engineer capability. For example, in the offense, the engineer would focus first on the amount of breaching equipment (AVLBs, MICLICs, ACES, engineer platoons, and CEVs) available and translate that into breaching lanes. In the defense, the engineer would determine the number of minefield, hull- or turret-defilade positions, and tank ditches that he could construct with available resources. He uses the results of his capability estimates during the SOEO development. Table A-2, page A-2, contains an outline of this analysis.

The engineer combines his analyses of the terrain, enemy capability, and friendly capability to form facts and assumptions about the following:

- Likely enemy engineer effort and the most probable enemy COA.
- Potential enemy vulnerabilities.
- Critical friendly requirements.
- The impact of the above factors on the mission.

The engineers determine their capability to support the TF. The TF engineer and XO analyze the engineer company's capability to emplace obstacles, prepare vehicle fighting positions, breach obstacles, and recommend where the terrain best supports the above.

The availability of key breaching equipment such as the ACE, the CEV, the AVLB, and the M1A1 plows and rollers, are tracked to keep the TF commander apprised of the breaching capability available. During the war-gaming phase of the tactical decision-making process, the engineer normally recommends the placement of TF breaching assets as well as the breaching technique based on the terrain and enemy obstacle threat. He also determines the number of lanes the TF potentially can make. Table A-9 shows the TF's breaching capability.

Likewise, the engineers provide the TF commander with details of the friendly capability to build fortifications and obstacles. Generally, this is done by meters of minefield or the number of obstacles and the number of fighting positions potentially available. These

Table A-9. Breaching capability

	Capability
Vehicle lanes (1 per engineer platoon)	2
Lanes with tank plows (this assumes 3 per tank company)	3
Lanes with line charges	4
17-meter gaps	4
NOTE: The number of tank plows is determined by the number of tank companies per TF.	

estimates are functions of time, equipment, troops, soil conditions, the unit training level and materials available. Table A-10 shows the engineer company's capabilities to create obstacles as well as planning factors for obstacle construction. Table A-11 shows the planning factors for fortification (for comparison, all equipment is available). This table uses the following planning factors:

- 15 hours per day available to actually dig (remaining hours used for movement, maintenance, resupply, reconnaissance, position siting, and coordination).
- ACEs work in teams using 3.5 hours per two-tier vehicle fighting position.
- Dozers work in teams using 2.5 hours per two-tier vehicle fighting position.
- SEEs working individually using 1 hour per crew-served weapons position.
- All crews are assumed to be trained.

Table A-10. Engineer company capabilities

	Capability
Hand-emplaced obstacles	200 meters/hour
AT ditch	50 meters/hour
Volcano minefield	555 meters/15 minutes
GEMSS minefield	500 meters/15 minutes
FASCAM (artillery-delivered)	1 or 2 to plan
NOTE: Hand-emplaced rate is 100 meters per hour per platoon. AT ditch rate with two ACEs, Volcano, and GEMSS is for one load, blocking obstacles.	

Table A-11. Planning factors for fortification

Equipment	24 hr	36 hr	48 hr	60 hr
Dozer (X2)	12	18	24	32
ACE (X7)	12	19	25	32
SEE (X2)	20	40	60	60

ANALYZE THE MISSION

The engineer participates in mission analysis by identifying engineer tasks that are mission critical and have an impact on the overall mission. He identifies engineer tasks from the higher unit's entire OPORD, not just the engineer annex. He must look in numerous places to fully understand the total scheme of maneuver, the commander's intent, and instructions from the higher unit's engineer. The engineer should concentrate on the following portions of the OPORD as he receives and identifies the engineer mission:

- Mission (paragraph 2).
- Commander's intent (two levels up) (paragraphs 1b and 3).
- Scheme of maneuver (paragraph 3).
- SOEO (paragraph 3).
- Subunit instructions (paragraph 3).
- Coordinating instructions (paragraph 3).
- Service support (paragraph 4).
- Command and signal (paragraph 5).
- Engineer annex.

Mission analysis has several components. The engineer focuses on engineer capabilities within each component. These capabilities are—

- Specified tasks.
- Implied tasks.

- Assets available.
- Limitations (constraints and restrictions).
- Risk.
- Time analysis.
- Essential tasks.
- Restated mission.

SPECIFIED TASKS

Specified tasks are those derived directly from the WO, OPORD, or commander's intent. Examples include obstacle zones, obstacle belts with intents, the required number of breaching lanes, and the type of breach designated by the higher commander.

IMPLIED TASKS

Implied tasks are developed by analyzing the mission in conjunction with the facts and assumptions developed earlier. For example, obstacle-handover coordination during a relief-in-place mission, if not specified, is an implied task. A classic example of an implied task is identifying and planning a river-crossing operation to support an attack to seize an objective if a river crossing is necessary to accomplish the mission but is not specified in the higher OPORD.

ASSETS AVAILABLE

The engineer should have already identified the available engineer assets in the EBA. He should also examine the total force structure of the combined-arms team. This will help him as he develops the SOEO. For instance, the amount of firepower available may help to determine whether the force should conduct an in-stride versus a deliberate breach.

LIMITATIONS

Constraints are those specified tasks that limit freedom of action. Designated reserve targets, obstacle belts (with intents), and breach-lane requirements are examples of constraints the engineer must consider in his mission analysis. Restrictions are limitations placed on the commander that prohibit the command from doing something. Therefore, they impact greatly on the COA development. Obstacle zones and belts are excellent examples of restrictions because they limit the area in which tactical obstacles can be placed.

RISK

A commander might specify a risk he is willing to accept to accomplish the mission. For instance, the priority obstacle effort in a defense may be employed on the most likely enemy AA while situational obstacles are to be planned on the most dangerous AA as an economy-of-force measure. The engineer must understand how a risk involving an engineer capability will specifically impact on combined-arms operations and advise the commander accordingly.

TIME ANALYSIS

The engineer must ensure that engineer operations are included in the combined arms time analysis. First, he determines the actual total time available. While preparing the friendly capabilities portion of the EBA, he established a fact or assumption of the time available. He now refines this time analysis. A good tool to use in this process is a basic time-line sketch that includes such items as the—

- Supported unit's OPORD.
- Engineer unit OPORD.
- Movement times.
- LD or prepare-to-defend times.
- Rehearsals.
- Hours of darkness or limited visibility.

This technique assists the engineer in accurately refining the estimate of the amount of time actually available and adjusting the friendly engineer capability accordingly.

ESSENTIAL TASKS

Specified and implied tasks that are critical to mission success are identified as essential tasks. The engineer focuses the development of his plans, staff coordination, and resource allocation on the essential tasks. The engineer does not ignore the other specified and implied tasks, but his planning centers on the essential tasks.

RESTATED MISSION

The restated mission follows the same format as any mission statement. The who, what, where, and why are based on the mission analysis. The restated mission must clearly articulate the engineer's task and purpose during the operation.

DEVELOP THE SCHEME OF ENGINEER OPERATIONS

The engineer needs to receive planning guidance to tailor his SOEO. The amount of guidance required is based on the experience of the engineer and the maneuver commander, the time available, whether habitual relationships between the engineer and maneuver units have been established, and SOPs. Some areas in which the engineer might require guidance are—

- Situational obstacle planning.
- The use of digging assets (survivability versus countermobility).
- The use of maneuver forces in the obstacle effort.
- Risk acceptance of M/S tasks.
- Interpretations of the higher commander's intent pertaining to M/S.

COA development centers on employing maneuver forces. However, the engineer assists in the process by considering the impact engineer operations have on maneuver. The engineer must participate in order to tailor the SOEO for each COA. He develops an SOEO for each maneuver COA. He does not develop complete plans, just his concept. It is developed using the same steps as the maneuver COA but without the detailed force allocation. If time permits, the engineer may begin working on the details for each plan (see Table A-12).

ANALYZE RELATIVE COMBAT POWER

The engineer compares the anticipated enemy engineer capability with the friendly engineer capability needed to defeat it. For example, in the offense, the engineer considers the enemy doctrinal norms, confirmed intelligence, recent activities, and the time

Table A-12. SOEO development

Development Process
Analyze relative combat power.
Identify engineer missions and allocate forces/assets.
Develop an SOEO.
Balance assets available with support requirements.
Integrate into the maneuver COA.

the enemy has to prepare and then determines if the friendly engineer capability is sufficient to overcome the enemy capability. Likewise, in the defense, he looks at enemy breaching capability and where and when he expects that capability to be employed. Then he determines what obstacle effect will defeat it and what assets are available to ensure success.

IDENTIFY ENGINEER MISSIONS AND ALLOCATE FORCES

Based on the maneuver COA, situation analysis, mission analysis, and commander's intent, the engineer assesses the engineer requirements. This is the most important step in developing an SOEO.

DEVELOP A SCHEME OF ENGINEER OPERATIONS

The SOEO focuses on how the engineer effort integrates into and supports the maneuver COA. Like the maneuver COA, the SOEO is generic without a specific engineer force allocation or unit designation. It must address all phases of the operation, particularly where engineer priorities must change to support the maneuver.

BALANCE ASSETS AGAINST SUPPORT REQUIREMENTS

The engineer reviews his SOEO in light of the assets he has available (using his EBA product). Hasty estimate tools (such as belt planning factors, blade-hour estimates, and breach-lane requirements) are used to quickly assess whether adequate assets are available to support the plan. All shortfalls are noted and the SOEO is refined, if necessary. The SOEO is refined by—

- Shifting assets to the main effort.
- Shifting priorities with the phases of the operation.
- Recommending to the commander where to accept risk.
- Requesting additional assets.

INTEGRATE INTO THE MANEUVER COURSE OF ACTION

The engineer prepares a statement describing the SOEO. This statement addresses how engineer efforts support the maneuver COA. He integrates the necessary graphics to illustrate this tentative engineer plan (for example, breaching control measures and obstacle graphics and intents).

WAR-GAME AND REFINE THE ENGINEER PLAN

Staff analysis identifies the best COA for recommendations to the commander. War-gaming techniques are used to analyze the COAs. War gaming is a systematic visualization of enemy actions and reactions to each friendly COA. The engineer participates in war gaming to ensure that the SOEO supports the maneuver plan and is integrated with the other staff elements; to further identify weaknesses in his plan and make adjustments, if necessary; and to ensure that the S2 integrates enemy engineer assets and actions as he plays the enemy force. There are three techniques for war gaming: avenue in depth, belt, and box (see Table A-13).

After each COA is independently war-gamed, the results are compared. The goal of comparing COAs is to analyze the advantages and disadvantages of a COA relative to the other plans. Each COA is compared to the others using specific evaluation criteria. These evaluation criteria may be developed by the staff or may be directed to the staff by the commander during his planning guidance.

The engineer compares COAs in terms of which SOEO best supports mission accomplishment. His comparison is only part of the total comparison by the staff.

Table A-13. War-gaming techniques

Technique	Description
Avenue in depth	This technique concentrates on one AA from start to finish. It is equally applicable to offensive and defensive operations. It allows the engineer to war-game the analyzed impact of enemy obstacles on the attack plan and the effects of sequential obstacle belts or groups for the defensive plan.
Belt	The belt technique divides the battlefield into areas that run the width of the sector, war-gaming across the front and multiple avenues at once. This is the preferred technique. It allows the engineer to war-game the mutual support between obstacle belts and groups. It is the best method for analyzing mutual support and adjacent engineer support.
Box	This technique focuses solely on critical enemy or friendly events in a designated area (box). The advantage of this method is that it is not time-consuming. It allows the engineer to focus on a particular breaching site or EA.

