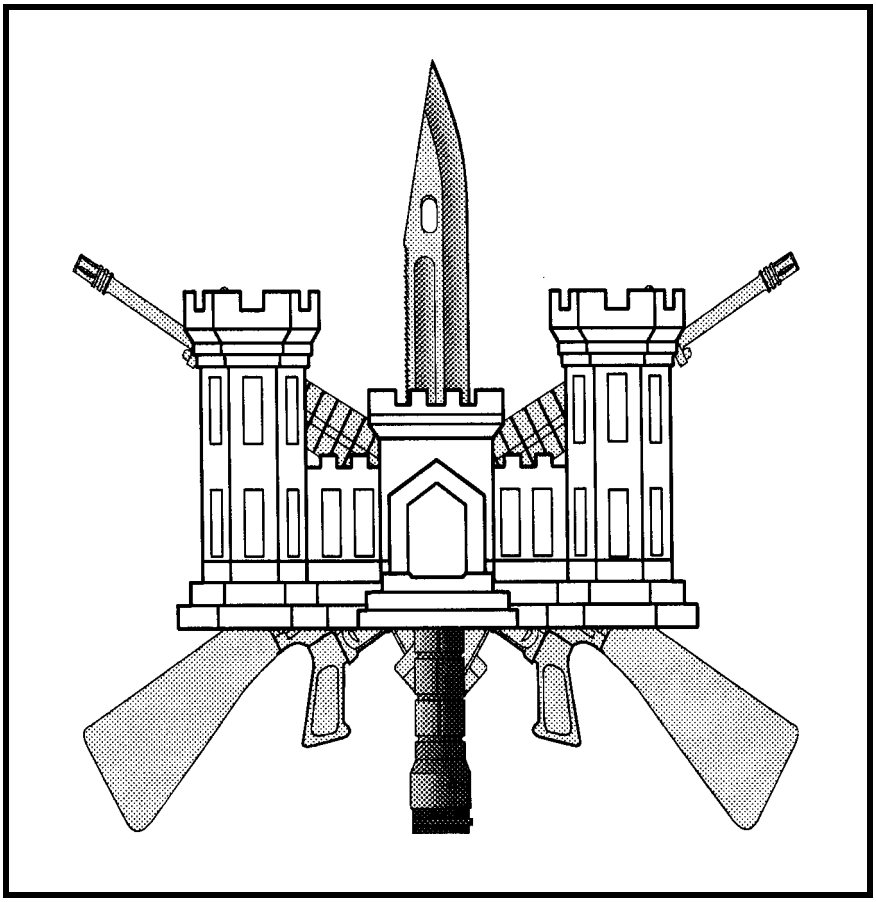
FM 5-71-3

NOTE: This reprint includes Change 1, dated 13 November 1997. New or changed material is indicated by a vertical bar in the margin.

Brigade Engineer Combat Operations (Armored)



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FIELD MANUAL
No. 5-71-3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 3 October 1995

Brigade Engineer Combat Operations (Armored)

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PREFACE

Field Manual (FM) 5-71-3 describes how the mechanized division engineer (DIVEN) battalion supports an armored brigade. The manual is designed as an engineer extension of *FM 71-3.* It serves as a guide for brigade engineers, their staffs, and subordinate commanders in planning, integrating, and conducting engineer operations. The manual also serves as a guide for the brigade staff and subordinate maneuver commanders on the organization, capabilities, and employment of engineers as a brigade combat multiplier.

This manual sets forth the principles that guide the conduct of engineer operations supporting an armored brigade. It addresses engineer tactics, techniques, and procedures (TTP) as necessary to emphasize critical principles. The TTP are intended to be descriptive rather than prescriptive and are not a replacement for the TTP and standing operating procedures (SOPs) unique to the supported unit.

FM 5-71-3 is fully compatible with Army doctrine 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 5-71-100, 5-100, 71-3, 100-5, 101-5, and 101-5-1.*

The proponent of this publication is Headquarters (HQ), United States (US) Army Engineer School. Send comments and recommendations on Department of the Army *(DA) Form 2028* directly to Commander, US Army Engineer School, ATTN: ATSE-T-PD-PM, Fort Leonard Wood, Missouri 65473-6650.

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

CHAPTER 1

Engineer Operations and the Brigade Battlefield

Armored brigades are organized to fight successful battles on any part of the battlefield and in conventional, nuclear, or chemical environments. It combines the efforts of its task-organized battalions to perform major tactical tasks as part of a division or corps operation. The key to victory in the brigade battle is the armored brigade's ability to integrate, mass, and synchronize subordinate maneuver battalions and combat support (CS) and combat service support (CSS) units in support of the brigade fight.

The mechanized engineer battalion focuses on maneuver at the tactical level. The battalion conducts mobility, countermobility, and survivability (M/CM/S) and limited general engineering missions to support maneuver in the brigade area. A brigade normally has under its control—

- Two to five maneuver battalions.
- One to two artillery battalions.
- One forward support battalion.
- One air-defense (AD) battery.
- Command and control (C^2) facilities (main and tactical command posts (CPs)).
- Other CS assets (such as military police (MP), chemical decontamination, and smoke generators).

The DIVEN battalion is structured to provide support to three mechanized or armored task forces (TFs); it is not structured to provide continuous, dedicated support to the other units.

However, engineer support to the other units is still the brigade engineer's responsibility. He employs nonorganic and/or corps engineer assets to meet this responsibility. Corps-level support normally consists of a company from a corps combat battalion (mechanized), a platoon from a combat support equipment (CSE) company, or a horizontal construction platoon from a combat-heavy company provided in direct support (DS) for specified times or tasks. This level of support may be increased based on the mission, enemy, terrain, troops, and time available (METT-T) and the brigade's priority within the division scheme of maneuver (see *Appendix A*).

MISSION

The armored brigade's primary mission is to destroy enemy forces using its mobility, firepower, and shock effect. It defeats enemy assaults using defensive fires, obstacles, and counterattacks (CATKs). The armored brigade's secondary mission is to conduct various operations other than war (OOTW), independently, or as part of a joint or combined HQ.

The mechanized engineer battalion conducts engineer battlefield functions for the brigade focusing on M/CM/S tasks. It focuses its effort on the brigade's deep,

close, and rear operations. As a combat multiplier, the engineer concentrates his efforts on maintaining the brigade's freedom of movement and lessening the enemy's ability to mass and maneuver on the battlefield.

BRIGADE ENGINEER ORGANIZATION

The mechanized engineer battalion has three combat engineer companies and a headquarters and headquarters company (HHC). The battalion is habitually associated with a ground maneuver brigade. Its HQ provides centralized C^2 for the total brigade engineer effort. The DIVEN commander task-organizes DIVEN companies and corps assets to the forward combat engineer battalions. This task organization is what creates the brigade engineer force. The battalion habitually trains and operates with its associated maneuver brigade.

The brigade engineer organization is tailored to support the commander's intent and scheme of maneuver. In *Figure 1-1*, a reinforced engineer battalion supports the main-effort brigade. Two of its companies support the lead TFs, while the third organic company controlling the battalion's three obstacle sections is in a follow-and-support role. The battalion is augmented with an engineer company in DS from the engineer battalion supporting the follow-on brigade. It accepts obstacle handover from the lead TFs and improves the lanes. As a general rule, the brigade engineer organization can control two to five companies.

EMPLOYMENT PRINCIPLES AND CONSIDERATIONS

Through the tactical decision-making process, the brigade engineer properly allocates his forces to accomplish the engineer mission. Task organization and command/support relationships are METT-T driven. The following organizational principles provide a framework for commanders and staff officers:

- Task-organizing engineer forces to the requirements.
- Giving priority to the main effort.
- Integrating engineers with maneuver and fire.
- Ensuring that current engineer operations promote future maneuver combat operations.
- Avoiding holding engineers in reserve (engineer forces can be positioned to support the reserve or CATK force or positioned in a follow-and-support role).
- Building a logistically sustainable force.
- Maintaining effective C^2.
- Using all local resources.

Figure 1-2, page 1-4, shows the layout of the command/support relationships; however, these are general guidelines. The normal battalion relationship with a maneuver brigade is a command relationship. The battalion commander weighs the alternative between command or support relationships based on the concept of the operation and the capabilities of the supported force. The main considerations are to—

- Mass to support the main effort.
- Preserve vertical integrity for C^2 to ensure maximum effectiveness.

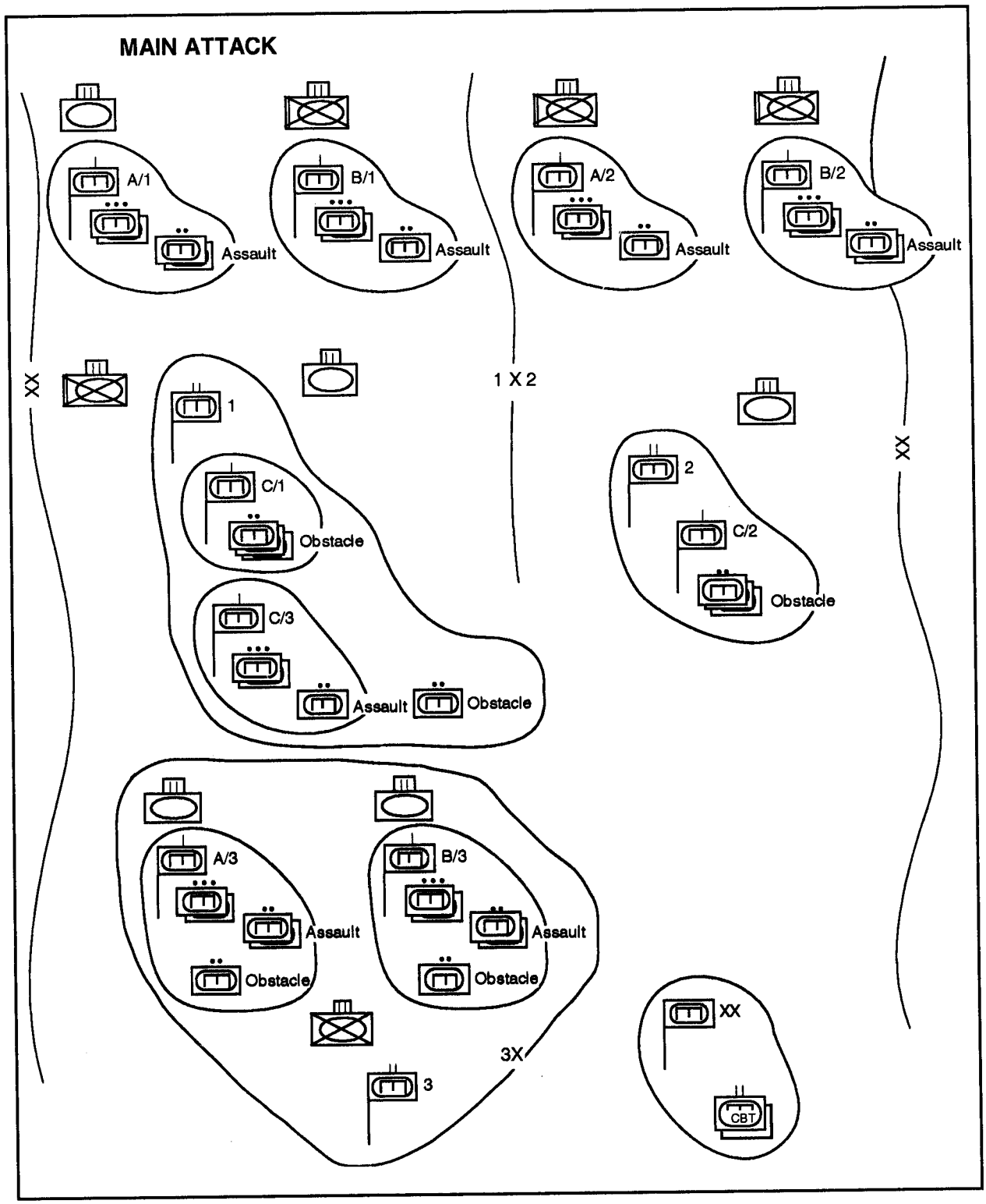
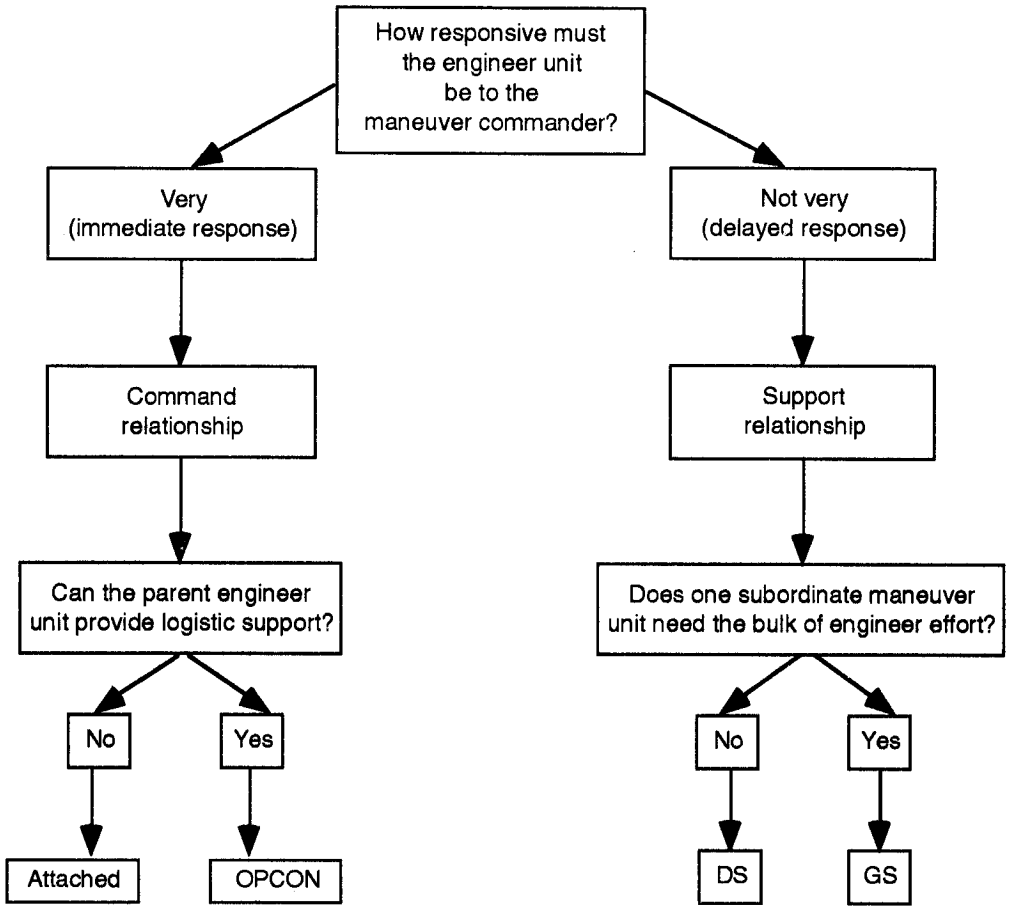


Figure 1-1. Brigade engineer organization offensive scenario

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
Direct[1] support	P	S	P	P
General support	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 1-2. Command/support relationships

- Maintain flexibility to rapidly shift and synchronize engineer operations.
- Assess the ability of the supported force to logistically support the engineer force.

In the offense and defense, there are opportunities to mass and properly weight the main effort. The engineer battalion provides the C^2 and the engineer capability that allows the brigade engineer to adequately plan, prepare, and execute engineer operations. *Figure 1-3, page 1-6,* illustrates the normal mix of division, corps, and echelons above corps (EAC) engineer units in a division area. In this scenario, the division's mission is to conduct a defense, CATK, and then conduct a river crossing upon transition to the offense. The 2d brigade is initially the main effort, then the 3d brigade becomes the main effort for the CATK mission. DIVEN employment considerations include—

- Task-organizing DIVEN battalions to the maneuver brigades with whom they habitually train and fight. The engineer effort is weighted to accomplish the commander's intent, which gives priority to the 2d brigade in the defense, then the 3d brigade for the CATK.
- Task-organizing CSE companies to DIVEN battalions for survivability and countermobility missions in the forward brigade areas requiring heavy earth-moving equipment. The CSE effort is weighted to support the 2d brigade. Upon transition to the offense, CSE units with the forward brigades construct and maintain the combat trails required to sustain the attack and move follow-on forces.
- Task-organizing a corps mechanized engineer battalion to weight the division main effort and support other units which are not provided engineer support by the organic engineer brigade. A corps engineer battalion (minus one company) is attached to the division cavalry squadron as a covering force. The battalion's remaining company is attached to the engineer battalion in the 2d brigade to support the main effort. An additional battalion is task-organized to the 3d brigade to support the CATK.
- Task-organizing a corps wheeled engineer battalion to other combat, CS, and CSS elements in the division area. A battalion minus supports the 1st brigade and the remainder of the battalion supports the aviation brigade (planning and loading air Volcano and providing engineer expertise for air-reconnaissance missions) and conducts other area-support missions for artillery, AD, and C^2 facilities in the division rear area.
- Task-organizing a corps mechanized battalion to C^2 the river crossing while the DIVEN battalion focuses on other tasks in support of the 3d brigade's offensive mission.

BATTLEFIELD OPERATING SYSTEM (BOS) INTEGRATION

The brigade engineer must understand the capabilities of other combat, CS, and CSS elements to properly integrate his BOS. He must also understand every BOS to integrate and synchronize engineer operations on the battlefield.

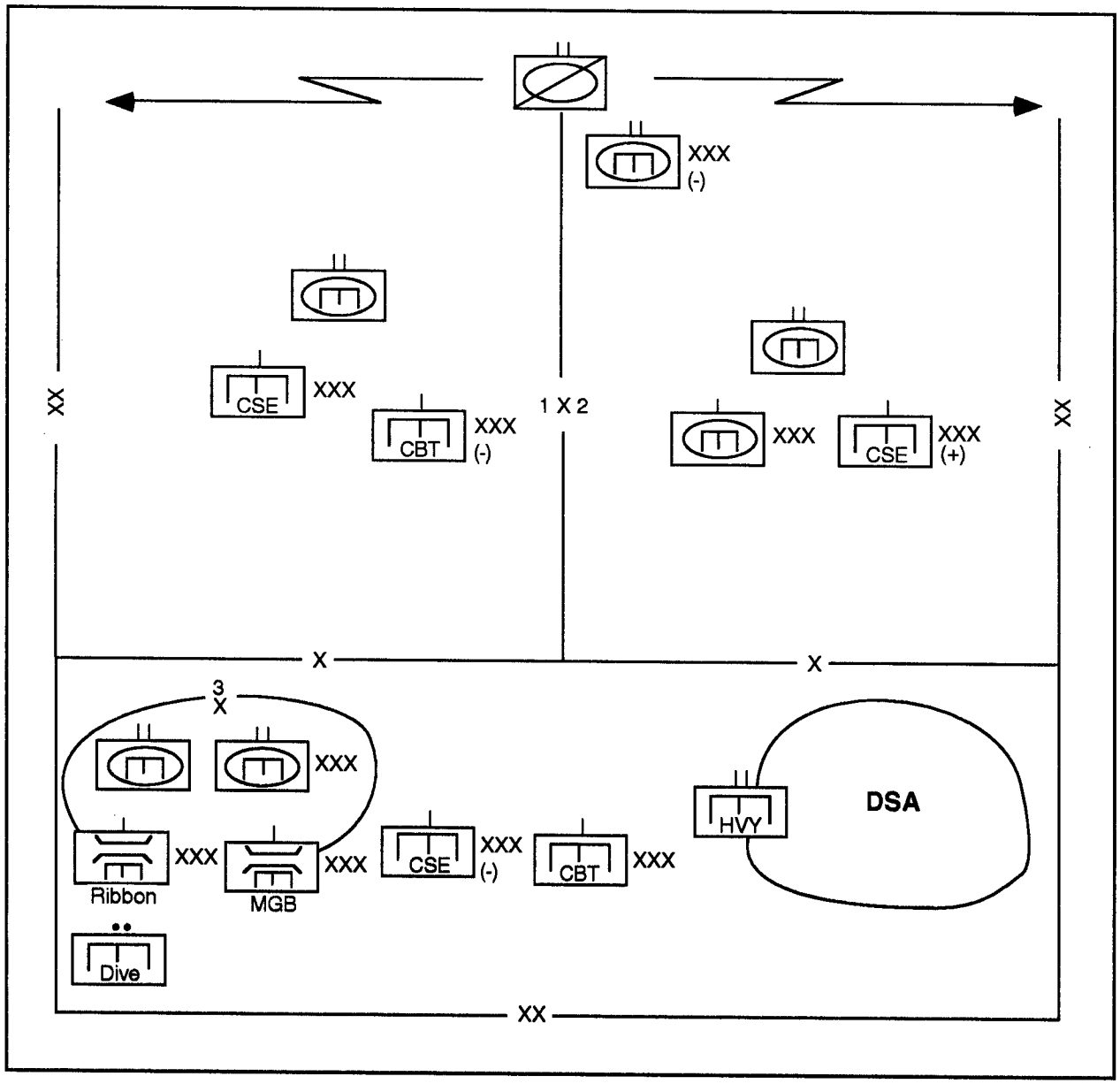


Figure 1-3. Engineer support in the division/brigade area of operation (AO)

INTELLIGENCE

The intelligence preparation of the battlefield (IPB) is a staff tool that helps identify and answer the commander's priority intelligence requirements (PIR). The Intelligence Officer (US Army) (S2) initiates and coordinates the IPB and uses it to predict battlefield events and synchronize courses of action (COAs). The IPB is a continuous and systematic four-step process performed for a specific geographic region. The steps are—

- Define the battlefield environment.
- Describe the battlefield effects.
- Evaluate the threat.
- Determine the threat's COAs.

The engineer staff officer uses the engineer battlefield assessment (EBA) as a tool to integrate his BOS into the IPB process. The EBA focuses on analyzing the following elements and predicting the overall effect on the operation:

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

The IPB and EBA are conducted concurrently, resulting in intelligence products that are distributed to the TFs. The coordination between the brigade S2, the engineer battalion Operations and Training Officer (US Army) (S3), the assistant brigade engineer (ABE), and the engineer battalion intelligence noncommissioned officer (NCO) (S2) allows BOS integration to occur. The IPB and EBA processes are discussed in more detail in *Chapter 2.*

NOTE: The engineer S2 is currently manned by a 12Z50 NCO (E8).

MANEUVER

Maneuver refers to the employment of forces through offensive or defensive operations to achieve a positional advantage over an enemy force. As the commander develops his concept of the operation and considers the maneuver of all his forces, he is careful to retain a balance in the application of maneuver, firepower, and protection. The nature of this balance establishes the priorities and relationships of maneuver to other combat functions.

Brigade engineer forces conduct mobility operations and construct obstacles and fortifications to enhance the brigade's ability to maneuver and fight on the battlefield. In the offense, the engineer assesses force ratios to determine the type of breaching operation required. Moreover, he war-games the breaching operation to synchronize maneuver and fire power. In the defense, he ensures that tactical obstacles are integrated with direct and/or indirect fires to support the scheme of maneuver.

When employed as a separate engineer TF for combat operations or OOTW, the engineer battalion may have maneuver forces, MPs, and smoke assets task-organized to it. Consequently, the engineer battalion commander must fully understand the capability and limitations of each of these assets.

MOBILITY AND SURVIVABILITY

Combat engineer operations are integrated to ensure that the brigade masses its combat power at the right place and time. The breaching tenets (intelligence, fundamentals, organization, mass, and synchronization) and obstacle integration are two examples of engineer planning and operations requiring close coordination to achieve mass. During the planning, preparation, and execution phases, the brigade engineer and his staff work closely with other brigade staff officers' war gaming, integrating, and synchronizing engineer operations.

Nuclear, biological, and chemical (NBC) defensive measures fall under the M/S BOS and must always be integrated and predicted as a critical element of survivability operations.

FIRE SUPPORT (FS)

FS coordination is critical to engineer operations. The brigade fire-support coordinator (FSCOORD), fire-support officer (FSO), and engineers coordinate the effects of FS in offensive and defensive operations. To support combined arms breaching in the offense, fires are planned to suppress and obscure the enemy. Critical friendly zones (CFZs) are planned at the breach site to

support counterfire operations. In the defense, fires are planned to maximize the effects of tactical obstacles. Considerations for planning where fires can be placed include—

- Forward of the obstacle to disrupt enemy formations and force the enemy to deploy into forward engagement areas (EAs).
- Sides of the obstacle to hinder the enemy's attempts to bypass it.
- Behind the obstacle to destroy the enemy piecemeal as it passes through the obstacle.

A plan should be developed that provides for continuous observation from multiple vantage points.

Artillery-delivered scatterable minefields are always considered in offensive and defensive operations. The brigade engineer plans all scatterable mine (SCATMINE) systems. The scheme of employment involves getting the right obstacle effect to the right target at the right time. The commander, S2, S3, engineer, and FSO develop the scheme of employment. Proper obstacle employment occurs by war gaming the COAs and identifying battlefield conditions that trigger target execution.

AIR DEFENSE

Air-defense artillery (ADA) is planned and coordinated to protect friendly units from enemy air attacks. The brigade engineer integrates AD protection for the following:

- Combined arms breaching.
- Combined arms obstacle operations.
- Survivability operations.
- Class IV/Class V supply points and mine dumps.

The brigade engineer coordinates ADA coverage of breach points, C^2 nodes, key supply points, and critical movement routes. He ensures that his subordinates are aware of the threat and trained on reaction to enemy air attacks.

COMBAT SERVICE SUPPORT

Sustainment is the preparation and the continuous execution of CSS functions in support of the commander's tactical plan. This means two things to the brigade engineer:

- Sustaining the engineer force (includes manning, arming, fixing, and moving engineer assets on the battlefield).
- Sustaining the brigade commander's ability to execute his mission (includes munitions and materials to accomplish engineer operations and the maintenance of facilities and roads to deliver CSS materials in the brigade sector).

CSS operations are discussed in *Chapter 6.*

C^2/BATTLE COMMAND

Leadership is the most important element of the C^2 system. The brigade engineer's leadership provides the purpose, direction, and motivation necessary for his soldiers to accomplish the mission. He visualizes the current and future state of friendly and enemy engineer forces and formulates a clear intent to focus engineer effort. He must be aggressive, technically competent, and physically capable of leading soldiers into combat.

The commander and his staff plan, coordinate, synchronize, and monitor engineer operations from C^2 facilities containing more than one echelon. Staff participation varies at each echelon. The facilities include a—

- Tactical CP.
- Main CP.

- Rear CP.

The brigade engineer focuses on integrating C^2 of all engineer functions into the brigade C^2 process for deep, close, and rear operations. See *Figure 1-4* for the C^2 laydown and *Figure 1-5, page 1-10*, for the flow of reporting.

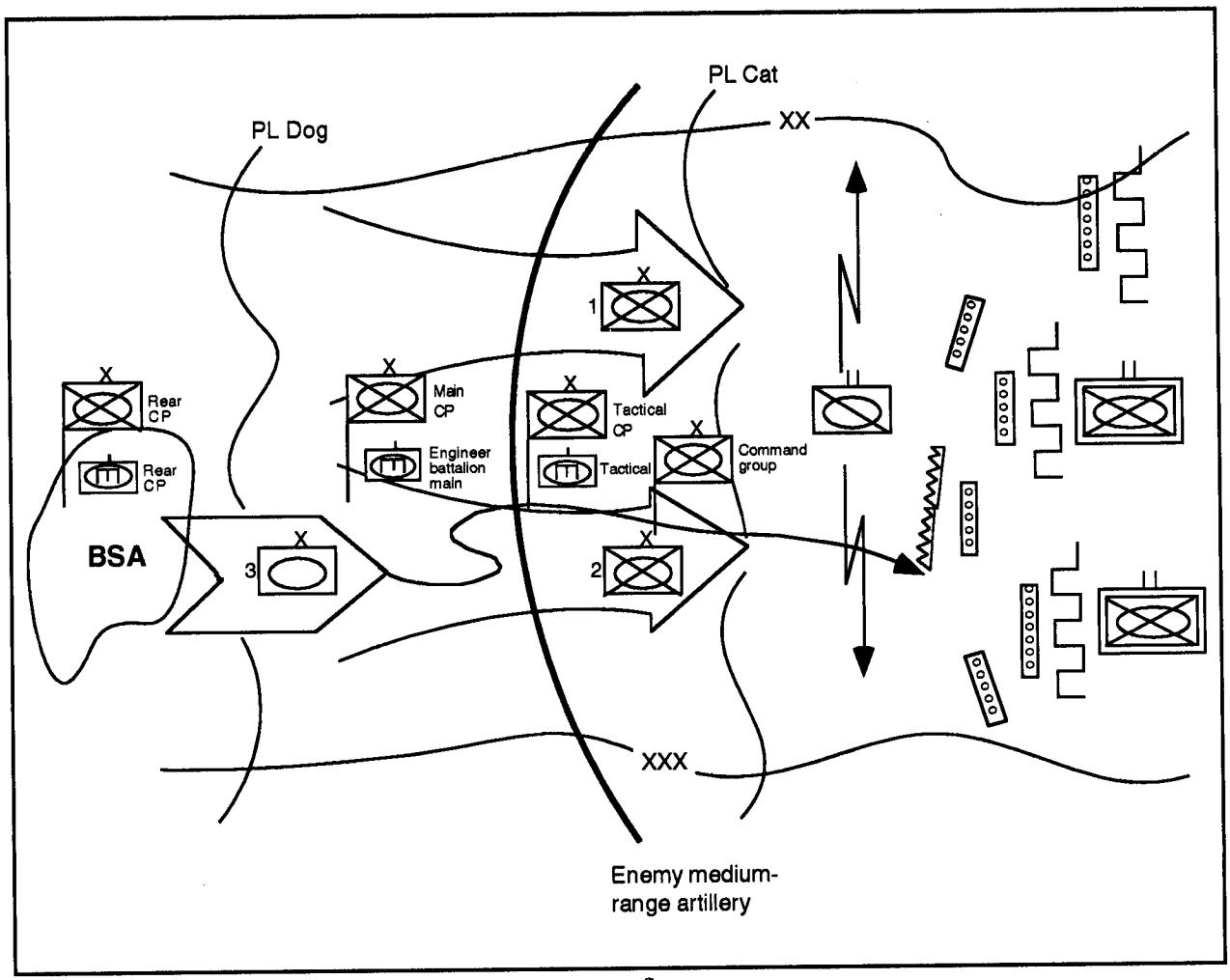


Figure 1-4. C^2 laydown

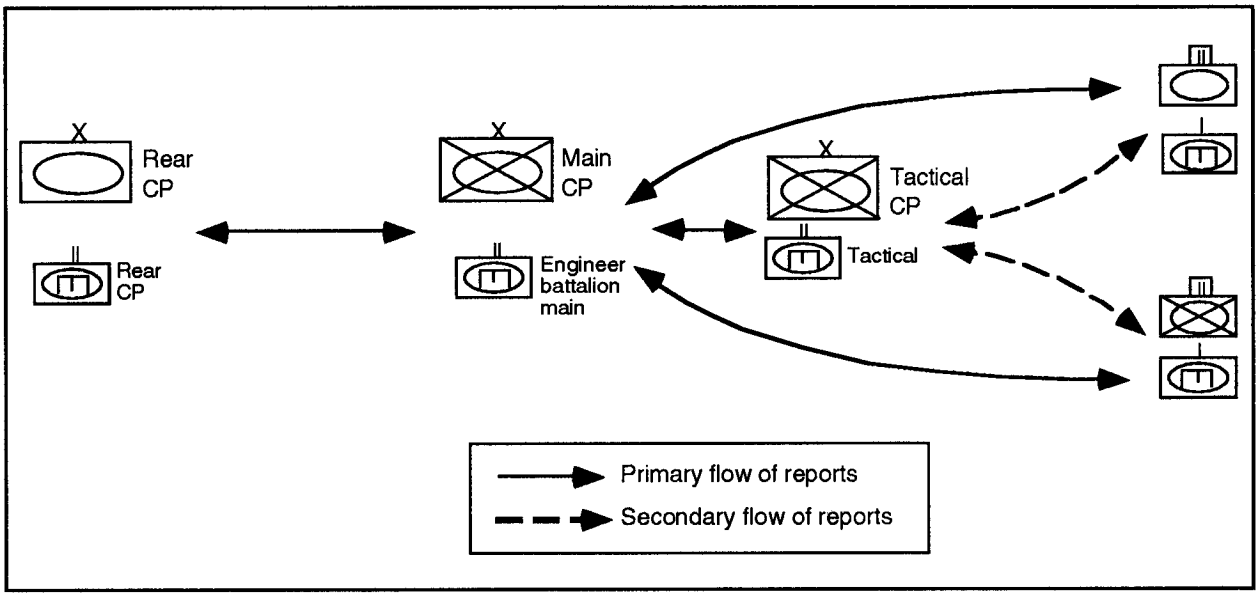


Figure 1-5. Flow of reporting

CHAPTER 2

Command and Control

C^2 is the process through which the activities of the engineer battalion are planned, coordinated, directed, and controlled to accomplish the mission. This process encompasses the personnel, equipment, communications, facilities, and procedures necessary to gather and analyze information to plan, issue instructions, and supervise the execution of operations.