RECOMMEND A COURSE OF ACTION

The objective of the comparison is to make a unified recommendation to the commander on which COA is best. The engineer may have to give greater consideration to a COA that he can least support if it looks like it is the best selection from the other staff perspectives. He must be prepared to inform the maneuver commander where risk must be accepted or what additional assets he will need to avoid that risk. The engineer must also be prepared to inform the maneuver commander where those assets may be obtained and what influence the commander may have to exert to get them. This is where knowledge of the higher and adjacent unit's engineer assets becomes important.

Based on the staffs recommendations, the commander makes a decision on which COA to adopt for final planning. He may select a specific COA, modify a COA, or combine parts of several COAs. In any event, the commander decides and issues to the staff additional guidance for developing the plan. This guidance concentrates on synchronizing the fight, focusing on integrating the TF combat support into the plan.

FINALIZE THE ENGINEER PLAN AND ISSUE ORDERS

The engineer focuses his planning efforts on the SOEO for the selected maneuver COA, The engineer determines the C^2 necessary to accomplish the engineer missions (see Chapter 2 for additional information). The SOEO is fine-tuned based on the war-gaming process, commander's guidance, and situation updates. As the engineer fills in the details of his plan, he refers back to his initial mission analysis to ensure that all missions have been taken into account. He ensures that all engineer tasks are assigned to maneuver and engineer units as part of the subunit instructions. He makes final coordination with other staff members to ensure total integration and mutual support.

The engineer conveys his written plan through his input in the basic OPORD (SOEO, subunit instructions, and coordinating instructions paragraphs) and the engineer annex (see Appendix B). As part of the combined-arms staff, the engineer also participates in the OPORD brief to the assembled command group. As with the other primary staff officers, the engineer gets only one chance to brief the command group on

the SOEO. This is the first step in a properly executed and well-coordinated engineer plan.

The engineer's focus is to brief the subordinate commanders; the maneuver commander and staff should already know the plan. Time is always critical; repeating information covered by other staff members should be avoided, and only critical items should be covered (including SOP items). Above all, the engineer should be thoroughly familiar with the total plan so that he is comfortable fielding questions.

19 December 97

FM 5-71-2 – Appendix B has been replaced by Change 1

APPENDIX C

PRECOMBAT INSPECTION CHECKLIST

A company that has a well-established system of checks and inspections will consistently perform to standard. The engineer leader must establish checks and inspections that support the unit's mission-essential task list (METL). Once established, the engineer leader must ensure that the checks and inspections are performed before and after combat operations. Checks and inspections fall into the following categories: precombat checks, precombat inspections, postcombat checks, and postcombat inspections.

PRECOMBAT CHECKS

Precombat checks aid the leader in preparing his unit for combat. These include checks for individuals, vehicles, weapons, and equipment. While these checklists are generic, they can be easily tailored to fit a unit's specific needs. Leaders at all levels use these checklists in their planning and in preparing instructions to their subordinate leaders.

PRECOMBAT INSPECTIONS

Precombat inspections validate that the precombat checks have been performed. The leader must plan his time and that of his unit's to ensure that inspections are performed. Time must also be available for corrective actions should an individual or item fail the inspection. The leader cannot delegate this responsibility; he must be the inspector. This demands that he be competent in the maintenance and care of all of his unit's equipment. The standards he sets will determine the unit's ability to perform in combat.

POSTCOMBAT CHECKS

Postcombat checks are identical in form to precombat checks but differ in substance. Checks are still performed on individuals, vehicles, weapons, and equipment; however, the focus changes to repairing and refitting these items to a reusable condition. Expendable items may need replenishing and lost items require replacing. Units replace their basic-load items and ensure that equipment has its full complement of POL. Damaged and nonoperational equipment is evacuated for repair. Individual needs must also be attended to—soldiers require rest and refitting and medical problems must be attended to—as well as morale problems.

POSTCOMBAT INSPECTIONS

In the same way that precombat inspections are performed, postcombat inspections must be planned and conducted by the leaders. Since postcombat operations are heavily maintenance-oriented, the leader should seek the aid of his vehicle, communications, and supply personnel to assist him in conducting his inspections. They are capable of making immediate repairs and also serve as expert advisers. Inspections must focus on serviceability. Vehicles and equipment must be operated to

standard. A check of all radios requires that a net station be positioned at a distance consistent with combat conditions. It does a unit no good to be able to talk only in an assembly area. Sufficient time must be allocated to perform these inspections as it is necessary to pay strict attention to detail. An inspection which checks only one of every three weapons ensures that the unit is only one-third operable. A 100 percent inspection must be made of everything.

Table C-1 provides an example of a precombat inspection. The commander can rotate the inspectors' responsibilities to train his officers and provide as thorough an inspection as possible.

Table C-1. Sample precombat inspection

Vehicle preparations	• Loaded according to the load plan • Vehicle refueled • Water cans full, Class I stowed • Equipment cleaned and stowed • First-aid kit/combat-lifesaver bag complete and stowed • Vehicle dispatched, TM present, vehicle tool kit stowed • Basic load of ammunition stowed
Communications equipment	• Radios operational, mounted and secured, connections and receptacles cleaned and frequencies set • Antenna matching unit(s) operational • COMSEC equipment operational • Telephones operational and stowed • OE-254 complete, operational, and stowed • All required nets entered and monitored
NBC	• M11 decon apparatus mounted and operational • Hasty decon kit with DS-2 and nitrogen bottles stowed • Automatic chemical alarm operational and mounted • M256 kits stowed
Optics	• Night-vision devices and binoculars cleaned, operational, and stowed
Maintenance	• Preventive maintenance checks and services conducted on all equipment • DA Form 2404(s) completed on all equipment
Armaments	• All weapons cleaned and test-fired

C-2 Precombat Inspection Checklist

APPENDIX D

ENGINEER COMPANY WORKING SEPARATE FROM ENGINEER BATTALION

Certain circumstances can cause the detachment of one or more companies for an extended period of time (when the company is with a deploying TF, with a TF attached to another brigade, or used to augment another engineer battalion [light or heavy]). This type of task organization is often found during contingency operations.

PLANNING

The company will be supported with a service-support slice from the engineer battalion headquarters company. The normal command relationship for the support slice is attached to the engineer company. This slice should be tailored to support the type of operation that the company participates in. At a minimum, it should include the personnel and equipment listed in Table D-1.

The engineer company must have the capability to stand alone under these circumstances. During contingency operations, the engineer company could be called on to support any number of operations. These include constructing refugee camps and EPW compounds, performing humanitarian missions, destroying captured enemy equipment, clearing areas of UXO, developing combat roads and trails, and constructing base camps to support follow-on contingency forces.

The engineer company could also have additional attachments based on its mission requirements. These include, but are not limited to—

- Infantry or armored platoons for security.
- Vertical or horizontal construction elements.
- Water-purification units.
- Military police (MP) sections.
- EOD units.

Table D-1. Support personnel and equipment

Maintenance	POL	Combat Health Support	Mess
1 maintenance NCOIC 6 mechanics 1 PLL clerk 1 M88 1 contact truck 1 ULLS computer PLL to support OPTEMPO	1 fuel handler 1 HEMMT fuel truck	1 senior aidman with evacuation team 1 ambulance	1 senior cook with mess team 1 vehicle with MKT or KcLFF

These forces could also be coalition multinational forces in contingency operations. The engineer commander must ensure that he has the capability to support these varied units to achieve his mission. In many cases, the company may also be augmented by civil-affairs personnel and military translators to facilitate operations in the AO.

PREPARATION

For extended operations, the company is normally attached to the supported TF. The TF commander has to fully integrate the engineer company into all planning sessions, rehearsals, and administrative actions. After attachment, the engineer company commander ensures that the gaining TF commander understands the capabilities, limitations, and requirements associated with the engineer company. The engineer commander and the TF commander coordinate the linkup point, linkup time, and the size of the force (personnel and equipment) being transferred.

EXECUTION

The detached company is responsible for maintaining communications with the engineer battalion, where possible. The company reports equipment, personnel, and mission status according to unit SOPs. Although the engineer battalion commander has no tasking, command authority, or OPCON over the detached company, he must anticipate reattachment and be prepared to refit or rearm the company as needed.

APPENDIX E

BASIC FORMATIONS AND MOVEMENT TECHNIQUES

The company uses a variety of mounted and dismounted formations and movement techniques to maneuver on the battlefield. This appendix gives examples of many of the basic formations and movement techniques the company commander could use. It is not designed to be all encompassing. For more information on these topics, see FMs 7-8, 5-34, and 71-1.

MOUNTED MOVEMENT TECHNIQUES

The mounted engineer company must be proficient in moving with its maneuver counterpart. In the following paragraphs, formations, movement techniques, and actions taken during movement for the mounted engineer company are discussed.

WEDGE

The engineer company almost always maneuvers as part of another larger formation. Normally, this will either be the parent engineer battalion or TF. Figure E-1, page E-2, shows the formation that the company is most likely to use. The company wedge provides the most defensible formation with the easiest C^2. Ordinarily, the company follows a maneuver company. The company might lead if it is part of the engineer battalion formation. In either case, the wedge is the best formation to use if enemy contact is likely.

The company will also have organic, and possibly task-organized, support equipment. These could include the ACE, CEV, or tank or infantry platoons from other companies/teams. These additional vehicles can strain the company's C^2 capability. All of the heavy support vehicles are tethered to individual engineer platoons. Each platoon leader has the responsibility of assisting with the C^2 of a heavy equipment asset. This improves the company's C^2 and provides each heavy asset with a security element as it moves across the battlefield. Any vehicles that are not METT-T required to complete a mission will fall under the control of the engineer company XO/1SG.

Figure E-2, page E-3, shows a company wedge formation. Note where the key leaders in the company are. While the platoon sergeant is forward, his M998 should move with the engineer company XO/lSG but be prepared to move forward to support changing mission requirements.

COLUMN

Figure E-3, page E-4, depicts a column formation. This formation is used when enemy contact in not expected. This formation maximizes C^2 and the speed of the formation. Normally, the company transitions from the column to the wedge as enemy contact becomes more likely.

LINE

Figure E-4, page *E-4,* shows the company in a line formation. This formation is designed to maximize the company's forward firepower. The company transitions from the wedge to the line as enemy contact becomes eminent. Engineer companies do not generally use this formation. However, if the company is tasked to suppress a dismounted