Each engineer C^2 facility must have a definable purpose that is clearly understood. Leaders provide the purpose and motivation that form a versatile C^2 system. The primary objective of each facility is to support the battalion commander. Effective engineer C^2 enables the commander to integrate engineer operations and support the brigade's scheme of maneuver.

ORGANIZATION AND RESPONSIBILITIES

The battalion commander determines the C^2 organization that best supports his method of operation. The C^2 organization of his supported brigade influences his decision. Once he decides on the organization, he organizes his staff, determines the succession of command, and assigns responsibilities. The unit SOP establishes the C^2 organization.

The following paragraphs are a guide for how key personnel in the battalion function and support the mission. The engineer battalion commander determines roles and responsibilities that best fits his organization based on the experience and capabilities of his subordinates.

BATTALION COMMANDER

The battalion commander is the brigade engineer and principal advisor to the brigade commander. He—

- Commands all organic and supporting engineer units.
- Analyzes and restates the mission.
- Designs the concept of operations.
- Organizes the engineer forces.
- Transmits his own and the higher commander's intent.
- Provides support to subordinate units.
- Controls the ongoing battle.
- Provides planning guidance for future operations.

EXECUTIVE OFFICER (XO)

The XO is the principal assistant to the battalion commander. He is free to move to any point in the AO to accomplish his duties and responsibilities. He—

- Is the battalion's chief of staff and is second in command to the battalion commander.

- Is responsible for orchestrating the battalion's orders process.
- Is responsible for the operation of the tactical operations center (TOC).
- Is the principal integrator of CSS.

COMMAND SERGEANT MAJOR (CSM)

The CSM's primary role is to advise the commander on matters concerning the soldiers in the battalion. He—

- Understands the administrative, logistics, and operational requirements of the battalion.
- Is the most experienced enlisted soldier in the battalion and keeps abreast of organizational matters.
- Receives taskings from the battalion commander and acts as a troubleshooter throughout the maneuver brigade sector.
- Focuses attention on functions critical to the success of the operation.
- Organizes and lays out the battalion assembly area, as necessary.
- Conducts liaison, leads advance or quartering parties, assists in the CSS effort, and monitors unit morale.
- Must be equipped with a vehicle and a communications system that allow him to travel and communicate long distances in varied terrain.

ADJUTANT (US ARMY) (S1)

The S1 ensures that unit strength, personnel, discipline, and law and order are maintained. He supervises and coordinates all personnel-support activities which encompasses the areas of—

- Personnel services.
- Administrative services.
- Chaplain activities.
- Legal services.
- Postal services.
- Morale.
- Public affairs.

INTELLIGENCE OFFICER

The S2 collects combat intelligence. In the absence of a dedicated S2 officer, the battalion intelligence NCO or another staff officer (as an additional duty) may perform the S2's functions. The S2—

- Analyzes, coordinates, and integrates engineer intelligence with the brigade S2.
- Produces intelligence products to support the IPB and orders process.
- Keeps the commander and staff updated on the enemy situation.
- Is the principal advisor to the commander on enemy engineer capabilities and limitations.

ASSISTANT BRIGADE ENGINEER

The ABE integrates engineer operations into the brigade. He participates in—

- Producing brigade plans and orders.
- Developing EBA products.
- War gaming COAs.

In the absence of the brigade engineer and S3, the ABE advises the brigade commander on engineer operations.

OPERATIONS AND TRAINING OFFICER

The S3 plans, organizes, and coordinates the battalion's and supporting units' engineer operations. He is the officer in charge

(OIC) of the ABE section. In the absence of the brigade engineer, the S3 advises the brigade commander on the current and future employment of engineers. He coordinates with the assistant division engineer (ADE) and TF engineers and maintains the current operational status of engineer units supporting the brigade.

SUPPLY OFFICER (US ARMY) (S4)

The S4 provides logistics information to the commander and functions as the battalion's logistics planner. He—

- Coordinates with the brigade S4 and company XOs on the status of equipment and supplies.
- Plans, coordinates, and supervises the logistical effort, to include coordinating all aspects of CSS in *paragraph 4* of the battalion order and engineer annexes.
- Coordinates with the forward support battalion (FSB) commander and support operations officer to ensure that the battalion commander's logistics priorities are understood and supported.
- Keeps the DIVEN S4 informed on logistics status.
- Functions as the battalion's purchase officer, as needed and authorized.

BATTALION MAINTENANCE OFFICER (BMO)

In the absence of a dedicated maintenance officer, the battalion maintenance technician (BMT), the support-platoon leader, or another staff officer may perform the BMO's functions as an additional duty. The BMO plans, coordinates, and supervises the maintenance recovery efforts of the maintenance section and ensures that adequate maintenance support is provided to the battalion. He works closely with the FSB on all maintenance matters. The BMO—

- Organizes and runs the battalion's maintenance program.
- Coordinates DS maintenance with the FSB.
- Prepares maintenance status reports using *DA Form 2406.*
- Anticipates and plans for maintenance requirements.
- Advises the commander on the impact that the maintenance status will have on current and future operations.
- Keeps the DIVEN and brigade S4 advised on the battalion's maintenance status.

SIGNAL OFFICER (SIGO)

In the absence of a dedicated SIGO, the battalion's communications NCO or another staff officer (as an additional duty) may perform the SIGO's functions. The SIGO—

- Develops the battalion's communications plan.
- Advises the commander on employing communications methods.
- Monitors and reports on the battalion's maintenance status.
- Ensures that communications are maintained with subordinate, superior, and lateral units.
- Monitors communications security (COMSEC).

CHEMICAL OFFICER (CHEMO)

In the absence of a dedicated CHEMO, the battalion's chemical NCO or another staff officer (as an additional duty) may

perform the CHEMO's functions. The CHEMO—

- Advises the commander on the probability and impact of enemy NBC employment.
- Disseminates chemical-activity reports to subordinate units, higher HQ, and lateral units.
- Monitors the battalion's chemical equipment and supply status.
- Recommends mission-oriented protective posture (MOPP) level.

CHAPLAIN

In the absence of a dedicated chaplain, a chaplain from another unit (on an area-support basis) may perform the chaplain's functions. The chaplain—

- Advises the commander on unit morale, spiritual well being, and esprit.
- Provides religious services and personal counseling.
- Coordinates special staff actions with the S1.

HHC COMMANDER

The HHC commander is located with the field trains. He—

- Is the OIC.
- Is the primary executor of the battalion's CSS plan.
- Coordinates security for and movement of the field trains.
- Is the liaison officer (LO) to the FSB.
- Functions as the CSS coordinator, assisting the S1 and S4 by ensuring that field-trains support is smooth and efficient.

FACILITIES

The battalion establishes a tactical CP, main CP, and rear CP (see *Appendix B*). It also establishes an ABE section which operates from the brigade main CP. The battalion tactical CP is located forward where the commander can influence the battle and communicate with all his elements. The commander might be located with the brigade command group or forward, leading an engineer TF. For example, the brigade commander could make the engineer battalion commander the breach-force commander in a brigade deliberate breaching operation, requiring the battalion commander to position himself forward in the fight.

The engineer battalion establishes a tactical CP to support the battalion commander or S3 during the battle. The tactical CP controls and coordinates (immediate effects of) the engineer close battle, which includes reconnaissance, situational obstacles, withdrawal or reallocation of assets, and immediate resupply for continuation or transition to a new mission. Other tactical-CP functions include displaying and tracking the current engineer situation and serving as a communications relay.

The engineer battalion main CP is positioned where planning and coordination can be accomplished in concert with the brigade. The battalion commander determines the location based on the engineer mission and capabilities of his staff. For example, the battalion commander may decide to locate his TOC with the ABE section in the brigade main CP to consolidate and better control a 24-hour TOC. He

may also decide to maintain a separate planning tent for concurrent planning. Regardless of the layout, the battalion main CP must be able to plan, control, and monitor combat operations.

TACTICAL CP

The principal members of the tactical CP are the—

- Commander, as required.
- S3, as required.
- Tactical officer (OIC).

The primary functions of the tactical CP are to—

- Monitor the tactical situation.
- Track the decision support template (DST).
- Assist the commander to see the battlefield and communicate with subordinates.

The secondary functions of the tactical CP are to—

- Anticipate engineer changes.
- Give early warning to subordinate units.

The tactical CP can be located with the—

- Engineer TF.
- Brigade tactical CP.
- Engineer main effort.

MAIN CP

The principal members of the main CP are the—

- Commander, as required.
- XO (OIC).
- S3, as required.
- Assistant S3.
- S2.
- S1/S4, as required.
- Operations sergeant.
- Communications sergeant.
- NBC sergeant.

The primary functions of the main CP are to—

- Serve as the net control station (NCS) of the battalion's command networks.
- Monitor the tactical situation.
- Manage engineer assets (synchronization matrix and time line).
- Report to the higher HQ and monitor flanks.
- Prepare an in-depth EBA and provide results to the ABE and brigade staff.
- Conduct the tactical decision-making process.
- Prepare the engineer annex and/or engineer portion of the brigade order.
- Prepare operation orders (OPORDs) for missions assigned to the engineer battalion.
- Plan future operations.

The secondary functions of the main CP are to—

- Back up the command of the battalion.
- Control the close fight when ordered.

The main CP can be located close to or with the brigade main CP.

ABE SECTION

The principal members of the ABE section are the—

- S3 (OIC).
- ABE.
- Operations sergeant.

The primary functions of the ABE section are to—

- Participate in brigade planning for future operations.
- Integrate and synchronize engineer operations.
- Execute deep operations.
- Monitor the tactical situation.

The secondary functions of the ABE section are to—

- Alternate as the CP for the engineer battalion main CP.
- Send reports to the higher HQ.

The ABE section is located with the brigade main CP.

REAR CP

The principal members of the rear CP are the—

- HHC commander (OIC).
- First sergeant, as required.
- S1/S4, as required.
- Support-platoon leader, as required.
- BMO, as required.

The primary functions of the rear CP are to—

- Conduct the logistics estimate as part of the orders process.
- Anticipate the battalion's logistical requirements.
- Prepare the administrative/logistics (A&L) annex to plans and orders.
- Receive administrative reports and requests for supplies from the companies and process them through the brigade rear CP, FSB support operations officer, or field trains, as applicable.
- Monitor the status of all classes of supply, maintenance, and personnel.
- Keep the higher HQ (DIVEN and maneuver brigade) informed on the battalion's CSS status.
- Plan, coordinate, and execute battalion reconstitution.
- Monitor the tactical situation.
- Function as the NCS of the A&L network.

The secondary functions of the rear CP are to—

- Supervise brigade rear-area engineer operations.
- Serve as the staff engineer to the FSB.
- Prepare to assume the functions of the main CP.

The rear CP can be located with the—

- Brigade rear CP or FSB main CP.
- Battalion's field trains.

The HHC commander functions as the LO to the brigade rear CP. The rear CP plans and coordinates the CSS plan. The field trains are the central point for CSS execution. Elements of the S1 and S4 sections use the rear CP as their base for planning and coordination.

THE PLANNING PROCESS

The tactical decision-making process is a systematic approach to formulating tactical plans. Troop-leading procedures (TLP), the estimate of the situation, METT-T, and IPB

are the processes that are used. These processes are interrelated (see *Figure 2-1).* They are accomplished based on the amount of time and resources available. There is a discussion in the following paragraphs on—

- Conducting TLP.
- Commander and staff actions.
- Integrating the estimate of the situation, METT-T, and IPB into TLP.

TLP, although continuous, are not a cut-and-dried process. There are no distinct

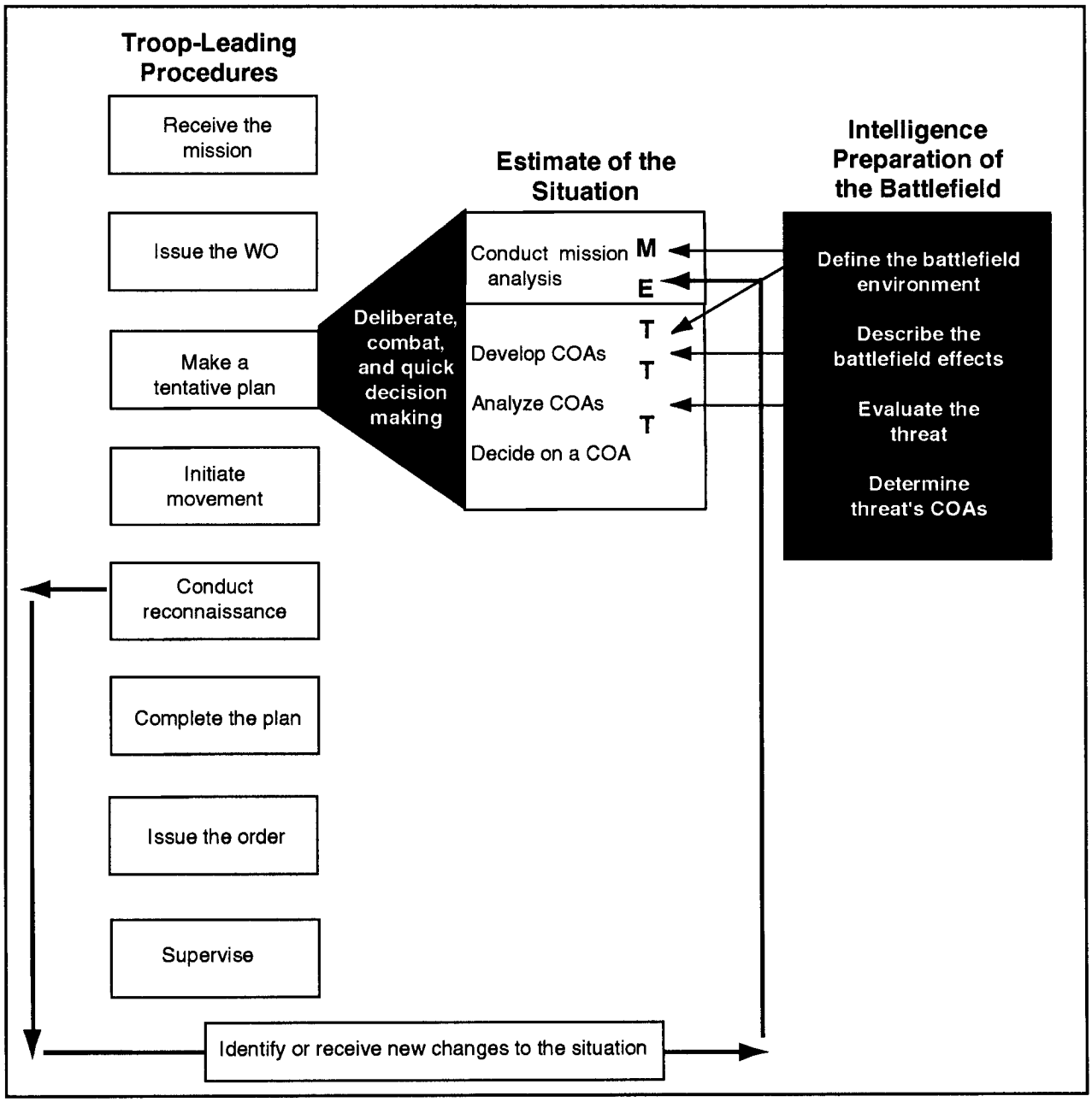


Figure 2-1. Relationship between TLP, estimate of the situation, METT-T, and IPB

start and stop points. The steps are not always performed sequentially; some can occur simultaneously. For example, the less time a unit has the more it must adjust or abbreviate TLP.