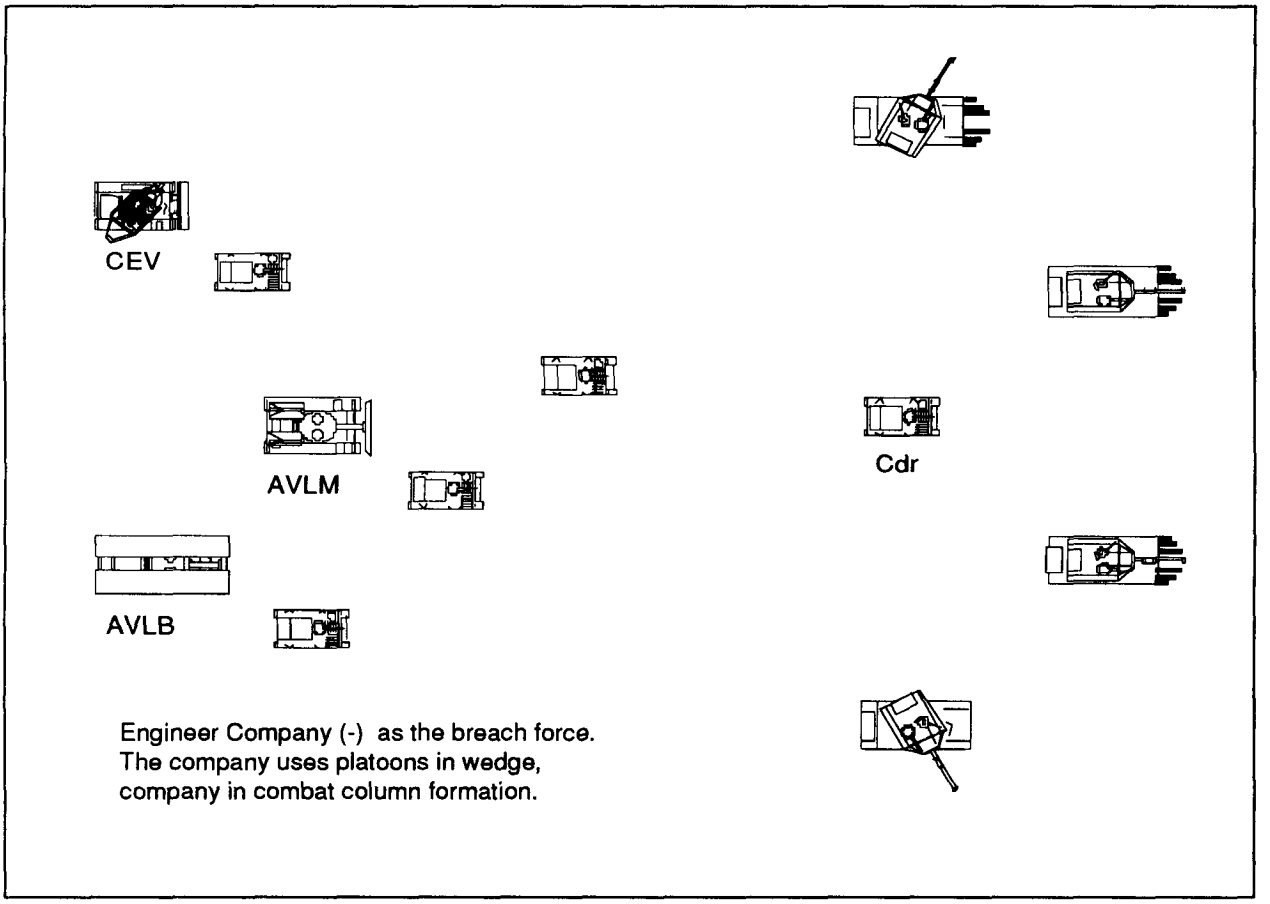


Figure E-1. Engineer company (-) as the breaching force

threat while another company maneuvers, this formation works well.

ECHELON

The echelon formation is used when the company is on the flank of the battalion/TF and the enemy threat is also from the flank. Figure E-5, page E-5, shows an echelon right formation. The echelon formation can also be used on the left flank of the battalion and, in that case, it would be the mirror image of Figure E-5. This formation maximizes the company's firepower to the flank.

V

The V formation is a variation of the wedge. It is used when there is a significant threat of command-detonated mines or explosives. The formation shown in Figure E-6, page E-6, could be used during a route-clearance operation. It allows the company to secure the flanks of the road while a platoon clears the route. This formation also identifies command-detonated-mine firing wires or ambushes before the enemy can attack the element on the route. It is not generally used when there is a significant enemy threat.

DISMOUNTED MOVEMENT TECHNIQUES

The dismounted engineer company must be proficient in moving with its maneuver counterpart. In the following paragraphs, formations, movement techniques, and actions taken during movement for the dismounted engineer company are discussed.

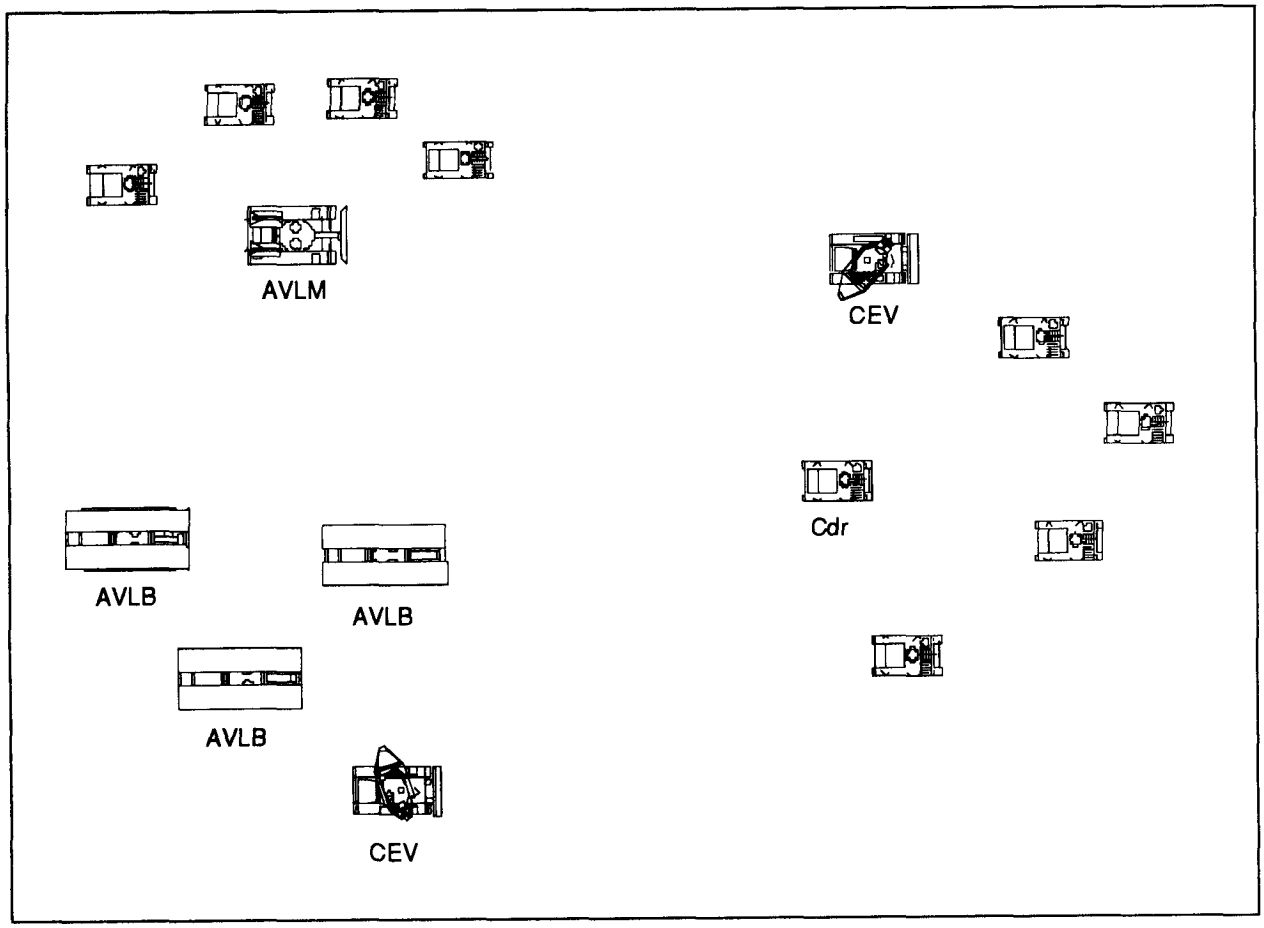


Figure E-2. Engineer company in wedge formation

Company formations are built from multiple platoon formations. These formations include the company column, line, V, and wedge. The company commander selects the best formation based on his METT-T analysis. Table E-1, page E-7, shows a comparison of each formation and its use.

WEDGE

The dismounted wedge is used when the enemy situation is vague and enemy contact is likely (see Figure E-7, page E-8). This formation allows a large volume of fire around the formation. Generally, at least one platoon or element will be free to maneuver from the wedge after contact.

COLUMN

The column formation is the company's primary movement formation (see Figure E-8, page E-9). It provides good dispersion both laterally and in depth and simplifies control. The lead platoon is the base platoon for fire control.

LINE

The line formation allows the delivery of maximum fire to the front but little fire to the flanks (see Figure E-9, page E-10). This formation is hard to control and does not lend itself well to rapid movement. It is the basic company assault formation during an attack.

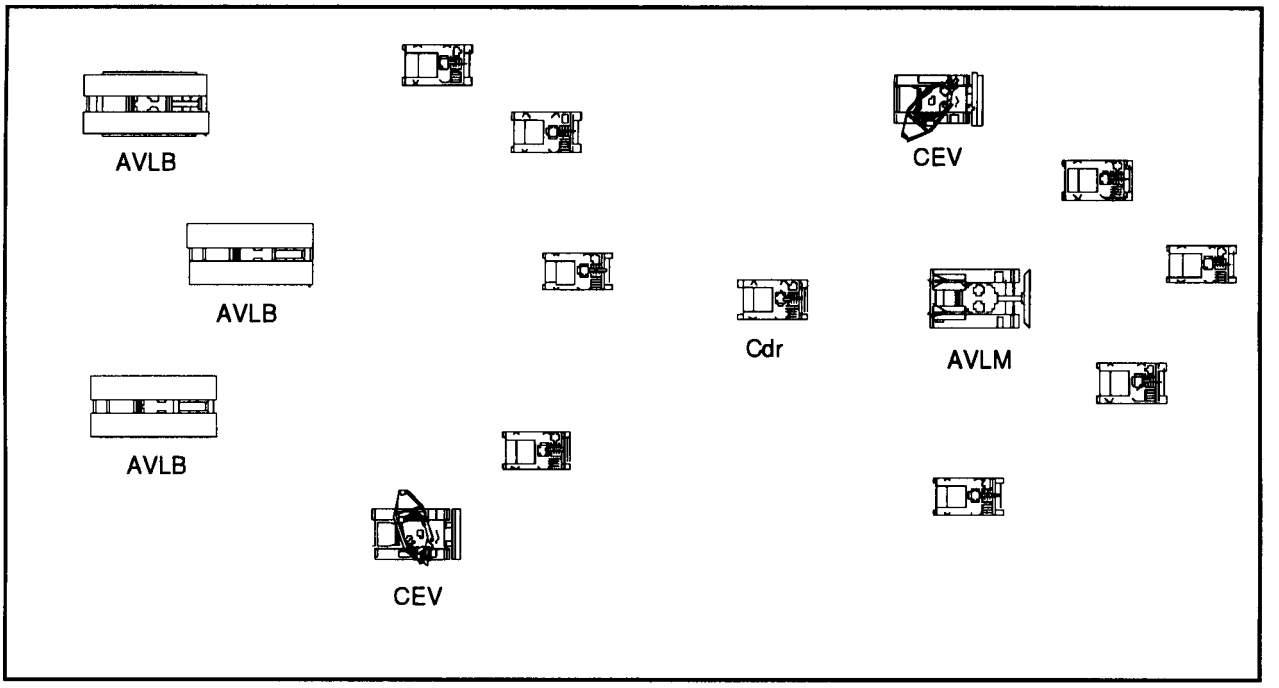


Figure E-3. Engineer company in column formation, platoons in wedge formation

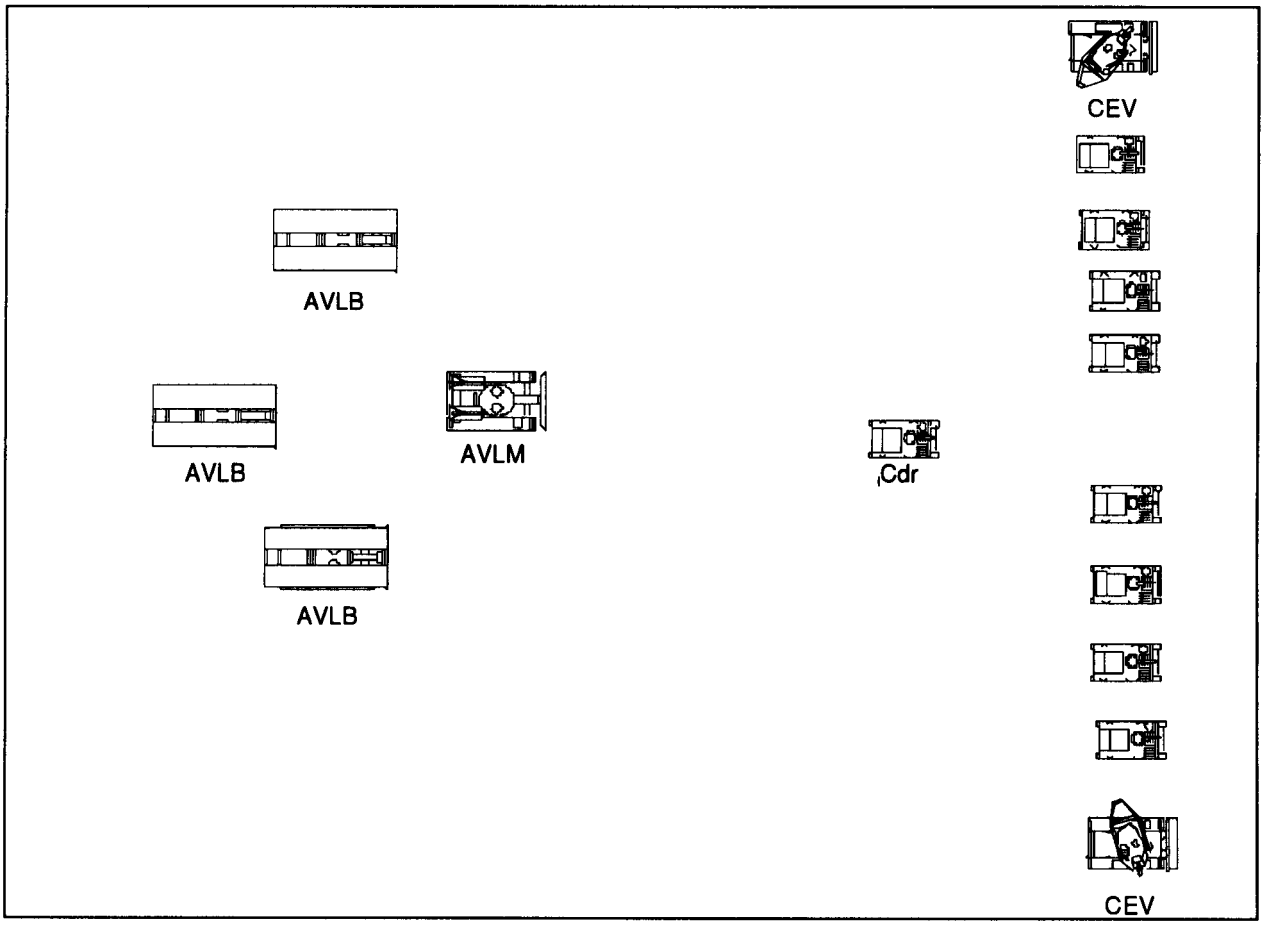


Figure E-4. Engineer company in line formation

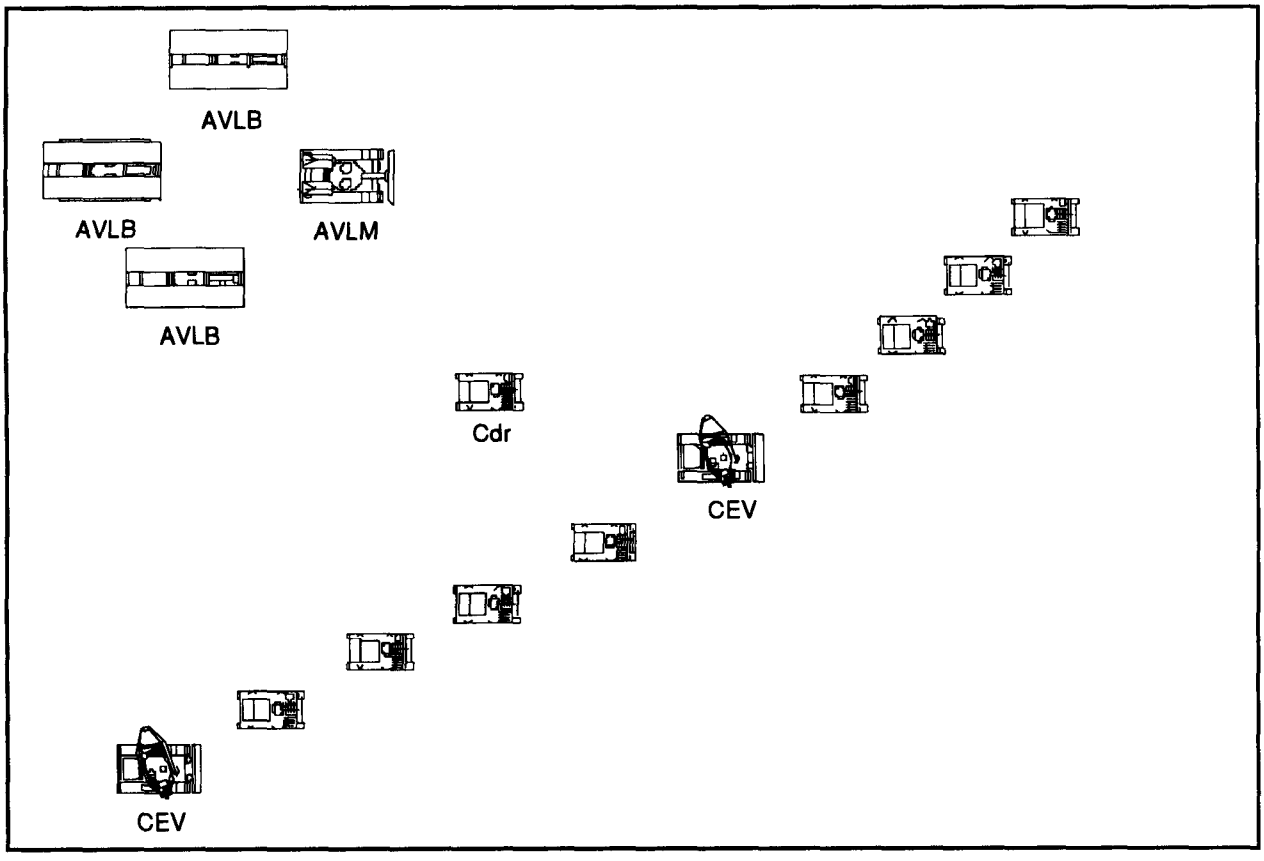


Figure E-5. Engineer company in echelon right formation

V

The V formation has two platoons up front to provide a heavy volume of fire on contact (see Figure E-10, page E-11). It also has one platoon in the rear that can either overwatch or trail the other platoons. This formation is hard to control and movement is slow.

FILE

The file formation gives maximum control to leaders and is used for speed during movement (see Figure E-11, page E-12).

TRAVELING

The dismounted engineer company supporting a maneuver TF normally travels as part of one of the larger maneuver elements. When breaching assets are needed forward with the lead company, the engineer company travels behind the lead company for security (see Figure E-12, page E-13). If each maneuver company needs a breaching capability, the dismounted engineer company can be broken into platoon-sized elements, where each platoon travels with a maneuver company. In this case, the company headquarters travels with either the battalion tactical operations center or the main effort for C^2.

HAND-AND-ARM SIGNALS

During many operations, the company has to use hand-and-arm signals for C^2. See FM 5-10, Appendix A, for these hand-and-arm signals.

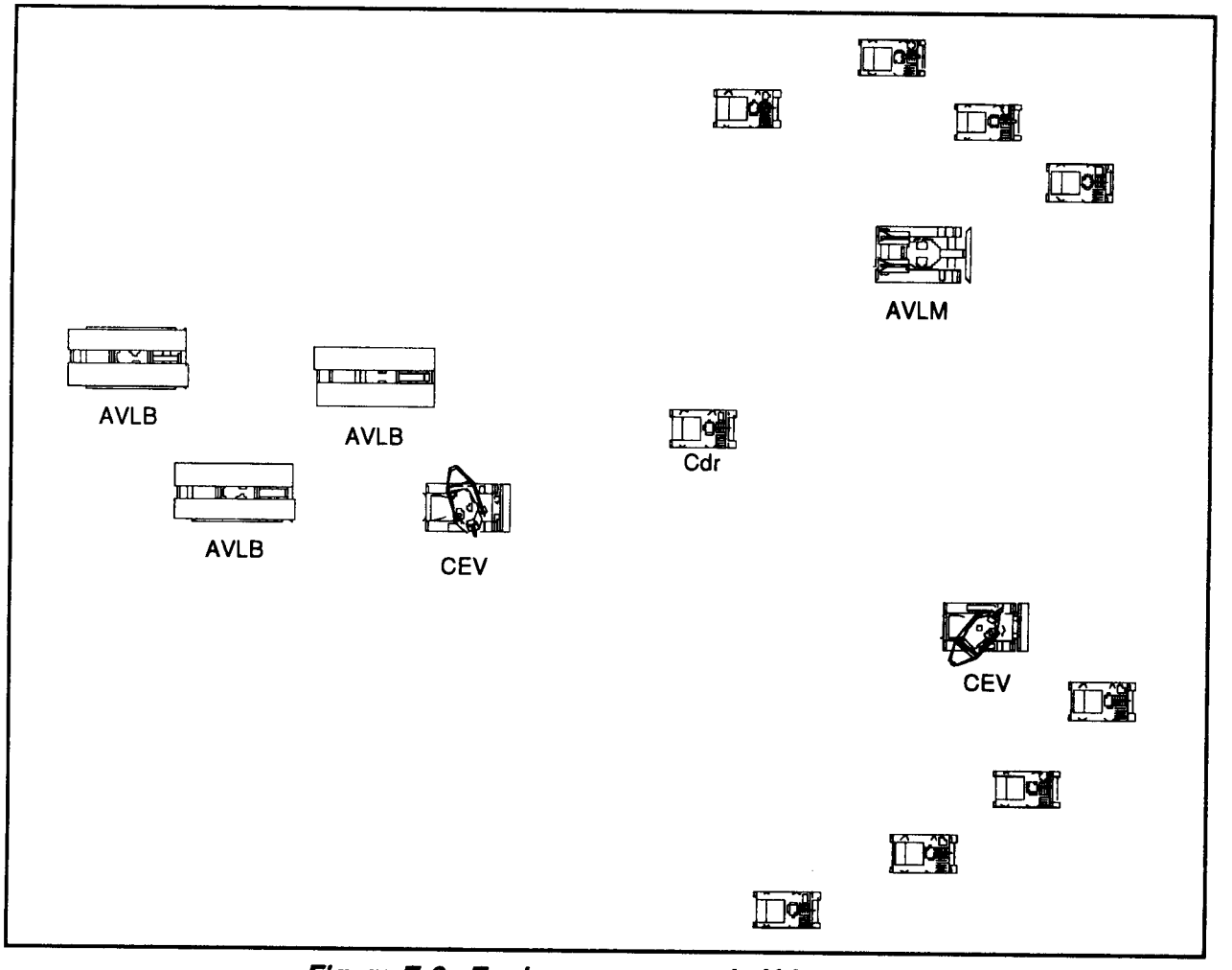
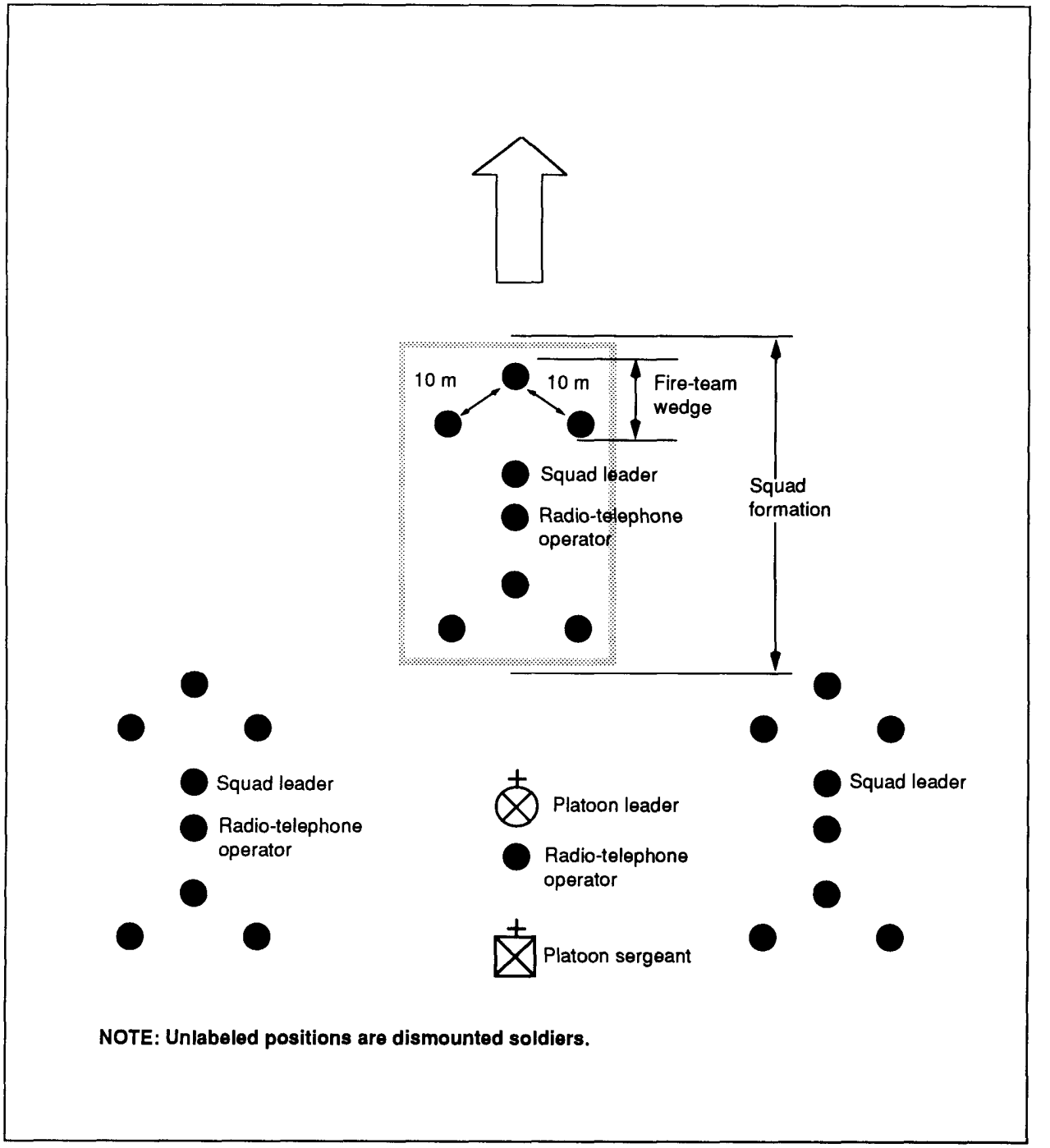