The collection, analysis, and distribution of information is a continuous staff requirement. Information that the engineer staff section analyzes is exchanged with other staff sections and used to update the situation. To successfully execute the mission, the engineer staff must focus on the information that the brigade and the engineer commanders need (horizontal versus vertical). The engineer battalion conducts all of the above procedures, to include the engineer estimate, as its method for supporting the brigade's tactical decision-making process (see *Figure 2-2).*

The engineer estimate is a logical thought process that supports the estimate of the situation and the brigade's orders process. It is continuously refined and conducted concurrently with the maneuver brigade (see *Table 2-1, pages 2-10 through 2-12, and Table 2-2, page 2-13).* The engineer estimate has a specific purpose. It—

- Allows the integration and synchronization of M/S.
- Drives the coordination between the engineer battalion and maneuver brigade staffs.
- Drives the development of engineer plans, orders, and annexes.

The tactical decision-making process is the planning framework for the combined arms staff. The staff engineer must be familiar with the process; moreover, he must be familiar with how he participates and coordinates with the brigade staff. The engineer commander, XO, and S3 must understand the brigade's decision cycle as it influences their planning at the brigade and engineer battalion levels (see *Figure 2-3, page 2-14).*

In the following paragraphs, there is a discussion on how the engineer commander and staff support the brigade's planning process. It is important to note that the main focus of the battalion HQ is supporting the maneuver brigade and subordinate companies.

RECEIVE THE MISSION

TLP begin with the receipt of a new mission. A unit normally learns of a new mission through a warning order (WO) from the higher HQ, followed later by an OPORD. A mission could also be announced in a fragmentary order (FRAGO) as a change to the current operation, or it can be deduced by the commander as a result of ongoing operations. A unit should begin planning as early as possible. The higher HQ should take no more than one-third of the available time it has to issue its order. Likewise, each successive unit has the same obligation to issue its order in a timely manner.

The engineer commander and staff focus on the following essential components of the basic order and engineer annex:

- Enemy situation.
- Mission paragraph.
- Task organization.
- Service-support paragraph.
- Engineer annex.

From these components, the engineer commander and staff determine the—

- Type of operation.
- Enemy and friendly situations.
- Assets available.
- Time available.

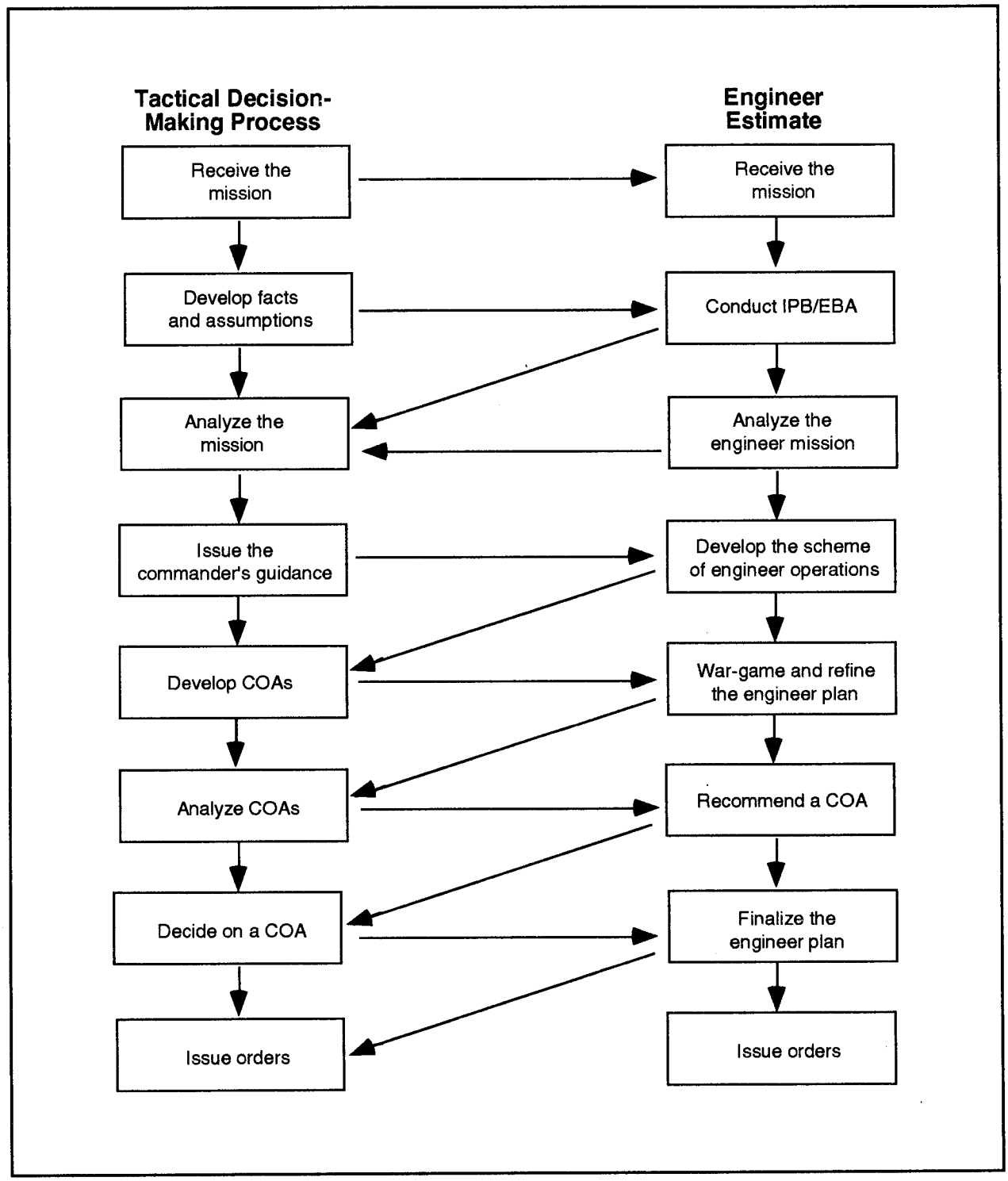


Figure 2-2. The tactical decision-making process and the engineer estimate

Table 2-1. Engineer estimate aspects relating to decision making at the maneuver brigade and the engineer battalion level

Tactical Decision-Making Process	Engineer Estimate	Actions to Be Taken
Receive the mission	Receive the mission	Sources of Information: • Enemy situation, from the necessary situation paragraph and the intelligence annex • Mission paragraph • Division's task organization • Service-and-support paragraph and annex • Engineer annex Determines: • Types of operations (offense, defense, and entry) • Assets available • Current intelligence picture • Time available (initial estimate)
Develop facts and assumptions	Conduct IPB/EBA	IPB/EBA Process • Develops facts and assumptions on— – Enemy engineer weaknesses/vulnerability – Critical friendly engineer capabilities and requirements • Mutually supports the S2's IPB process (continually) • Breaks the IPB/EBA process into three components: – Terrain analysis – Enemy missions and M/S capabilities – Friendly M/S capabilities Terrain Analysis Sources of Information: • Brigade S2 through terrain-analysis products produced during the IPB • MCOO • Terrain analysis (with the S2) • OCOKA • Ground reconnaissance Determines: • Terrain-enhancement requirements for the brigade • Effects of the terrain on friendly and enemy maneuver • AAs • Critical LOCs Enemy Mission and M/S Capabilities Sources of Information: • S2's order of battle • Doctrine template of enemy engineer organizations • Enemy engineer personnel/equipment capabilities • Current activities (such as SALUTE reports) Determines: • Situation template of enemy engineer activity and location • Tentative employment of specific engineer equipment and capability critical to the mission (for example, SCATMINES and breaching assets)

Table 2-1. Engineer estimate aspects relating to decision making at the maneuver brigade and the engineer battalion level (continued)

Tactical Decision-Making Process	Engineer Estimate	Actions to Be Taken
Develop facts and assumptions (continued)	Conduct IPB/EBA (continued)	Friendly Mission and M/S Capabilities Sources of Information: • Engineers task-organized to the brigade • Refined time estimate (from step one in conjunction with the brigade S3) • Known unit work rates • Availability of critical resources Determines: • Estimate of the total engineer capability for the mission • Impact of new information on the mission; this process is continuous. • Critical resource impacts on the mission
Analyze the mission	Analyze the engineer mission	Sources of Information: • Higher HQ mission • Commander's intent (analyze two levels up) • Scheme of maneuver (paragraph 3) • Scheme of engineer operations (paragraph 3) • Subunit instructions (paragraph 3) • Coordinating instructions (paragraph 3) • Service and support (paragraph 4) • Command and signal (paragraph 5) • Engineer annex Determines: • Specified M/S tasks • Implied tasks (analyze the mission with facts and assumptions) • Assets available (entire brigade TF) • Limitations (constraints and restrictions) • Risk, as applied to an engineer capability • Time analysis (time line) • Essential tasks (specified and implied tasks that are critical to the mission) • Restated mission
Issue the commander's guidance	Develop the scheme of engineer operations	Sources of Information: • Brigade commander • Brigade S3/XO • Maneuver COAs • Relative combat-power analysis Determines: • Tailoring of scheme of engineer operations • Engineer priority of effort/support • Higher commander's intent for M/S operations within the brigade sector • Employment considerations of engineers; the brigade engineer assists in the staff's maneuver COA development. • Tailored engineer scheme of operations for each maneuver COA. (Complete engineer plans for each COA are not developed; they are just concepts.) • Engineer missions and allocation of forces/assets. (Hasty assessment tools, such as belt planning, blade-hour estimates, or breach-lane requirements, are used to quickly evaluate each COA to determine if adequate assets are available to support the plan.) • Integration of engineer scheme of operations into maneuver COA (continuous process during this step)

Table 2-1. Engineer estimate aspects relating to decision making at the maneuver brigade and the engineer battalion level (continued)

Tactical Decision-Making Process	Engineer Estimate	Actions to Be Taken
Develop COAs	War-game and refine the engineer plan	Sources of Information: • Staff analysis. It identifies the best COA to recommend to the commander. • War-gaming techniques (outlined in *FM 101-5*). They are used to visualize the flow of the battle (each COA is independently war-gamed). • Advantages/disadvantages analysis of a given COA relative to another Determines: • Scheme of engineer operations that best supports the maneuver plan • Weaknesses in the engineer plan to make adjustments, such as— – Shifting assets to the main effort – Shifting engineer priorities – Recommending to the commander to accept risk at a specific time – Requesting additional engineer assets from higher headquarters • Integration of enemy engineer assets and actions as the S2 plays the enemy force • Engineer scheme of operations that best supports mission accomplishment
Analyze COAs	Recommend a COA	Sources of Information: • Combined staff analysis of the COAs during war gaming • Higher and adjacent engineer unit task organizations Determines: • Unified recommendation to the commander on which COA is best (engineer is prepared to inform the commander where risk must be accepted or what additional assets are needed to avoid risk). • Recommended COA for commander's decision Recommended COA for commander's guidance
Decide on a COA and issue orders	Finalize the engineer plan and issue orders	Sources of Information: • Commander's approved COA • Initial mission analysis (identify all specified/implied tasks) • Accepted engineer scheme of operations Determines: • Final engineer task organization • Final coordination with the staff on approved COA • Input to basic OPORD (scheme of engineer operations, subunit instructions, coordinating instructions, and engineer annex) • Engineer participation in the OPORD brief

Table 2-2. Relationship of the engineer estimate to the engineer annex

Engineer Estimate	Content	Engineer Annex Format
Develop the scheme of engineer operations for— • Force allocation • Task organization	Task organization of engineer units (includes who they support and in what command/support relationship)	Task organization
Conduct IPB	Aspects of the weather, terrain, and enemy M/S activities that significantly impact engineer missions	1. Situation a. Enemy
Conduct EBA of the— • Terrain • Enemy M/S capability	Missions and plans of higher and adjacent engineers that impact on the current planning should be identified	b. Friendly
Develop higher HQ OPORD and engineer annex	Changes in task organization which occur during the execution that need to be clarified	c. Attach/detach
Receive restated mission from the supported unit	Mission statement of the supported unit	2. Mission
Develop the scheme of engineer operations	Concept of the engineer operations to support the maneuver	3. Execution a. Scheme of engineer operations
	Details on the use of obstacles and SCATMINES	b. Obstacles c. SCATMINES
Analyze mission	Missions to engineer units: • Task-organized to brigades • Under brigade troops	d. Subunit missions
War-game and refine the engineer plan	Instructions common to two or more engineer units	e. Coordinating instructions
Develop the scheme of engineer operations	Allocation of M/S mission resources that should be identified	4. Service support a. Command-regulated supplies
Allocate resources	Method of mission sustainment	b. FSP locations
	Method of unit sustainment	c. Transportation d. Medical e. HN assistance
Finalize the engineer plan	Location of engineer CPs Special C^2 arrangements required reports	5. Command and signal

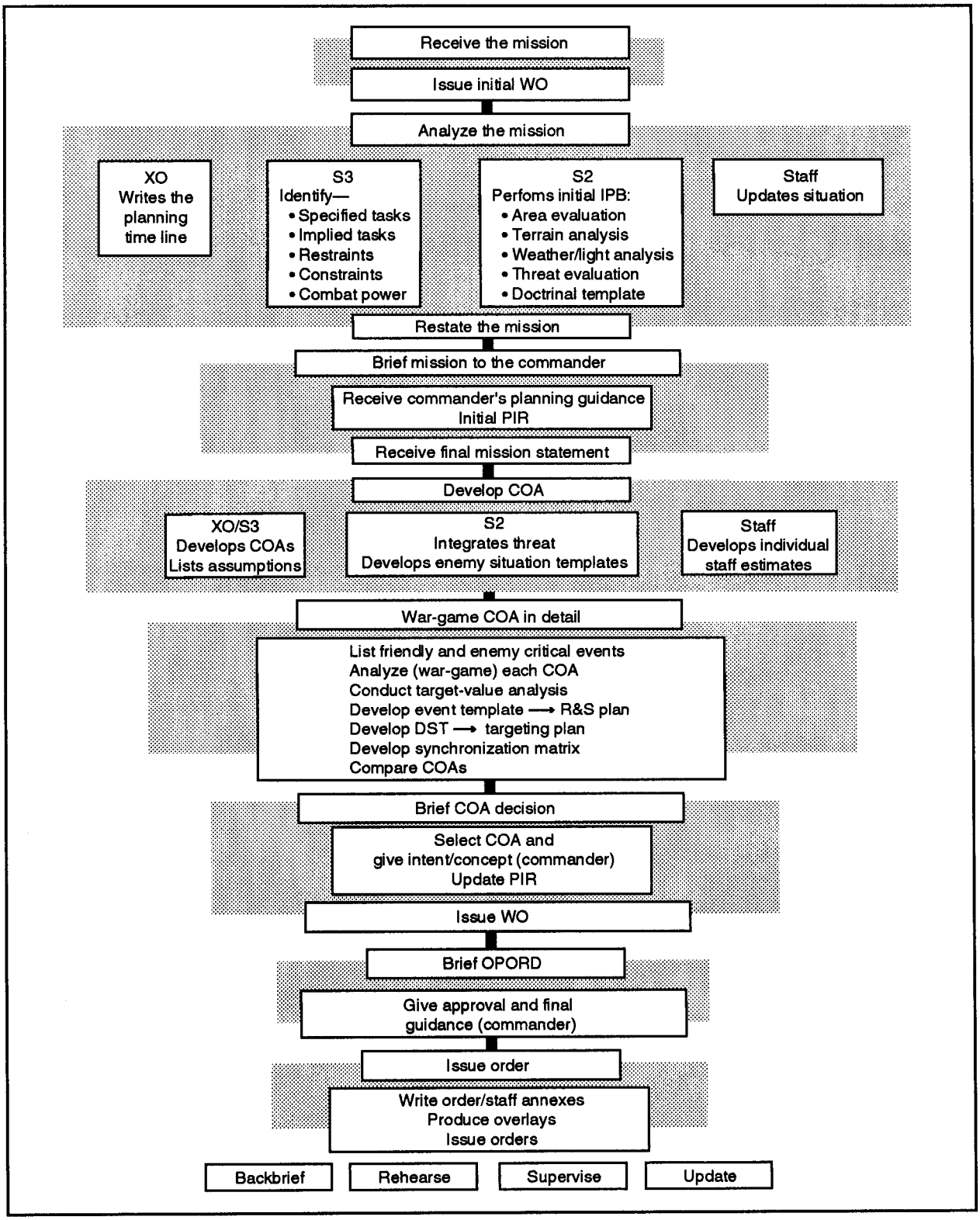


Figure 2-3. The brigade planning process

When the engineer commander learns of a new mission, he should issue an initial WO to subordinate units, informing them of the nature and time of the new mission. The engineer staff convenes and conducts the mission analysis. It normally conducts parallel planning during the estimate of the situation. The engineer XO or representative closely monitors the maneuver brigade's planning and attempts to conduct concurrent planning in the battalion TOC. The engineer S3 constantly exchanges information with the battalion TOC to facilitate the process.