Figure E-6. Engineer company in V formation

Table E-1. Comparison of company formations

Dismounted Movement Formations	Movement Use	Movement Characteristics			
		Control	Flexibility	Fire Capability/Restriction	March Rate
Column	When the company performs primary movement formations	Good for maneuver (fire and movement)	Provides good dispersion laterally and in depth	Allows limited firepower to the front and rear, high volume to the flank	Good
Line	When the enemy situation is unknown and the leader wants all soldiers forward for maximum firepower to the front	Difficult	Is minimal	Allows maximum firepower to the front, little to the flanks and rear	Slow
V	When the enemy situation is vague, but contact is expected from the front	Difficult	Provides two squads up front for immediate firepower and one squad to the rear for movement upon contact from the flank	Allows an immediate heavy volume of firepower to the front or flanks	Slow
Wedge	When the enemy situation is vague, but contact is not expected	Difficult but better than the company V and company line	Enables the leader to make contact with the smallest element and still have two squads to maneuver	Provides a heavy volume of firepower to the front or flanks	Slow but faster than the company V
File	When visibility is poor due to terrain or light	Easiest	Is the most difficult formation from which to maneuver	Allows immediate fires to the flanks; prevents focused fires to the front and rear	Fastest



NOTE: Unlabeled positions are dismounted soldiers.