ISSUE A WO

The engineer commander should issue a WO to units immediately after the brigade commander issues his planning guidance. The WO should be brief but contain enough information for the units to prepare for the mission. Additional WOs can be issued later to keep units informed and allow parallel planning to occur. WOs normally do not have a specific format; however, some of the following information should be in them:

- Enemy and friendly situations (brief).
- Changes in task organization.
- Earliest time of move.
- Nature and time of the operation.
- Time and place the OPORD is issued.
- Other specified tasks.

MAKE A TENTATIVE PLAN

The process that forms the basis for the entire operation is performed in this step. The time factor is a major influence on how the estimate of the situation is performed. The tactical decision-making processes are—

- Deliberate.
- Combat.
- Quick.

The time factor highly influences these processes. The most common process that the brigade conducts is the combat decision-making process (CDMP). The CDMP facilitates the demands of the ongoing operation by matching the realities of the high-tempo battlefield where windows of opportunity for action are fleeting and tactical demands continuously challenge the command. The CDMP is used during operations when the command may be executing and planning up to three operations simultaneously. Normally, in the CDMP, a friendly COA is wargamed against enemy COAs.

Mission Analysis

The first step of the command estimate process is the mission analysis.

Determine the Facts and Assumptions. The brigade or engineer battalion staff presents the maneuver brigade/engineer commander with facts and assumptions for the mission analysis and the development of COAs. The information pertains to both friendly and enemy situations. The engineer staff officer assists the commander in developing facts and assumptions by—

- Participating in the IPB.
- Conducting the EBA.

The IPB centers on templating the enemy, anticipating its capabilities, and predicting its intentions based on threat doctrinal norms and the order of battle. The engineer must understand the brigade S2's doctrinal and situation template so that he can analyze enemy engineer capabilities and the order of battle. The situation template becomes the foundation for the maneuver S2/engineer S2, S3, and ABE coordination. During threat evaluation and integration, the brigade S2 and the engineer must work

together. For example, obstacle intelligence (OBSTINTEL) and templating are developed in concert with the brigade S2's templating of a motorized rifle battalion's defense. The engineer S2 uses the situation template to further develop intelligence requirements (IR), PIR, and named areas of interest (NAIs) to support the event template and the reconnaissance and surveillance (R&S) plan. The engineer S3 or ABE, through the brigade S2, ensures that OBSTINTEL collection is integrated into the R&S plan.

The EBA is used as the framework for developing facts and assumptions. It consists of three parts. They are—

- Terrain analysis. The first component of the EBA is to analyze the terrain. The engineer develops facts and assumptions and supports the IPB process through the EBA. He analyzes the terrain and weather and assesses their impact on military/engineer operations. The terrain is analyzed using the following military aspects of terrain:
  - Observation and fields of fire.
  - Cover and concealment.
  - Obstacles.
  - Key terrain.
  - Avenues of approach (AA).

  The function of the terrain analysis is to reduce the uncertainties regarding the effects of natural and man-made terrain on friendly and enemy operations.

  Analysis of the military aspects of terrain is accomplished primarily through the preparation of the modified combined obstacle overlay (MCOO). The ABE and the engineer S2 assist the brigade S2 in developing the MCOO. It is the basic product of the battlefield-area-evaluation phase of the IPB process. The MCOO is the graphic terrain analysis on which all other IPB products are based. A slope overlay (for example, TerraBase) can be used to determine trafficability and intervisibility for intelligence collection, target acquisition, weapons capabilities, and obstacle integration within the brigade AO. These products are used for COA development and analysis (see *Appendix C*).
- Enemy mission and M/S capabilities. The second component of the EBA is to analyze the enemy engineer mission and M/S capabilities. The first step is to understand the enemy's mission and consider its doctrinal use of engineers. The engineer S2 uses the maneuver S2's doctrinal and situation template to develop the enemy engineer order of battle. He further assesses the enemy's M/CM/S capabilities and templates its effort and location. In coordination with the S2, the engineer S3 or ABE recommends IR/PIR, attempts to augment the reconnaissance effort, and monitors the collection of intelligence to confirm or deny the situation template.

  In the defense, the engineer templates the enemy's—
  - Mobility capabilities and location in its formation.
  - Use of SCATMINEs.
  - Engineers that support the reconnaissance effort.
  - High-value targets (HVTs) (bridging and breaching assets).

  In the offense, the engineer templates the enemy's—
  - Tactical- and protective-obstacle effort.

- Use of SCATMINEs.
- Survivability and fortification effort.

- Friendly mission and M/S capabilities. The third component of the EBA is to evaluate the friendly engineer mission and M/S capabilities and their impact on mission accomplishment. To perform this function, the ABE uses the information he developed in the first step (receive the mission). He evaluates the task organization to determine the engineer organization and assets available. He considers the possibility of additional support from the maneuver force and the engineer higher HQ. The engineer must also consider the availability of critical resources. After he determines the total assets available, he uses standard planning factors or known unit work rates to determine the total engineer capability.

  The engineer combines his terrain analysis and enemy and friendly capabilities to form facts and assumptions about the following:

  - Likely enemy engineer effort and the most probable enemy COA.
  - Critical friendly and enemy tactical events.
  - Potential enemy vulnerabilities.
  - Impact of these factors on the mission.

  The facts-and-assumptions process is lengthy, and the engineer must maintain his focus on the information that the maneuver commander and his battle staff need to make decisions. The EBA is a continuous process that is continually refined. Each time new information is collected, the engineer must evaluate its impact/effect on the mission and refine the facts and assumptions, as necessary.

Analyze Higher Headquarters' Mission and Commander's Intent. When analyzing the mission, the OPORD should be studied in front of a map with the overlays posted. This allows a better understanding of the terrain on which the operation takes place. It also allows implied tasks to be more readily identified. It is a good idea to list all identified tasks on paper. The list can be checked later to ensure that all tasks are addressed in the plan. During mission analysis, the following are identified:

- Specified tasks. Tasks derived directly from the WO, the OPORD, or the commander's intent. Examples are obstacle zones, obstacle belts with intents, the required number of breach 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 (not specified in the higher OPORD) 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 staff 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 helps the staff engineer as he participates in the COA development. For instance, the amount of firepower available may help to determine whether the force should conduct an instride breach versus a deliberate breach.

- Limitations (constraints and restrictions). 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 that the staff engineer must consider in his mission analysis. Restrictions are limitations placed on the commander that prohibit the command from doing something. Therefore, they greatly impact 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 may 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 staff engineer must understand how a risk involving an engineer capability specifically impacts combined arms operations and must advise the commander accordingly.
- Time analysis. The staff engineer must ensure that engineer operations are included in the combined arms time analysis. The time analysis has several steps. The first step is to determine the actual time available. The staff engineer establishes a fact or an assumption of the time available while preparing the friendly capabilities portion of the EBA. Now he refines his 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.
  - Line-of-departure or prepare-to-defend times.
  - Rehearsals.
  - Hours of darkness or limited visibility.

  This technique assists the staff 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 staff engineer focuses the development of his plans, staff coordination, and allocation of resources on the essential tasks. The staff 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 engineer commander must be familiar with the brigade's and the engineer battalion's decision cycle. A decision cycle is the total time required from the time the commander obtains information, to include the time it takes to process it, make a decision, issue orders, and have subordinates execute the operation. A time line is a necessary tool to properly plan time allocation (see *Table 2-3).*

Once the commander has an understanding of his mission and the time available, he must allocate the time for the various phases of the operation. This allocation is often done by reverse planning. Knowing the time to execute the operation, the

commander must consider the amount of time needed for the unit to accomplish troop-leading tasks. The time analysis produces a schedule of activities (time line) that must occur. Finally, as a part of the mission-analysis brief, the XO recommends the time line for the operation.

Issue Commander's Guidance. This may be the first time the brigade or the engineer commander is able to meet with his staff. The briefing includes the tasks the staff identifies and the restated mission it recommends. The commander approves or disapproves the restated mission and issues his planning guidance to the staff. Whether at the maneuver brigade or the engineer battalion level, the commander and his staff should develop a list of priorities to discuss at this briefing. This is the staff engineer's opportunity to raise any questions with the brigade or the battalion commander. The commander's planning guidance consists of the following:

- Restated mission.
- Higher commanders' intents (two levels up).
- His own intent (required).
- COAs for his staff to consider.
- Time and place of decision brief (time line).
- PIR.
- Commander's critical information requirements (CCIR) (his own critical information requirements).
- Effects desired on the enemy force.
- Risk assessment.

The commander's planning guidance is the single most important element of the estimate process. His ability to state his vision for the mission provides the engineer staff with a defined focus that is required to develop and analyze COAs. The engineer commander must provide his guidance as it applies to vertical and horizontal planning. The engineer staff focuses primarily on identifying, integrating, and synchronizing tasks to support the engineer mission (vertical). The S3, ABE, and S2 focus on integrating and synchronizing tasks to support the maneuver brigade mission (horizontal).

Table 2-3. Brigade time line

Time	Event
171200	Receive the mission, then— • Analyze the mission • Establish time line • Issue WO number 1 • Conduct staff estimates • Issue commander's guidance • Develop COA
1500	War-game/compare COA
1800	Brief decision
1830	Issue WO number 2
2230	Brief orders
2400	Distribute orders (R&S)
181000	Rehearse (brigade)

Reconnaissance is normally conducted later; however, the commander may decide to conduct his reconnaissance at this time. Reconnaissance missions that are given to the units could also be issued at this time.

COA Development

A COA is a possible plan that commanders can use to accomplish the mission. It is usually stated in broad terms with the details determined during war gaming. The brigade staff comes prepared with its tools for

planning. The EBA provides a reference for the ABE's and/or S3's participation in the brigade's COA development and analysis. Depending on the time available and the brigade staff's experience, the brigade S3 decides on its level of participation in developing COAs. COA development consists of the following steps:

- Analyzing relative force ratios.
- Arraying initial forces.
- Identifying critical events, enemy and friendly.
- Developing an initial scheme of maneuver.
- Determining C^2 means and control measures.
- Preparing COA statements and sketches.

At a minimum, the engineer S3 and/or ABE ensures that the brigade S3 understands the engineer task organization and available combat power. He develops his scheme of engineer operations to support the COAs. His initial scheme is a rough draft and is refined during the war-gaming process.

COA Analysis

An analysis identifies the best COA for recommendation to the commander. It can begin with the S3 briefing the staff on each friendly COA. At this time, the S3/ABE may identify a COA that is not feasible in his area of responsibility; therefore, it should be eliminated or modified immediately.

War-Game COAs. The XO leads the brigade staff in analyzing (war gaming) each friendly COA against enemy COAs. War gaming is a logical step-by-step process that relies heavily on tactical judgment and experience (see *Figure 2-4).* The analysis process is action, reaction, and counteraction. The war-gaming technique used (AA, box, belt) is based on time and staff training. Detailed war gaming accomplishes the following:

- Achieving the desired end state of a COA.
- Listing advantages and disadvantages.
- Assessing the feasibility of the COA.
- Completing the event template.
- Identifying requirements for CS and CSS.
- Synchronizing combat functions/critical events.
- Completing the synchronization matrix and DST.
- Developing the engineer task organization.
- Developing the brigade OPORD.

Detailed war gaming focuses on the timing aspect of the operation. The friendly COA selected is war-gamed in a deliberate fashion against enemy COAs. A myriad of tasks from the commitment of reserves, close air support (CAS), indirect fire, and the employment of family of scatterable mines (FASCAM) is synchronized. Additional NAIs are identified and included on the event template. Target areas of interest (TAIs) and decision points are identified and annotated on the DST. The DST, also referred to as the revised operations overlay, is the result of detailed war gaming. For more information on war gaming, see *FM 101-5.*

The engineer S3 and/or ABE must be an active player. For example, he must wargame the timing aspects of situational obstacles, obscuration and suppression for combined arms breaching, and the positioning

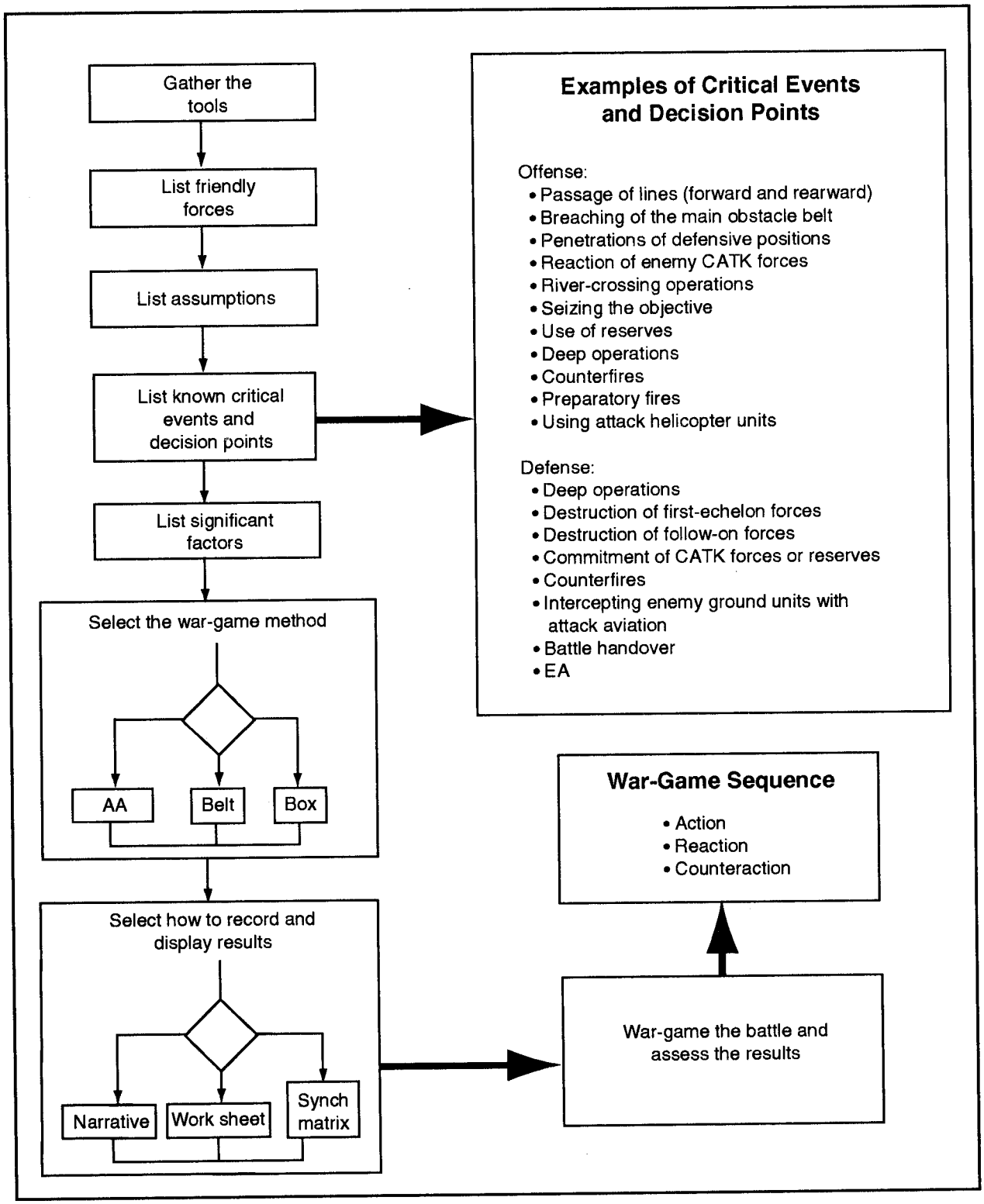


Figure 2-4. War-gaming steps

of forces and material for current and future operations. It is through detailed war gaming that the battlefield is truly synchronized. Understanding basic movement rates and other planning factors is paramount in war gaming.