Figure E-7. Dismounted-platoon wedge formation

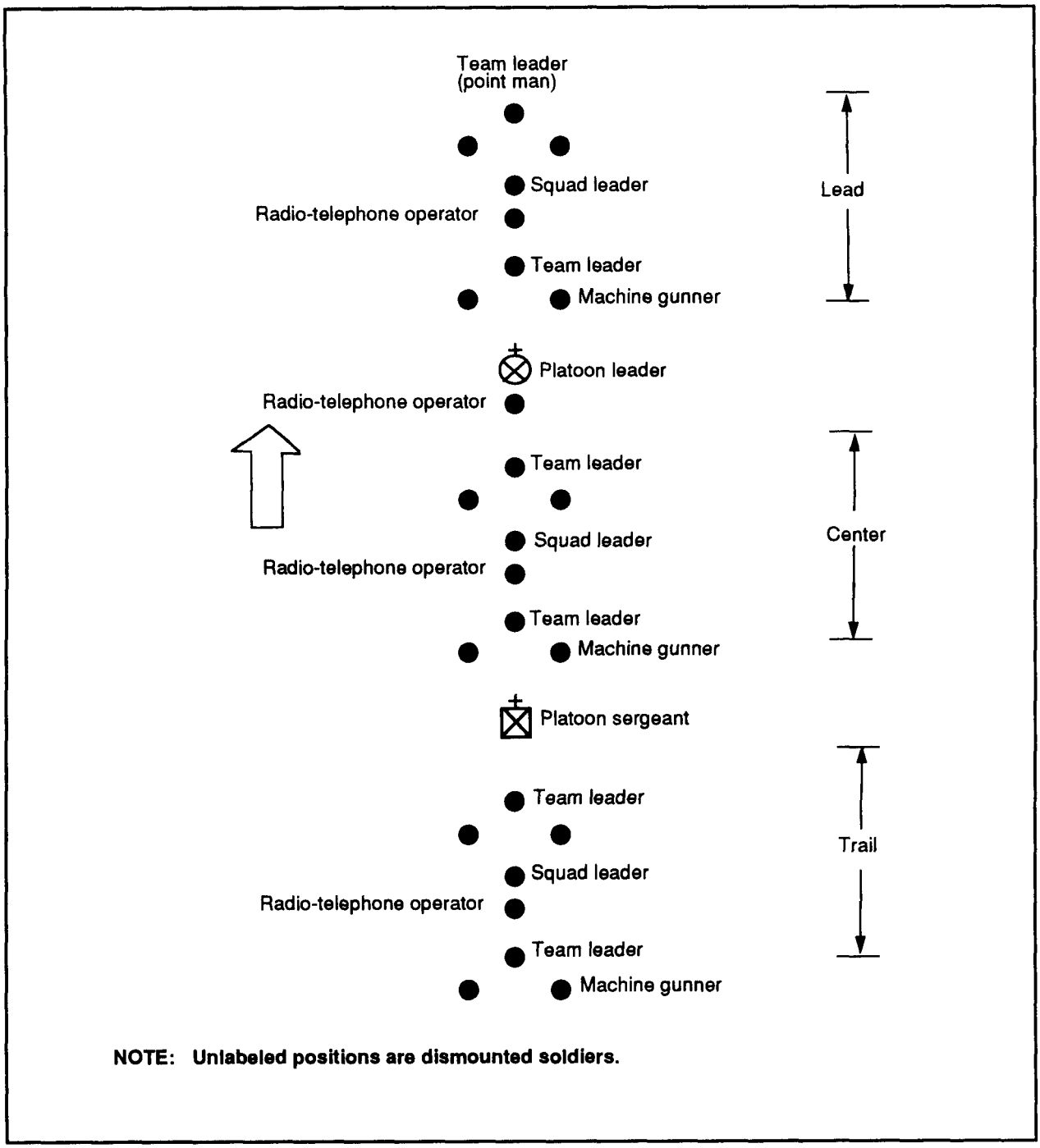


Figure E-8. Dismounted column formation

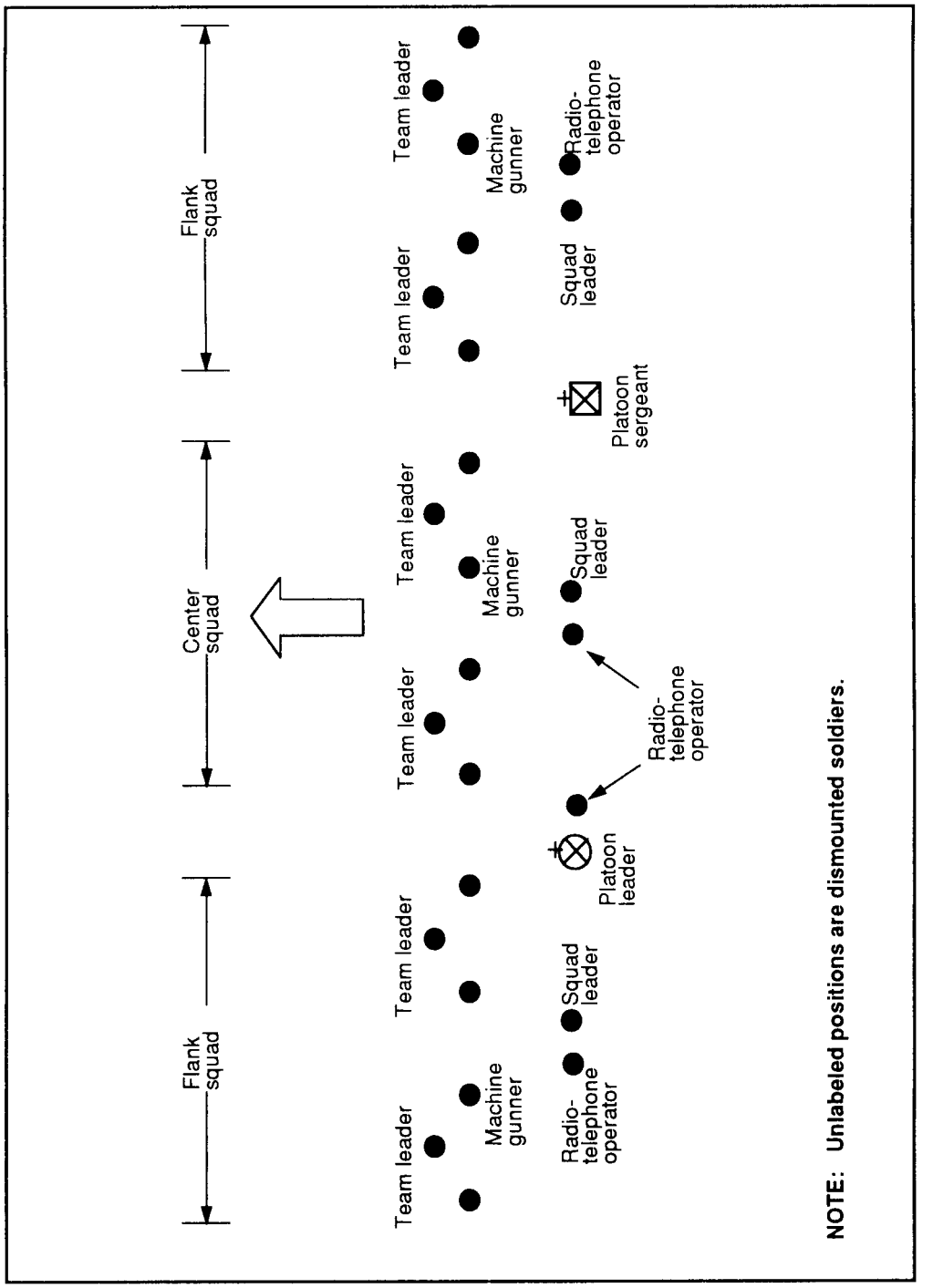


Figure E-9. Dismounted line formation

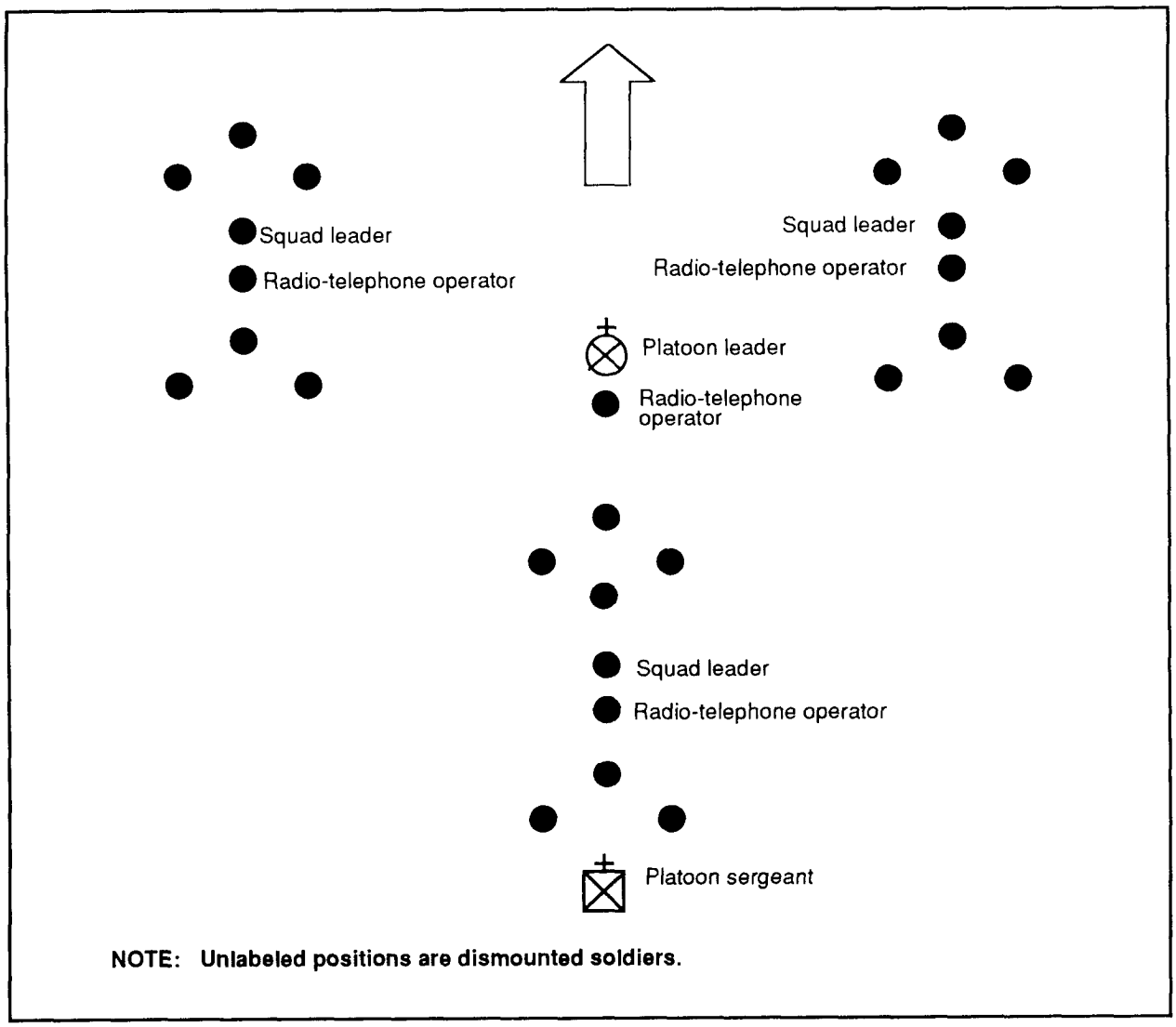


Figure E-10. Dismounted V formation

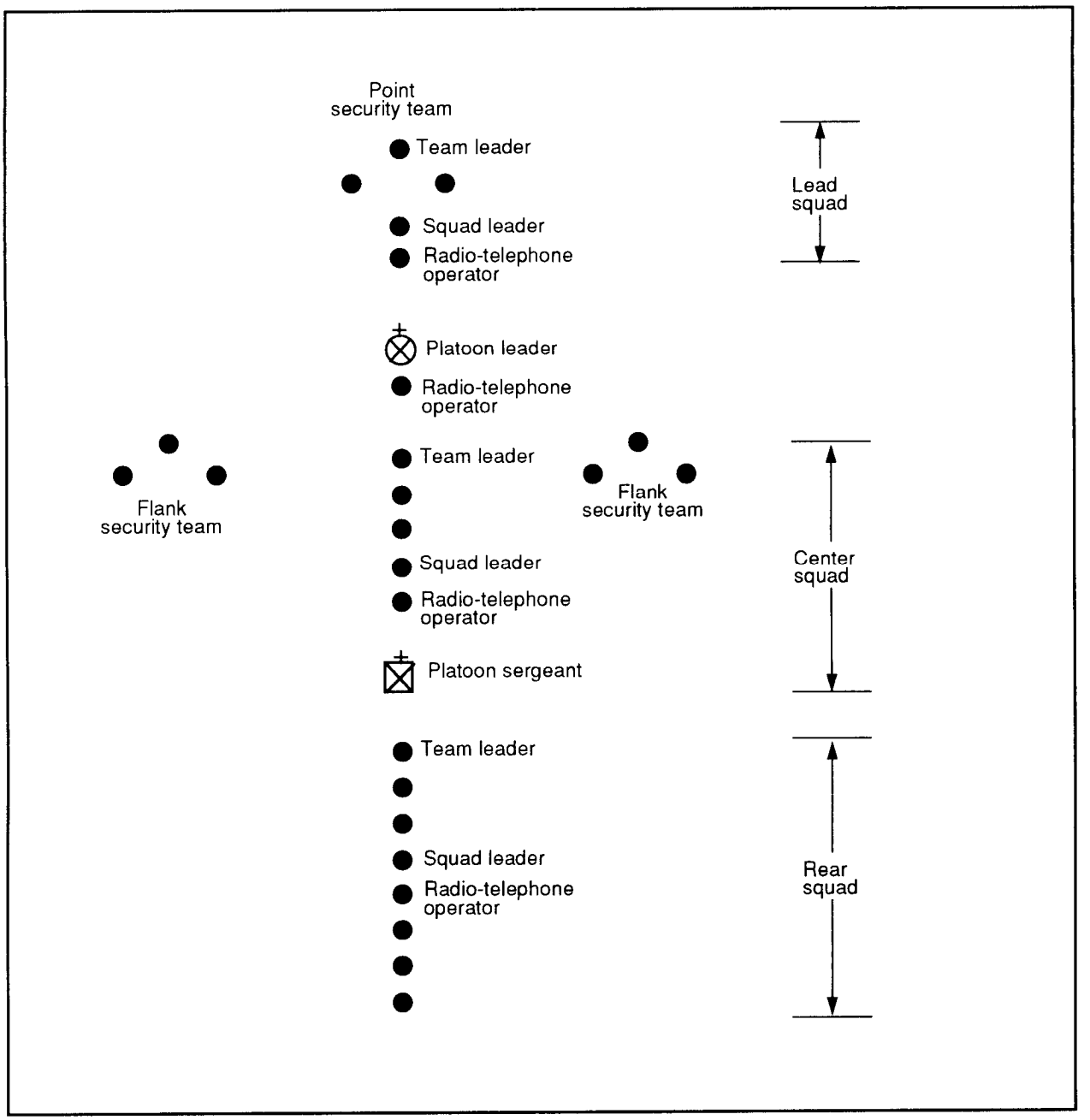


Figure E-11. Dismounted file formation

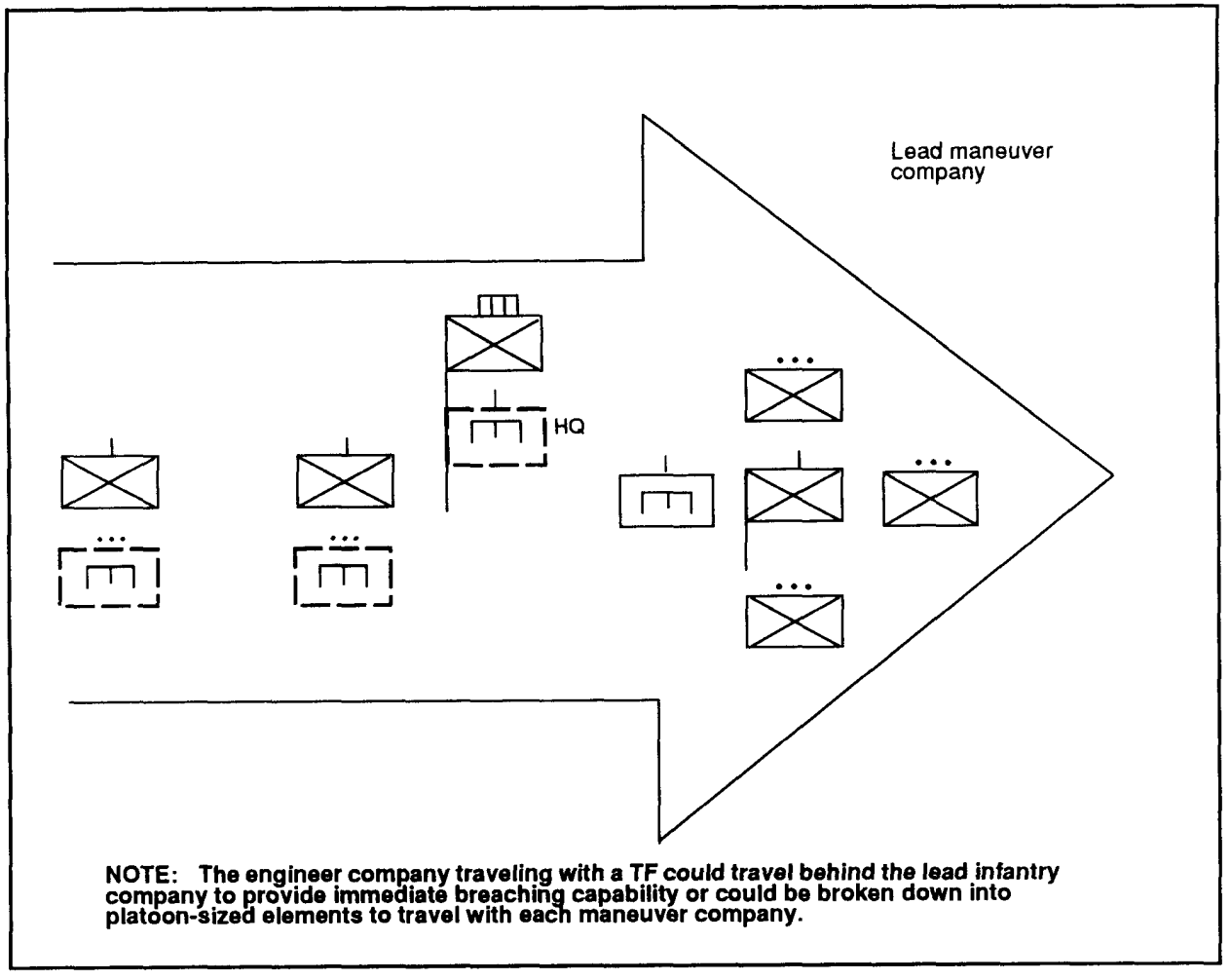


Figure E-12. Dismounted traveling formation

APPENDIX F

ROUTE CLEARANCE

The purpose of this appendix is to assist field units in route-clearance operations. The TTP that follow establish basic guidelines for conducting this combined-arms combat operation. They are not all encompassing and may be modified to meet the needs of the user.

OVERVIEW

To clear a route, the battalion focuses one company/team as the main effort on the route proposed as the MSR, and the remainder of the battalion conducts clearance-in-zone operations on terrain that dominates the MSR. The brigade retains an air-assault or a mechanized company in reserve. During route-clearance operations, the TF could perform the following missions:

- Conduct a deliberate breach through a known minefield or obstacle.
- Conduct an in-stride breach through an unknown minefield.
- React to a near or far ambush.

FACTS AND ASSUMPTIONS

In a route-clearance operation, the following facts and assumptions apply:

- Noncombatants are in the area.
- Noncombatants use the MSRs.
- ROE are in effect.
- MSRs are limited and the terrain is restrictive.
- The terrain limits communication capabilities.
- Enemy teams, squads, and platoons conduct decentralized operations; they can mass to a company-level operation.
- The enemy makes extensive use of minefield, indirect fires, snipers, and shoulder-fired surface-to-air missiles (SAMs).
- The enemy can infiltrate to ambush, emplace minefield, reseed cleared minefield, erect obstacles, emplace explosive devices, and conduct acts of terrorism.
- Buried point minefield can be emplaced in 1 to 1 1/2 hours on an unimproved road and 2 hours on an improved road.
- Point minefield consists of 5 to 35 mines with a mix of 10 to 25 AT mines and/or 5 to 10 AP mines.
- Minefield and obstacles may be covered by direct and indirect fires.
- All obstacles are considered to be booby trapped.
- Cleared minefield can be reseeded, which indicates the presence of mine caches.

- All movements are considered combat operations.
- Clearance operations are conducted during daylight hours.
- MSRs must be swept daily.
- Each convoy has a security escort that can also breach minefield, if required.
- Aviation, fire support, engineer, MI, MP, ADA, civil affairs, and psychological operations (PSYOP) assets are available.
- Dismounted forces can clear 700 meters (766 yards) of route per hour, using a minimum of four mine detectors, in a deliberate-sweep operation.
- Mounted forces can clear 5 to 15 km (3 to 9 miles) of route per hour, using a minimum of three mine-clearing rollers.
- A reserve is available.
- US forces have air supremacy.
- Light, mobile security elements have a mix of M60 machine guns and MK19 40-millimeter (mm) grenade launchers.
- Security forces move on their organic combat vehicles.

TASK-FORCE TASKS TO BE ACCOMPLISHED

You must accomplish the following tasks for route-clearance operations:

- Conduct deliberate-sweep operations.
- Detect obstacles.
- Secure the area to be cleared.
- Conduct breaching and clearing operations.
- Conduct route reconnaissance.
- Conduct cordon and search operations.
- Conduct mounted-movement drills.
- Conduct road movement.
- React to enemy contact.
- Conduct a hasty attack.
- Deploy a reserve.
- Conduct an air-mission brief (AMB), if air-assault operations are planned.
- Develop a fire plan/suppression of enemy air defenses (SEAD).
- Conduct emergency resupply operations.
- Conduct casualty-evacuation operations.
- Conduct vehicle-recovery and -evacution operations.
- Collect and disseminate intelligence information.
- Provide C^2.
- React to civilians on the battlefield.
- Conduct liaison with civil authorities.
- Respond to press interviews.

RECOMMENDED TASK ORGANIZATION

Table F-1 shows an example of the company/team organization for route-clearance operations. See Figure F-1, page F-4, for an example of a graphic illustration of a route-clearance operation.

Table F-1. Sample task organization for route-clearance operations

- **Heavy team**

  Assault force (platoon leader/XO)
  2 infantry platoons on Bradley fighting vehicles

  Support force (mechanized platoon leader)
  1 Bradley platoon
  1 engineer squad
  1 120-mm mortar section
  1 medical team (two FLAs)
  1 PSYOP team
  1 FO

  Breach force (company commander)
  1 engineer platoon (-) with organic vehicles (HMMWVs or M113s)
  1 infantry platoon (light) on three 5-ton trucks
  1 tank section (two M1s with mine-clearing rollers)

- **Light team**

  Assault force (platoon leader/XO)
  2 infantry platoons (light) on six 5-ton trucks

  Support force (platoon leader)
  1 AT/MP section with M60/MK19 mix
  1 engineer squad
  1 60-mm mortar section
  1 medical team (two FLAs)
  1 PSYOP team
  1 FO

  Breach force (company commander)
  1 engineer platoon (-)
  1 infantry platoon (light) on three 5-ton trucks
  1 AT/MP section with M60/MK19 mix

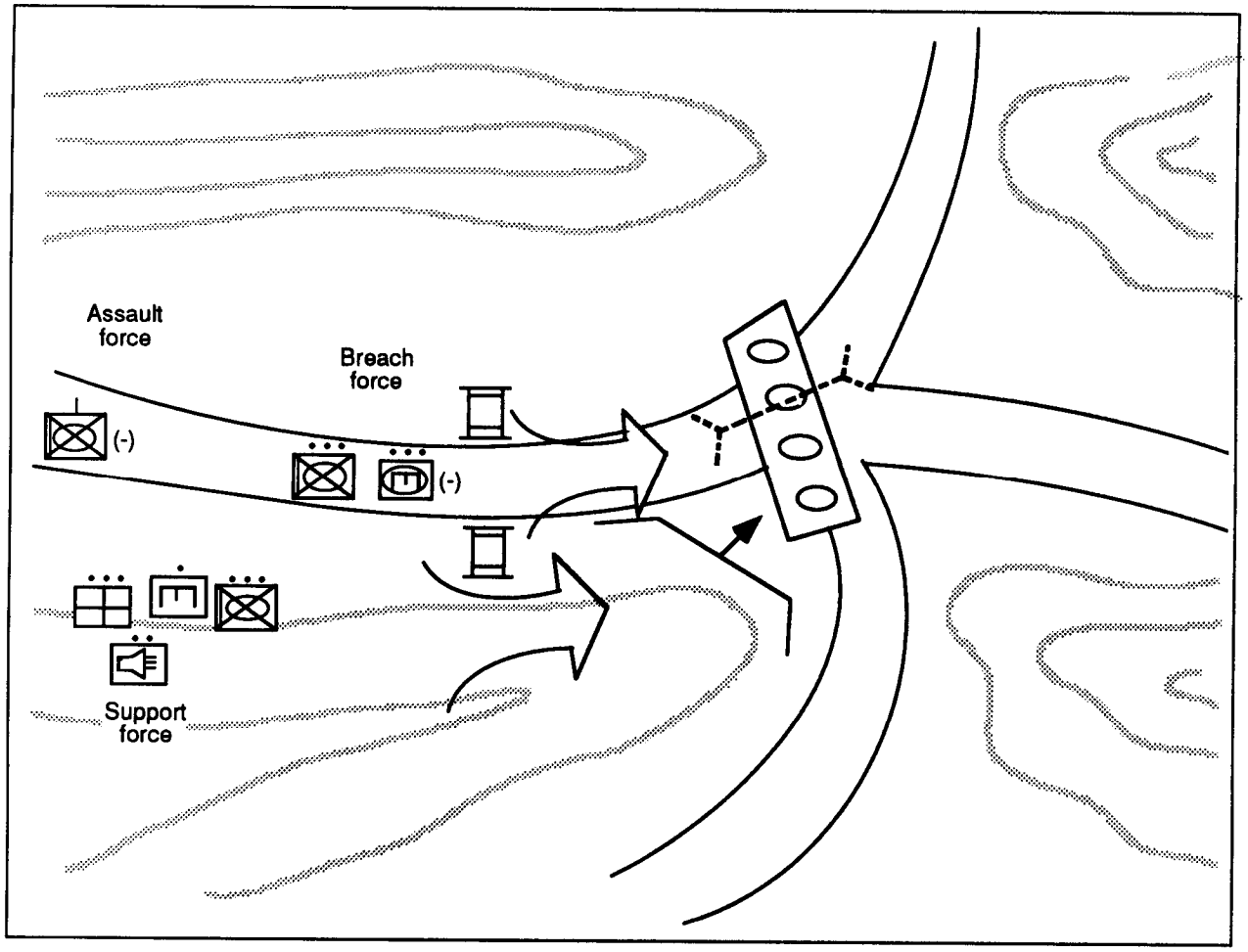


Figure F-1. Route-clearance operations

OPERATIONAL PLANNING CONSIDERATIONS

The following items should be considered by the TF when planning route-clearance operations:

INTELLIGENCE

The supporting staff conducts IPB to identify choke points, bridges, tunnels, critical road junctions, and other built-up areas. However, depending on its overall mission, the enemy may not always emplace obstacles at these locations. This is especially true if its goal is to psychologically disrupt our convoys. The following are factors that should be included in the IPB:

- The IPB should focus on the most probable enemy attack method and point obstacle and ambush locations.
- A situation map should be maintained.
- An incident map should be maintained to facilitate a pattern analysis.
- A threat order-of-battle data base should be maintained.
- A detailed R&S plan, incorporating modern battlefield techniques to monitor the route (such as ground sensors, forward-look airborne radar, infrared radar, and satellite images), should be developed.
- The unit should coordinate for "quick fix" and unmanned airborne vehicle (UAV) support.

- A daily flight should be conducted over the area by attack-helicopter teams to provide up-to-the-minute intelligence. The route should be filmed using an AH-64, if possible.
- The unit should coordinate with the Air Force to check routes periodically (for example, using the C-130 Specter gunship).
- An intelligence update should be provided to company/team leaders before departure his includes a 1:50,000 enemy situation overlay.

MANEUVER

The battle drill for the company/team, when encountering a known or suspected minefield, is as follows:

For a heavy team—

- The support force maneuvers to a position where it can overwatch the minefield and direct effective fires on possible enemy locations.
- The assault force dismounts and maneuvers using a covered and concealed route that avoids roads and does not mask supporting fires. The assault force may or may not be employed. If employed to seize terrain or destroy the enemy, it may or may not pass through the breach (METT-T dependent).
- The breaching force moves forward with tanks (with mine-clearing rollers) in the lead. The infantry platoon dismounts to protect the tanks and engineers. The engineer platoon conducts minefield-/obstacle-clearance operations and properly marks all lanes.
- The company commander moves with the breaching force or stays with the support force and controls indirect fires into the objective area. Indirect-fire assets capable of obscuring (with smoke) and suppressing the area are ready to use based on the company commander's assessment of the situation.
- After clearance is completed, the company commander leaves a stay-behind force from the assault force (squad- to platoon-sized) to secure the site until it is relieved by follow-on forces (such as MP, local forces, or a reserve).
- The company/team then continues route-clearance operations.

For a light team, route-clearance operations are the same as those conducted by the heavy force with the following exceptions:

- Hasty-sweep operations employ engineers well forward and rely on visual indicators.
- The breaching force does not have tanks providing close-in security. It is provided by AT/MP assets armed with M60s. All other breaching procedures remain the same.
- The support force does not have the Bradley platoon. Overwatch is provided by an AT/MP section with MK19s.