The fundamental role of the brigade staff is to synchronize and apply all the capabilities of the brigade and contribute to the success of the mission. The staff must record the results of each war game on the synchronization matrix and DST. This ensures that every member of the combined arms team understands when and where they need to apply their capabilities to achieve the effects and outcome the commander expects.

The brigade S3 portrays the friendly force while the brigade S2 interprets the enemy situation template and anticipates enemy actions. The engineer S3/ABE must be ready to interject thoughts and identify critical events/tasks as they apply to his BOS. He identifies engineer tasks and determines if a task is feasible based on the assets available. Also, he must articulate the actions of enemy engineers as the battle is played out. The war-gaming session must assess the feasibility of COAs and capture issues, tasks, and actions that are discussed during the session. The information that is gathered is used to further develop the event template and the synchronization matrix. The engineer uses the information to further develop his scheme of engineer operations.

The engineer battalion develops and wargames COAs; however, its focus is on the vertical piece of the operation. The battalion identifies vertical critical tasks and ensures that the tasks supporting the critical event are feasible and well integrated. The engineer XO leads the sessions and ensures that the information gathered is recorded, coordinated, and monitored. Close coordination between the engineer XO and S3 helps facilitate information flow and supports parallel planning.

Compare COAs. COA comparison consists of comparing options and choosing a COA. The actual comparison may follow any technique which allows a recommendation to be reached. An effective technique for comparing COAs is to use a comparison matrix. Each COA is compared to the others using specific criteria. When comparing COAs, the engineer determines which scheme of engineer operations best supports accomplishing the mission.

Recommend a COA. The brigade staff recommends to the commander the best COA. Each COA is outlined, the advantages and disadvantages of each presented, and a recommendation is made.

Decision/Execution

The brigade commander considers the staff's recommendation and announces his decision and concept/intent. At this point, the engineer commander and S3 can issue another WO to the subunits with updated information from the brigade commander. This facilitates planning at the engineer battalion and the company level. Although decision/execution is the final step of the tactical decision-making process, execution is encompassed in the remaining steps of TLP.

INITIATE MOVEMENT

A new WO, movement order, or FRAGO can initiate the movement of units. Units may have to reposition to start the operation on time. Movement of subordinate units may be necessary to change task organization. Some movement, especially reconnaissance units, may be necessary immediately after

receipt of the WO from the higher HQ. If there is enough time to issue the OPORD before any movement begins, the movement instructions can be included in the OPORD. Often, movement has to occur simultaneously with planning.

CONDUCT RECONNAISSANCE

Reconnaissance should be conducted whenever possible. The situation and the time available dictates the type and quality of reconnaissance. To best use available time, leaders should do an initial map reconnaissance to find routes and locations to reconnoiter before departing. For best results, map reconnaissance should begin immediately upon receipt of the higher headquarters' WO and continue until the mission is accomplished. Reconnaissance requires a combined arms effort, and the combat engineer can be a key player. The fundamental imperative is to train your reconnaissance force.

COMPLETE THE PLAN

Upon completing the detailed war game and the decision brief, the brigade staff quickly prepares the plan/order. The tasks identified through the war-gaming sessions are used in preparing the plan/order. Specific engineer tasks and instructions that involve maneuver units should be written in *paragraph 3* of the brigade order. *Table 2-4, page 2-24*, further depicts the relationship between the engineer estimate and the brigade OPORD. All other tasks related to the engineer scheme are included in the engineer order and annex (see *Appendix D*). Multiple copies of the plan/order must be made, and overlays must be accurately copied.

ISSUE THE ORDER

The commander issues an OPORD to subordinate commanders to ensure the coordinated execution of an operation. A FRAGO is an abbreviated OPORD used to convey changes to an OPORD as the situation requires. The order should be issued at the time and place stated in the WO, using the most secure methods available. As a minimum, an overlay (including an execution matrix) should be issued to subordinates.

The engineer battalion commander, S3, or ABE should brief the engineer portion of the brigade order. He will brief significant engineer tasks as they relate to the scheme of maneuver. This is his only opportunity to brief TF commanders on the scheme of engineer operations. He ensures that the TF commanders understand the task organization and specific instructions to subordinate units.

SUPERVISE

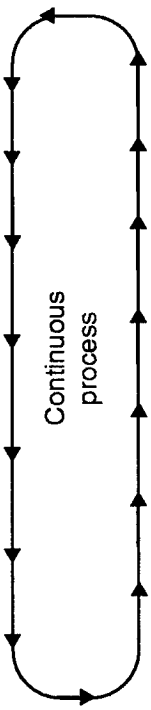
Once orders are issued, the engineer commander and staff supervise combat preparation and execution. Rehearsals, precombat checks and inspections, intelligence updates, and battle tracking are monitored.

Reports are submitted according to the unit tactical SOP. Battle maps and status charts are accurately maintained. This cannot be overemphasized. The reporting scheme that the battalion establishes must be efficient. Too many reports will overload the system. Focus your reports on what the commander needs to make critical decisions.

COMMUNICATION

Communication is the method through which C^2 is exercised. The chain of command and succession of command must be known throughout the organization. There must

Table 2-4. Relationship of the engineer estimate to the brigade OPORD



Engineer Estimate	Input	OPORD Paragraph
Conduct IPB/EBA	Critical aspects of the terrain and enemy engineer activity that impact the maneuver plan	1. Situation a. Enemy Intelligence annex
Analyze the engineer mission	Mission-essential M/S tasks assigned to maneuver units or separate engineers	3. Execution e. Subunit missions • Maneuver • Engineer
Develop the scheme of engineer operations	Concept of engineer operations to support the brigade plan Task organization of engineer forces and command/support relationships Allocation of M/S mission resources to maneuver units Graphic-control measures needed for obstacle-control, river-crossing, and large-scale breaching operations	3. Execution e. Subunit missions • Maneuver • Engineer Task organization 4. Service support Overlays: Operations Engineer CSS
War-game and refine the engineer plan	Additional coordinating instructions to maneuver units that are needed to synchronize engineer effort	3. Execution f. Coordinating instructions
Recommend a COA	None	None
Finalize the engineer plan		

be open lines of communications up, down, and laterally. The commander should—

- Provide for redundancy in the methods of communications. When possible, have a backup at key locations.
- Make sure subordinates know what to do during interruptions in communications. Ensure that SOPs specify immediate actions in case of jamming.
- Avoid overloading the communications systems. Use them only when necessary. Practice disciplining communications procedures by eliminating nonessential conversations.

The frequency-modulated (FM) network is the primary method of communications within the battalion. It operates two FM networks: command and A&L. The command network is for passing command traffic, operational information, periodic updates, and short immediate reports. The A&L network is for passing routine reports and coordinating battalion-level service support. *Table 2-5* lists the personnel and facilities that monitor the engineer battalion networks.

Mobile subscriber equipment (MSE) is the primary method of communications with higher units. Mobile subscriber radio telephones (MSRTs) support key decision makers in the battalion. The battalion TOC is normally located near the brigade TOC so that MSE can be wired to the brigade's small extension node (SEN). *Table 2-6, page 2-26,* shows the minimum amount of MSE required for personnel and facilities.

NOTE: When an MSRT-equipped vehicle is unoccupied, the digital secure voice terminal (DSVT) is remoted to a manned area.

Table 2-5. Engineer battalion networks

Personnel/Facilities	Networks
Battalion commander	Battalion command and maneuver brigade command
CSM	Battalion command and battalion A&L
XO	Battalion command and battalion A&L
S3	Battalion command and maneuver brigade command
Tactical CP	Battalion command and battalion A&L or brigade operations and intelligence
TOC	Battalion command, maneuver brigade command, and maneuver brigade operations and intelligence
ABE	Battalion command and battalion A&L
Rear CP	Battalion command and battalion A&L
Line-company commander	Company command and TF command
Line-company CP	Battalion command and company command

RESPONSIBILITIES

Responsibilities for communications are as follows: senior to subordinate, supporting to supported, reinforcing to reinforced, passing to passed (forward passage of lines), passed to passing (rearward passage of lines), left to right, and rearward to forward.

Table 2-6. Minimum requirements for MSRTs/DNVTs

Personnel/Facilities	Mobile Subscriber Radio Telephone	Digital Nonsecure Voice Terminal
Battalion commander (alternate facsimile (FAX)	1	—
Battalion TOC (alternate FAX)	1	1
S3 (alternate FAX)	1	—
XO	1	—
Line-company commander (alternate FAX)	1	—
Battalion rear CP	—	1
ABE	—	1

TECHNIQUES

Regardless of the task organization, it is the subordinate's responsibility to keep the commander informed. The eavesdrop technique may be used at all levels. It requires that radio stations be on a specific network for personnel to monitor and use message traffic even if they are not the direct recipients of the message. This allows commanders to stay abreast of the situation without having to respond to reports. Other techniques include—

- Sending reports through the supported unit.
- Sending periodic reports to the higher HQ, as required.

CHAPTER 3

Offensive Operations

Brigades normally conduct offensive missions in support of a division or corps operation. These missions include serving as the—

- Main attack.
- Reserve.
- Follow and support.
- Supporting attack.

The factors of METT-T may require that the brigade be task-organized differently for each mission. Brigade resources are almost always limited. The engineer battalion is task-organized forward and prepared to conduct reconnaissance, mobility, and countermobility operations.

Battles are fought in depth. The brigade engineer must understand the brigade's offensive framework—deep, close (reconnaissance/security, main and supporting attacks, and reserves), and rear operations. For more information on these elements, see *FM 71-3*.

OFFENSIVE CHARACTERISTICS

The offense is the commander's primary means of gaining the initiative. Through constant offensive pressure on the enemy, he is best able to force the enemy to conform to his intent and retain his own freedom of action. Even in the defense, the commander seeks to regain the initiative through offensive action at the earliest opportunity.

The success of the attack depends on the proper application of the following offensive characteristics:

- Surprise.
- Concentration.
- Tempo.
- Audacity.

Concentration is achieved by narrowing the zone of the main attack, thereby achieving an advantage of combat power at the point of attack. Brigade commanders balance the requirement for concentration against that of presenting a lucrative target for enemy CATKs by indirect conventional or nuclear fires.

Surprise, tempo, and audacity provide the depth and the agility required for successful brigade operations. Surprise is achieved by attacking at unexpected locations and times. Tempo and audacity provide the speed, mass, and decisiveness that creates the desired pressure on the enemy.

At the point of attack, the brigade must create the conditions to mass combat power. The brigade engineer focuses his efforts on maintaining the momentum (tempo) of the attack and allowing the brigade combat team to mass and overwhelm the enemy. He conducts reconnaissance and mobility operations to sustain the tempo at the point of penetration (POP).

The need to generate enough mass strongly influences which echelon can conduct a breaching operation (see *Table 3-1).* A company team generally cannot simultaneously mass sufficient fires, breach the obstacle, and also assault the defending position unless it is a simple obstacle defended by no more than a squad. A TF has sufficient combat power to attack an obstacle defended by a company and is normally the echelon used to conduct the breach.

The brigade has sufficient combat power to attack a complex and well-defended obstacle but has difficulty deploying all its combat power within range. Normally, the brigade breaches by isolating a small segment of the defense (platoon or company) that a TF can attack as the breaching echelon. If the obstacle and defense are in-depth (large-scale), brigades would normally receive additional support (such as artillery, engineer, and aviation) from the division for large-scale breaching operations.

The main feature of an offensive battle is destroying the enemy. OBSTINTEL provides the critical information required to locate enemy weapon systems and fire sacks. Based on this information, the brigade seeks to avoid the enemy's strength by—

- Preventing it from occupying its defensive positions.
- Isolating its forces from sources of support.
- Forcing it to fight in an unintended direction.

The engineer battalion is task-organized with the forward TFs and prepared to conduct combined arms breaching and other mobility tasks. Finally, units are assigned "on-order" missions to conduct countermobility operations to protect the flanks and support their transition to the defense.

Table 3-1. Types of breaching operations versus enemy size

Maneuver Unit	Instride	Deliberate	Assault	Covert	Enemy Size Overwatching Obstacles
Brigade	X X	X √	X	X	MRB MRC MRP
Task Force	X	X √	X	X X	MRB MRC MRP
Company		X	X	X X	MRB MRC MRP

X – Type of breach normally conducted
√ – Possible variation depending on scheme of maneuver

BOS INTEGRATION AND SYNCHRONIZATION

In offensive operations, the battalion staff identifies critical tasks and events that must be war-gamed to determine when and where combat, CS, and CSS assets are applied to achieve mass and synchronization. *Table 3-2, page 3-4,* lists critical tasks for offensive operations; it focuses on the critical tasks that must be integrated (coordinate) and/or synchronized (predict time and effect).

TACTICAL OFFENSE AND THE BRIGADE ENGINEER

The general forms of the tactical offense are—

- Movement to contact (MTC).
- Attack.
  - Hasty.
  - Deliberate.
  - Spoiling.
  - CATK.
  - Raid.
  - Feint and demonstration.
- Exploitation.
- Pursuit.

The brigade is trained and task-organized to pass from one operation to another without delay. The types of operations may be conducted in sequence in a successful battle, beginning with a MTC to locate the enemy and ending with the destruction of the enemy through pursuit.

MOVEMENT TO CONTACT

A MTC is conducted to gain or reestablish contact with the enemy. It is used to develop the situation early to provide an advantage before decisive engagement. The brigade conducts a MTC as part of a larger formation.

Planning

Planning begins by conducting the mission analysis, identifying tasks, and allocating forces. Typical tasks are—

- Combined arms breaching.
- Countermobility (tactical employment to protect flanks and support the attack/transition to defense).
- Reconnaissance (technical and tactical).
- Route clearance and marking.

The engineer S3/ABE identifies and wargames critical engineer tasks. His objective is to integrate and synchronize the tasks with other BOSs. For example, all offensive operations require a combined arms breaching capability. In a MTC, the brigade engineer considers the enemy situation and allocates forces accordingly. He task-organizes his forces with the brigade advance guard and forward TFs to support in-stride breaching. He anticipates and assigns a "be-prepared" deliberate breach mission. The brigade engineer's thought process includes the breaching tenets (intelligence, mass, synchronization, organization, and fundamentals) as he conducts the decision-making process (see *FM 90-13-1, Chapter 2).*

Table 3-2. Critical tasks for BOS integration and synchronization

Battlefield Operating Systems	Critical Tasks
Intelligence	• Template expected enemy engineer assets. • Analyze enemy missions and combat capabilities, includes weapons and their effective ranges. • Analyze enemy engineer organizations and their manpower and equipment capabilities. • Estimate and template the capabilities of the enemy to employ SCATMINEs, NBC, and survivability and to emplace conventional minefields. • Analyze recent enemy activity (intelligence updates). • Identify AAs from the flanks during the attack and the need for flank protection. • Identify AAs upon consolidation and support the transition to the defense. • Use the MCOO for templating. • Recommend IR and PIR and integrate them into the R&S plan. • Review all templates (doctrinal, situation, event, and DST). • Recommend HVTs (SCATMINE delivery systems). • Use intervisibility overlays and TerraBase to position forces and analyze fire control.
Maneuver	• War-game and determine the type of breaching operation required. • Focus on the allocation of forces to accomplish the mission. • Conduct reverse planning from actions on the objective. • Identify engineer critical tasks to support the scheme of maneuver. • Focus on synchronization (war-game and time the breach). • Identify mechanical breaching capability (include the number of plows). • Identify acceptable force ratios for assault and support forces. • Record situational obstacle employment on the DST/synchronization matrix.
M/S	• Determine engineer critical events and actions (war-game). • Identify the main effort. • Allocate engineer forces to meet the requirement. • Develop the synchronization matrix and time line. • War-game SCATMINE employment. • Check C^2 (who does what). • Template enemy use of NBC (monitor and report). • Determine MOPP level for breaching operations.
FS	• Conduct a TVA and recommend HVTs. • War-game with the FSO to determine artillery effects and the CFZ at the POP. • Determine the number of volleys required to achieve the effect. • Identify observer locations for SCATMINE targets. • Check the positioning and timing of artillery support. • Check the FS overlay and target list.
AD	• Ensure ADA coverage of breaching points and critical movement routes.
CSS	• Develop Class IV/Class V requirements. • Coordinate with CSS representatives (brigade S4 and FSB) to accomplish CSS requirements. • Identify limitations and get additional support. • Check UMCP locations and prioritize maintenance recovery. • Position recovery assets to best support forward units. • Anticipate losses and request replacements. • War-game and predict casualties (when and where). • Monitor the request for Class IV/Class V materials and haul support.
C^2	• Integrate and synchronize engineer operations through the brigade's decision-making process (deliberate, combat, or quick). • Synchronize during war gaming (determine the timing aspects of the breaching operation). • Identify strengths and weaknesses in the COA. • Identify C^2 requirements for the staging and movement of follow-on forces and equipment. • Identify the breaching operation as a critical event and reverse plan. • Track the DST/synchronization matrix. • Determine the location of the commander, S3, and XO to influence the battle.