FIRE SUPPORT

The following should be considered when planning for fire support:

- Priority targets shift in conjunction with company/team movement on the MSR. Smoke is planned for each target.
- A TF's 120-mm mortar section moves and sets up with the support force (if a light infantry company is used, they have an organic 60-mm mortar section).
- Clearance of fires is the responsibility of the maneuver commander in whose sector the target is located.
- Adequate Q-36 coverage is necessary for deliberate breaching operations.

MOBILITY/SURVIVABILITY

The following should be considered when planning for M/S:

- OBSTINTEL must include the description of the mines or explosive devices, the obstacle's composition, and the enemy actions or techniques used during obstacle emplacement.
- Upon visual identification of an obstacle, deliberate-sweep operations should begin and continue for 200 meters (219 yards) past the obstacle.
- All mines, obstacles, and explosive devices must be reported, cleared, and marked to facilitate unimpeded movement.
- Lane-marking materials and techniques are standard throughout the route.
- All radios, electronic equipment, and aviation assets must remain a safe distance away during breaching operations.

AIR-DEFENSE ARTILLERY

Despite air supremacy, the possibility of an air attack should be considered. Use the following passive air-defense measures:

- Eliminate glare by using mud, tape, cardboard, or camouflage nets to cover headlights, mirrors, and portions of windshields.
- Try to reduce dust clouds (reduce speed to reduce dust).
- Use routes that offer natural concealment.
- Use air guards.

COMBAT SERVICE SUPPORT

The following should be considered when planning for CSS:

- Clearance operations are supported with a logistical/medical package operation out of the BSA.
- The priority evacuation method is by air; the routine method is by ground.
- An AMB should be conducted with aviation assets for MEDEVAC contingencies (rehearse evacuation-request procedures).
- A medical team traveling with the company/team should consist of one to two front-line ambulances (FLAs).
- All personnel wear flak vests.
- All vehicles carrying troops require hardening (sandbagging floors and sides).

COMMAND AND CONTROL

The following should be considered when planning for C^2:

- The company/team commander has a requirement to operate on three separate frequencies: the battalion command, company/team command, and fire-support networks.
- Minefield indicators should be designated throughout the TF (see Table F-2 for a list of indicators).
- The battalion designates a reserve that is at least platoon-sized and is either mechanized or air-assault capable.
- Rehearsals should include—
  - — Actions on the objective/obstacle.
  - — Reaction to enemy contact.
  - — Reaction to a near or far ambush.
  - — A communications exercise.
  - — Fire support.

SPECIAL OPERATIONS

The following should be considered when planning for special operations:

- PSYOP teams should be employed forward to assist in dispersing civilians that could block the route.
- PSYOP/civil affairs support the counterintelligence in conducting civilian interviews.
- Civilians should be directed along the MSR to the displaced-personnel holding areas and the routes that the brigade has indicated for use.

REFERENCES

The manuals listed in Table F-3, page F-8, provide additional information on route-clearance operations.

Table F-2. Minefield Indicators

When conducting deliberate-sweep (mine detector and visual observation) or hasty-sweep operations, the presence of the following indicators may warn individuals of buried mines or hidden booby traps:

- Damaged vehicles.
- Dead animals.
- Avoidance by local population.
- Signs of digging.
- Signs of concrete removal.
- Holes or grooves in the road.
- Boxes or parcels placed along the road or shoulder.
- Parked vehicles and bicycles without operators.
- Wires on the road surface or extending to the shoulder.
- Metallic devices on the roadway surface.
- Evidence of mine-peculiar supplies (such as wrenches, shipping plugs, wrapping paper, and safety collars from fuzes).
- Disturbances in previous tire tracks.
- Disturbance of road potholes or puddles.
- Differences in amount of moisture or dew on road surface.
- Differences in plant growth (such as wilting, changing colors, or dead foliage).
- Signs posted on trees that covertly alert the local populace to the presence of mines.

Table F-3. References for route-clearance operations

FM 5-114. *Engineer Operations Short of War.* 13 July 1992.

FM 19-1. *Military Police Support for the AirLand Battle.* 23 May 1988.

FM 19-4. *Military Police Battlefield Circulation Control, Area Security, and Enemy Prisoner of War Operations.* 7 May 1993.

FM 20-32. *Mine/Countermine Operations.* 30 September 1992.

FM 33-1. *Psychological Operations.* 18 February 1993.

FM 34-130. *Intelligence Preparation of the Battlefield.* 8 July 1994.

FM 41-10. *Civil Affairs Operations.* 11 January 1993.

FM 63-6. *Combat Service Support in Low-Intensity Conflict.* 21 January 1992.

FM 90-13-1. *Combined Arms Breaching Operations.* 28 February 1991 (Change 1, May 1993).

Mine Recognition and Warfare Handbook. November 1990.

GLOSSARY

1SG	first sergeant
2IC	second in command
A&L	administrative and logistical
A&O	assault and obstacle
AA	avenue of approach
ABF	attack by fire
ACE	armored combat earthmover, M9
ADA	air-defense artillery
ADAM	area denial artillery munition
admin	administration
ADO	air-defense artillery officer
AHD	antihandling device
AIDSV	agility, initiative, depth, synchronization, and versatility
AMB	air-mission brief
ammo	ammunition
AO	area of operation
AP	antipersonnel
APC	armored personnel carrier
AR	armor
ARNG	Army National Guard
ASAP	as soon as possible
AT	antitank
atk	attack
attn	attention
AVLB	armored vehicle-launched bridge
AVLM	armored vehicle-launched MICLIC
AXP	ambulance exchange point
B/P	be prepared
BDAR	battle damage assessment and repair
bde	brigade

BICC	Battlefield Information Control Center
BMO	battalion maintenance officer
BMP	an amphibious infantry combat vehicle
bn	battalion
BOS	battlefield operating system
BP	battle position
BSA	brigade support area
BSO	battalion signal officer
C^2	command and control
C4I	command, control, communications, computers, and intelligence
can.	canister
cas	casualty
CATK	counterattack
cbt	combat
CCIR	commander's critical information requirements
CCP	casualty collection point
cdr	commander
CEV	combat-engineer vehicle
cgy	center of gravity
CL	class
cmd	command
c o	commanding officer
co	company
COA	course of action
commo	communications
comp	composition
COMSEC	communications security
cent	continue, continued, contain
coord	coordinating
CP	command post
CS	call sign
CS	combat support
CSE	combat support equipment

CSOP	combat security observation post
CSR	control supply rate
CSS	combat service support
CTCP	combat trains command post
DA	Department of the Army
Dec	December
decon	decontamination
def	defense
dir	direction
DIS	defense in sector
DP	decision point
DS	direct support
ea	each
EA	engagement area
EBA	engineer battlefield assessment
ech	echelon
EMT	emergency medical treatment
engr	engineer
EOD	explosive ordnance disposal
EPW	enemy prisoner of war
equip	equipment
est	establish
evac	evacuation
FA	field artillery
FAC	forward air controller
FAS	forward aid station
FASCAM	family of scatterable mines
FIST-V	fire-support team vehicle
FLA	front-line ambulance
fld	field
FM	field manual
FM	frequency-modulated
FO	forward observer

FPOL	forward passage of lines
FRAGO	fragmentary order
freq	frequency
FSB	forward support battalion
FSE	fire-support element
FSO	fire-support officer
ft	foot, feet
GEMSS	ground-emplaced mine scattering system
GP	group
GS	general support
GSR	ground surveillance radar
HEMTT	heavy expanded mobility tactical truck
HHC	headquarters and headquarters company
HMMWV	high-mobility, multipurpose wheeled vehicle
HN	host nation
HQ	headquarters
hr	hour(s)
HVT	high-value target
IAW	in accordance with
intel	intelligence
INTSUM	intelligence summary
IPB	intelligence preparation of the battlefield
JTF	joint task force
KIA	killed in action
km	kilometer(s)
L/U	linkup
LD	line of departure
ldr	leader
LO	liaison officer
LOC	lines of communication
loc	location
LOGPAC	logistics package
LRP	logistics release point

m	meter(s)
M/s	mobility/survivability
maint	maintenance
MAS	main aid station
MBA	main battle area
MC	mobility corridor
MCOO	modified combined obstacle overlay
mech	mechanized
med	medical
MEDEVAC	medical evacuation
METL	mission-essential task list
METT-T	mission, enemy, terrain, troops, and time available
MF	minefield
MI	military intelligence
MICLIC	mine-clearing line charge
MKT	mobile-kitchen trailer
mm	millimeter(s)
MOPMS	modular pack mine system
MOPP	mission-oriented protective posture
MOUT	military operations on urbanized terrain
MP	military police
MRB	motorized rifle battalion
MRC	motorized rifle company
MRE	meals, ready-to-eat
MRP	motorized rifle platoon
MRR	motorized rifle regiment
MRT	mortar
MSR	main supply route
MST	maintenance support team
MTC	movement to contact
N/A	not applicable
NAI	named area of interest
NBC	nuclear, biological, chemical

NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge
NEO	noncombatant evacuation operation
NLT	not later than
no.	number
O/O	on order
Obj	objective
obst	obstacle
OBSTINTEL	obstacle intelligence
OCOKA	observation and fields of fire, cover and concealment, obstacles, key terrain, and avenues of approach
OEG	operation exposure guidance
OP	observation post
OPCON	operational control
OPLAN	operations plan
OPORD	operation order
OPSEC	operations security
OPTEMPO	operating tempo
org	organize, organization
para	paragraph
PCI	precombat inspection
pers	personnel
ph	phase
PIR	priority intelligence requirements
PL	phase line
PLL	prescribed load list
plt	platoon
POC	point of contact
POL	petroleum, oil, and lubricants
PP	passage point
prep	prepare, preparation
pri	priority
PSG	platoon sergeant

PSYOP	psychological operations
pt	point
qty	quantity
R&S	reconnaissance and surveillance
RAAMS	remote antiarmor mine system
recon	reconnaissance
req	required
ROE	rules of engagement
RP	release point
rqr	required
rte	route
/s/	signed
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
SAM	surface-to-air missile
SEAD	suppression of enemy air defenses
SCATMINE	scatterable mine
sec	section
SEE	small emplacement excavator
SITEMP	situation template
SITREP	situation report
SME	subject-matter expert
SOEO	scheme of engineer operations
SOF	special operations forces
SOI	signal operating instructions
SOP	standing operating procedure
SOSR	suppress, obscure, secure, and reduce
SP	start point
spec	special
spt	support
STANAG	Standardization Agreement

sub	subordinate
sup	supply
surv	survivability
TACP	tactical air-control party
TAI	targeted area of interest
TDP	turret-down position
TF	task force
TLP	troop-leading procedure
tm	team
TM	technical manual
TOC	tactical operations center
TOE	table(s) of organization and equipment
trans	transportation
trns	trains
TRP	target reference point
TTP	tactics, techniques, and procedures
UAV	unmanned airborne vehicle
ULLS	Unite-Level Logistics System
UMCP	unit maintenance collection point
UN	United Nations
US	United States of America
USAES	United States Army Engineer School
USAF	United States Air Force
USAR	United States Army Reserve
UXO	unexploded ordnance
vic	vicinity
w/	with
WO	warning order
XO	executive officer

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FM 5-34. *Engineer Field Data.* 14 September 1987.
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STANAG 2394. *Land Force Combat Engineer Doctrine.* 12 January 1993.
STANAG 2868. *Land Force Tactical Doctrine.* 12 September 1983.

DOCUMENTS NEEDED

These documents must be available to the intended users of this publication.

Department of the Army Forms

DA Form 2028. *Recommended Changes to Publications and Blank Forms.* February 1974.
DA Form 2404. *Equipment Inspection and Maintenance Worksheet.* April 1979.

READINGS RECOMMENDED

These readings contain relevant supplemental information.

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FM 71-3. *Armored and Mechanized Infantry Brigade.* 11 May 1988.
FM 71-123. *Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion/Task Force, and Company/Team*. 30 September 1992.
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