The brigade staff, normally the brigade and engineer S3s/ABE, war-games the use of tactical obstacles. Emplacing conventional minefields in the offense is difficult and requires a realistic time estimate. Belts or brigade-directed obstacles are planned to protect flanks and support a meeting-engagement battle. The brigade staff war-games this scenario based on time phase lines (TPLs) for the two converging forces. The engineer S3/ABE, with the help of the maneuver S2, the S3, and the FSO, synchronizes the use of situational obstacles. They focus on getting the right obstacle to the right target at the right time. See *Figure 3-1* for the engineer force laydown for a MTC and *Figure 3-2, page 3-6,* for engineer support to a MTC.

Preparation

The engineer S3/ABE continues to refine the plan. He coordinates with the other staff officers to ensure that engineer tasks are integrated into the maneuver plan. The engineer S2 monitors the intelligence updates and provides information to the commander and staff. The S2 takes this information and updates the appropriate templates. The brigade engineer may recommend changes based on this input. The brigade engineer and his staff monitor precombat inspections (PCIs) and supervise rehearsals. The commander is the key player at the brigade rehearsal. He talks through critical engineer missions, tasks, actions, and decisions as the battle is played out. It is important that adequate time is

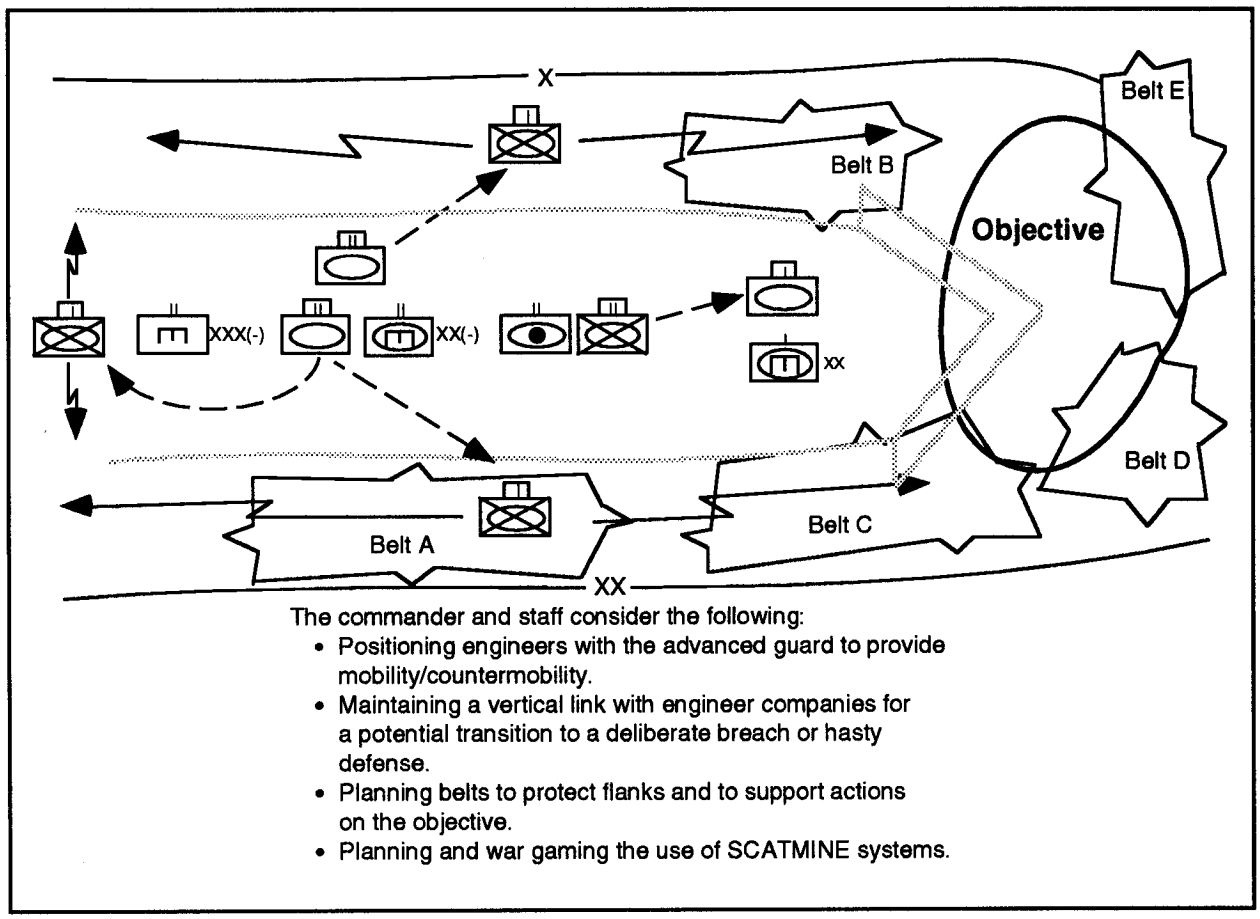


Figure 3-1. Engineer force laydown for a MTC

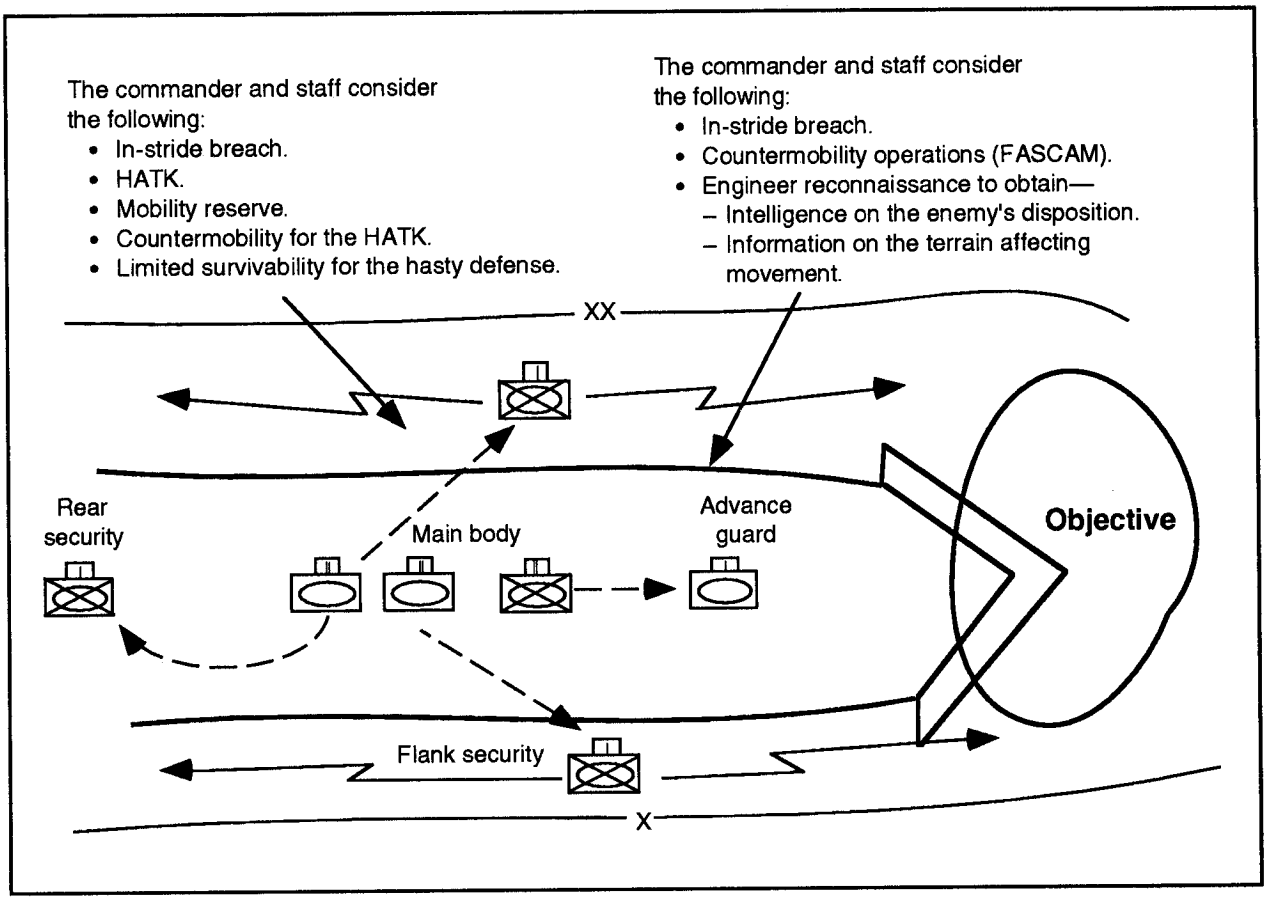


Figure 3-2. Engineer support to a MTC

considered before rehearsals are decided on. Extensive planning is required to execute full-scale rehearsals correctly. Time influences the rehearsal technique that is used for a given mission (see *FM 90-13-1, Appendix D*).

Execution

The brigade engineer normally directs the fight from the brigade command group. He monitors the battle and reports the status of significant engineer events as they occur. Staff officers also monitor activities and report the status to the higher HQ. Battle maps and status charts are maintained. During the battle, the engineer—

- Tracks enemy and friendly locations and critical events.
- Tracks the DST/synchronization matrix and keeps the commander informed.
- Tracks the employment of enemy and friendly SCATMINE systems.
- Sends SCATMINE warnings to subordinate units.
- Tracks battlefield losses and requests replacements.
- Tracks the positioning of Class IV/ Class V supplies.

Note: The above are normal C^2 functions for all combat operations.

ATTACK

The two major types of attacks are hasty and deliberate. The other types of attacks will not be discussed in-depth in this chapter; however, the same engineer fundamentals and considerations apply to each type of attack. Spoiling attacks, CATKs, raids, feints, and demonstrations require obstacle breaching and other mobility tasks. Combat engineers may also do some countermobility tasks. Diversionary operations, such as feints and demonstrations, may require engineers to complete the deception. METT-T influences the scheme of engineer operations. For more information on the other types of attacks, see *FM 100-5.*

Hasty

A hasty attack (HATK) is usually conducted following a MTC or when unexpected enemy contact is made. The basic principle in conducting the HATK is to seize the initiative. Depending on the disposition of the enemy, a HATK can be conducted against a—

- Moving enemy force.
- Stationary enemy force.

A HATK may be conducted in a number of situations, to include as a planned contingency during a MTC or as an unforeseen contingency during hasty or deliberate defenses and a deliberate attack (DATK).

Planning. The brigade engineer supports a HATK by developing a decentralized and flexible engineer task organization. HATKs are always a planned contingency in a MTC. Because the HATK is usually an outcome of the MTC, any intelligence planning will be that which was conducted as part of the MTC planning.

The nature of a MTC requires each maneuver unit to be task-organized with engineer units and have the capability to conduct engineer operations. Since there is no time to shift assets, engineer support to the HATK is based on the existing task organization. Engineer critical tasks identified for the MTC are applicable to the HATK (see *Figure 3-3, page 3-8, and Figure 3-4, page 3-9).*

Preparation. The engineer battalion prepares for the HATK while rehearsing the MTC. The brigade commander decides whether to conduct a HATK based on the advice of the S2 and the spot reports from the units in contact; therefore, split-second decisions are required. As a minimum, the commander wants to know the—

- Effort and composition of enemy tactical obstacles.
- Location and intent of enemy obstacles (kill sacks).
- Location of possible bypass routes and the consequences of them.

The commander ensures that subordinates understand their actions upon enemy contact. Rehearsals include actions on contact with enemy obstacles. In-stride breaching is rehearsed as part of the HATK. It is important that the engineer understands his role and that of his combined arms teammates.

Execution. The brigade engineer has a difficult role during the HATK. He must allow his subordinates to develop the situation and make decisions quickly. The C^2 functions that the engineer commander and staff conduct for the HATK are similar to those conducted for the MTC. The brigade engineer monitors the battle from the command group or lead TF and provides critical information to the brigade commander, as required. Commanders must talk laterally and vertically, developing the situation and maneuvering as a team.

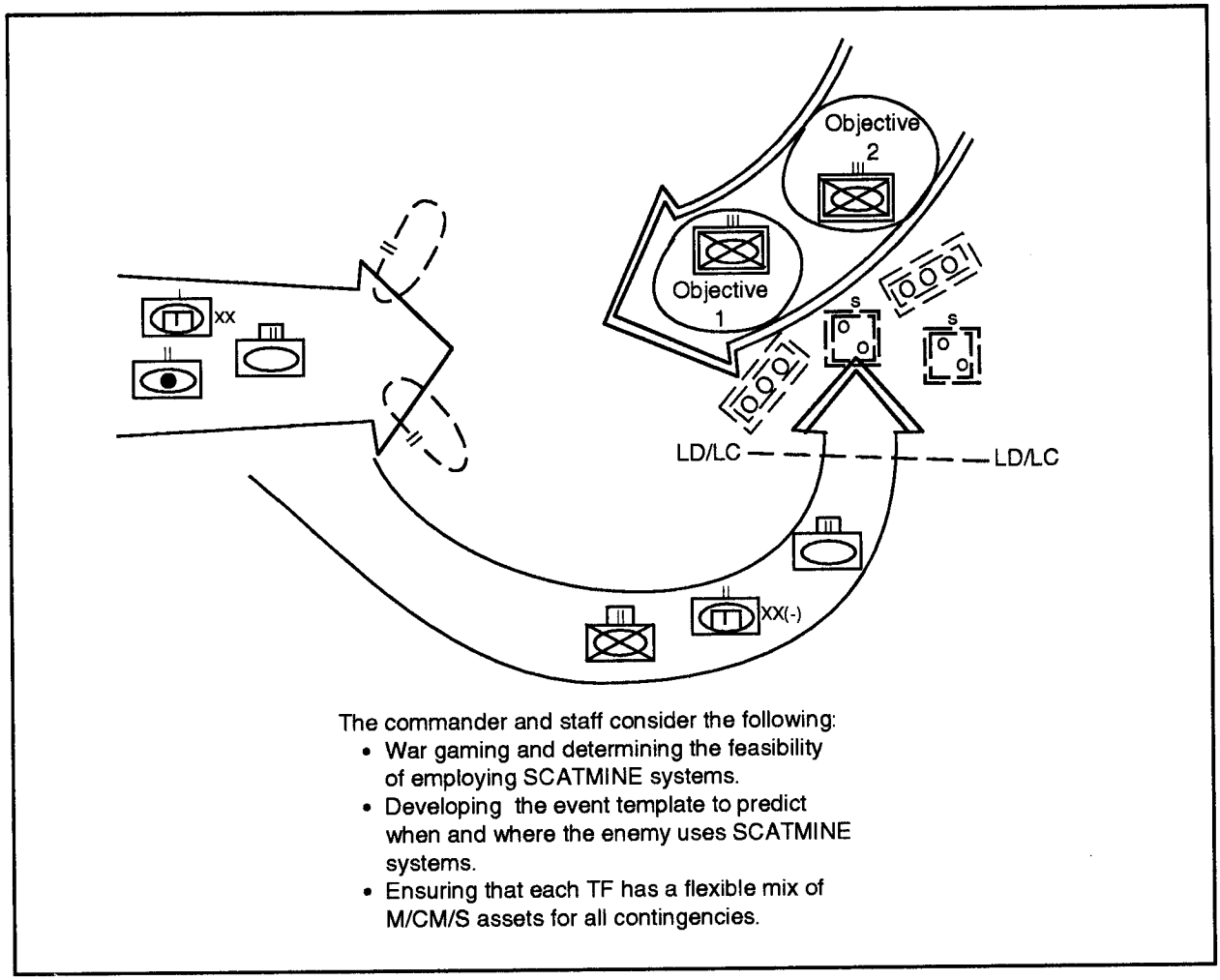


Figure 3-3. Engineer force laydown for a HATK

Deliberate

A DATK is characterized by detailed reconnaissance, thorough planning and rehearsal, rapid concentration of forces, surprise, attacks on enemy weaknesses, violent execution, early shift to exploitation, and positive, aggressive leadership at all echelons of command. This type of attack requires massed combat power on a narrow front. A DATK is conducted when offensive operations are directed and—

- A HATK has failed.
- The enemy is well organized and cannot be turned or bypassed.
- Lead time is available for intelligence gathering and offensive operations.

Planning. The brigade engineer develops a scheme of engineer operations that focuses on providing mobility support throughout the depth of the attack. The breaching tenets provide the framework for planning the deliberate breach. Breach planning is driven by two fundamental thought processes—the command and engineer estimates. In the development of the situation template, the estimates merge. The ABE, engineer S2, and brigade S2 develop templates and OBSTINTEL and

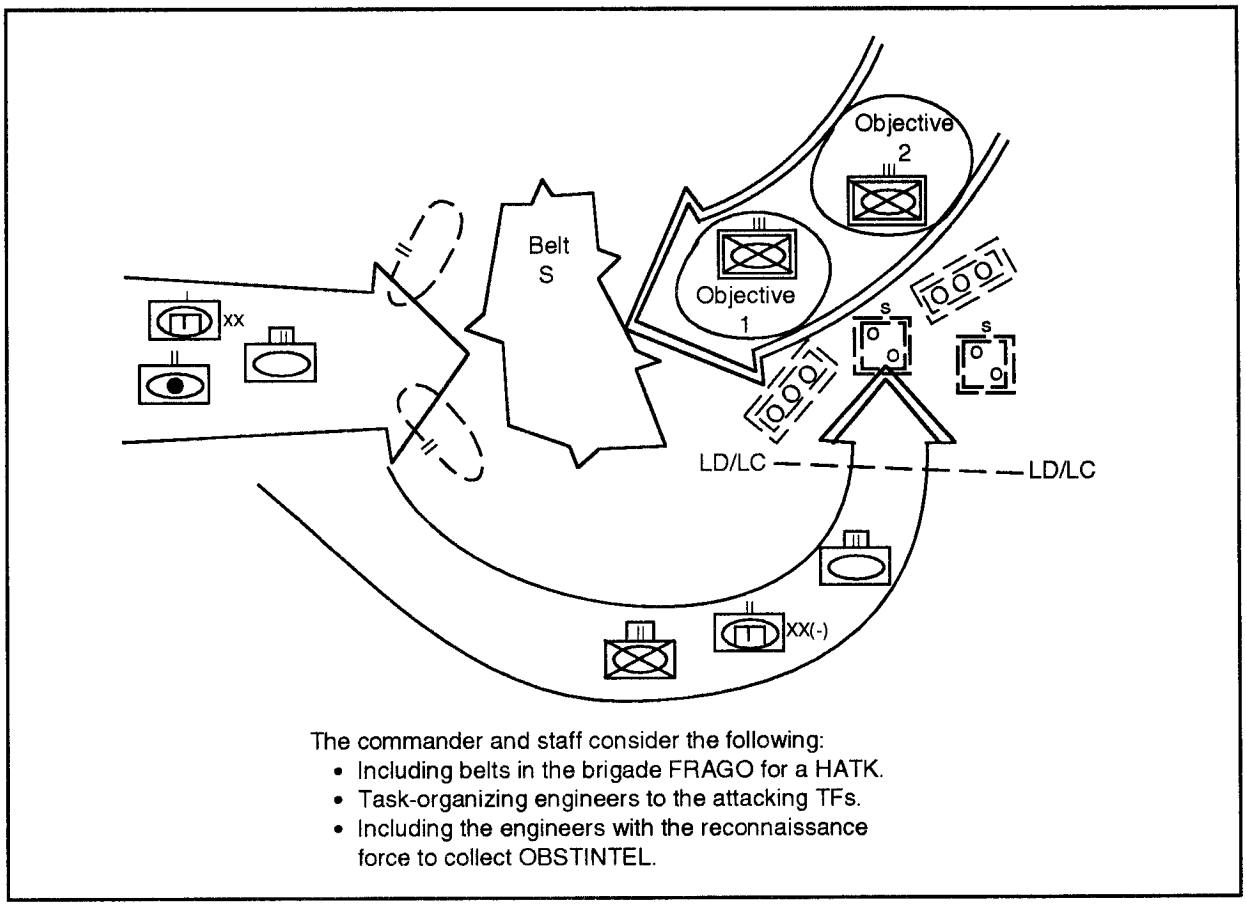


Figure 3-4. Engineer support to a HATK

recommend PIR. The brigade staff wargames the breach and identifies the following:

- Timing/intent of FS (suppression and obscuration).
- POP.
- CFZ.
- Cueing guidance (when and where).
- Intelligence electronic warfare (IEW)—direction finding, intercepting, and jamming enemy networks (when and what networks).
- ADA coverage.
- CAS.
- Control measures to perform the breach.
- Additional support from the division.
- Movement plan for follow-on forces.

The command and engineer estimates use the following reverse-planning sequence to develop the breach plan:

- Planning begins with actions on the objective.
- Actions on the objective drive the size and composition of the assault force.
- Actions on the objective determine the number and location of lanes to be breached.

- Lane requirements and the type of obstacle drive the amount and type of mobility assets task-organized to the breach force.
- Ability of the enemy's infantry to interfere with the breach determines whether the breaching site is to be secured by fires or by force.
- Ability of the enemy to mass fires at the breaching site determines the amount of suppression that is required. This determines the size of the support force.

During the DATK, a brigade deliberate breach may be required. If so, the brigade engineer must be able to plan operations for the breach force (the engineer battalion may be the breach force). Items that should be considered when planning breach-force operations include—

- Task organization. Normally, the breach force is allocated one or more engineer companies depending on the number of lanes to be opened. It may also be allocated maneuver assets (infantry, armor, tube-launched, optically tracked, wire-guided (TOW) antitank (AT) missile launchers, plows), smoke assets, AD assets, and/or MP assets. Normally, these assets are OPCON to or in direct support of the breach force; responsibility for their logistics requirements remains with their parent unit.
- Routes/assault positions. Routes are planned which follow the movement of one of the maneuver forces. This is to avoid having the engineers fight through uncleared enemy territory. Breach-force assault positions are identified short of the obstacle system to allow the breach force to consolidate and await for the signal to execute the breach. Before the breach force is committed, the support force, artillery, and CAS set up the conditions (effects of smoke and suppression) for the breach. The breach force waits in the assault position until the brigade commander tells them to advance. Both primary and alternate routes and attack positions are planned.
- Quantity and spacing of breach lanes. The number and spacing of lanes are METT-T driven. If the terrain is open and allows adequate maneuver space, the breach force breaches and marks two lanes per TF. Once the assault force is passed and the far side of the lane is secured, friendly forces use one lane for casualty evacuation and one to allow chemically contaminated vehicles and personnel to pass through, as required.
- C^2. The number of lanes that is needed determines the task organization and the C2 structure. Normally, each lane is assigned to a platoon reinforced with the breaching assets needed to reduce all obstacles to its front. An engineer company HQ can control reduction efforts on up to three lanes. Maneuver forces are positioned where they can best provide direct FS to the breaching element. They may be in overwatch positions covering the entire obstacle or they may move forward with the engineer platoons as each lane is developed. All company commanders (maneuver and engineer), as well as other combat support leaders (AD, smoke, and MPs), are on the engineer battalion command network. The engineer battalion commander is positioned forward where he can best observe and control the reduction effort and keep

the brigade commander informed. The battalion S3 is also forward and ready to assume control of the reduction effort should the need arise.

- Maneuver and fire control. Movement to the breach-force assault position may be as shown in *Figure 3-5*. Maneuver forces could be positioned in a wedge formation to the front of the breach force. Engineer elements travel in a column behind the wedge formation, with smoke elements moving on their flanks to provide screen support, as required.

Once in the vicinity of the obstacle, the maneuver forces' movement is controlled by using attack-by-fire (ABF) or support-by-fire (SBF) positions. These positions are clearly identified on graphics and the execution matrix shows when forces are to move from one position to another. The maneuver forces' role is to provide immediate security for the engineer force reducing the obstacle by providing direct fire on enemy forces within and to the flanks of the obstacle. This is different from the mission of the support force, which concentrates direct and indirect fires on the far side of the obstacle to suppress the main enemy defense. To

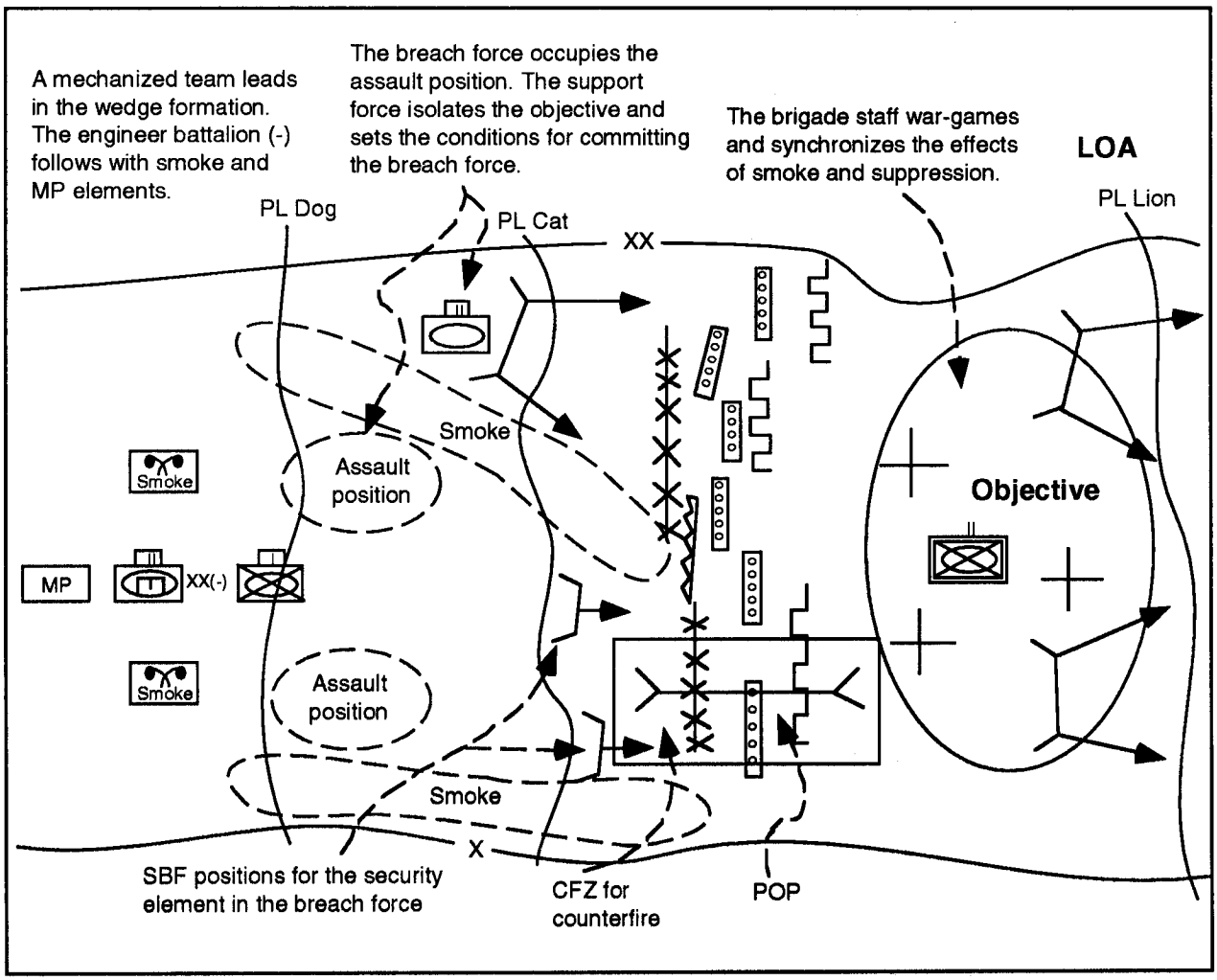


Figure 3-5. TF breach

prevent fratricide, fire-control measures, such as near- and far-side boundaries, are used to delineate which areas the support force fires on and which areas the security element of the breach force fires on. The breach force must be fully aware of the support force's locations. Other considerations include—

- Traffic control. The reduction force in each lane provides initial traffic control. Traffic control is passed to the MPs or other assigned traffic-control elements once the assault force is passed and the enemy's direct-fire threat is eliminated.
- FS. Typically, the support force retains priority of fires during the breach. The support force's fire-support teams (FISTs) normally observe the enemy overwatching the obstacle and can call for fire support. The support force also controls requests for smoke emplaced by indirect-fire methods. On order, the breaching area should become a restricted fire area.
- Graphic control measures. Control measures that should be included on the brigade's consolidated graphics are—
  - Preplanned lane locations.
  - Coordination points (for assault-force linkup).
  - Passage points.
  - Battle handover line (BHL).
  - Coordinated fire lines (CFLs), restrictive fire areas (RFAs), and CFZs.
  - Objectives and ABF/SBF positions.
  - Phase lines (PLs) and unit boundaries.
- Casualty evacuation. Engineer battalions do not have the organic means to evacuate casualties. Casualty evacuation is coordinated on an area basis with the support or the assault force's aid stations. The breach force evacuates casualties to the aid station.
- Smoke assets. Smoke planning is critical. Everything must be war-gamed, from applying smoke to achieving the desired effects of smoke. Typically, a breach force may be allocated one mechanized smoke platoon. This asset may provide smoke to screen the breach force's approach to assault positions and the flanks of the forces performing reduction operations.

In *Figure 3-5, page 3-11,* the breach force moves from an attack position while a mechanized team leads in a wedge formation with two engineer companies abreast. The breach-force commander is positioned in the center where he can best C^2 the formation. The breach force eventually occupies an assault position and conducts final preparations for the breach while the support force sets, suppresses, and obscures the breach. On order, the breach force moves forward to reduce the obstacle system. A mechanized team occupies SBF positions to provide local security, and the smoke platoon continues to provide smoke at the breaching site. Engineer breach teams reduce and mark lanes and provide initial traffic control for assault forces passing through. After the assault forces pass, the MPs waiting in assault positions are called forward to assume traffic control.

Once the brigade is able to establish footholds within its objective, committed TFs establish a hasty defense along PL Lion. The initial lane marking is upgraded to an intermediate marking pattern and the division is informed of lane locations. The lane network must be adequate for a brigade to pass through to secure the breachhead line. Lanes are further upgraded to handle two-way traffic and to allow a follow-on division attacking subsequent objectives to pass through.

While mobility is initially the priority effort, the brigade engineer also considers obstacle operations. He uses situational obstacles to assist in isolating the POP from reinforcements and CATKs and to provide supporting protection to the flanks during the attack. He also develops obstacle and survivability plans for a transition to the defense. Using the event template, the S3 and ABE estimate the time available for obstacle operations, to include transporting Class IV/Class V supplies to designated locations, emplacing obstacles, and integrating direct and indirect fires. See *Figure 3-6* for the engineer force laydown for a DATK and *Figure 3-7, page 3-14,* for engineer support to a DATK.

Preparation. The success of a deliberate breaching operation depends heavily on the success of the R&S plan. The scheme of maneuver is based on known and templated intelligence. The brigade conducts an aggressive R&S plan with scouts, engineers, patrols, IEW assets, and aerial reconnaissance. NAIs are developed to confirm or deny the template. The brigade and engineer S2s continually refine the template based on hard intelligence. The task organization may be adjusted as more details on the defense and obstacle system are revealed. This information is also used during the combined arms rehearsals.

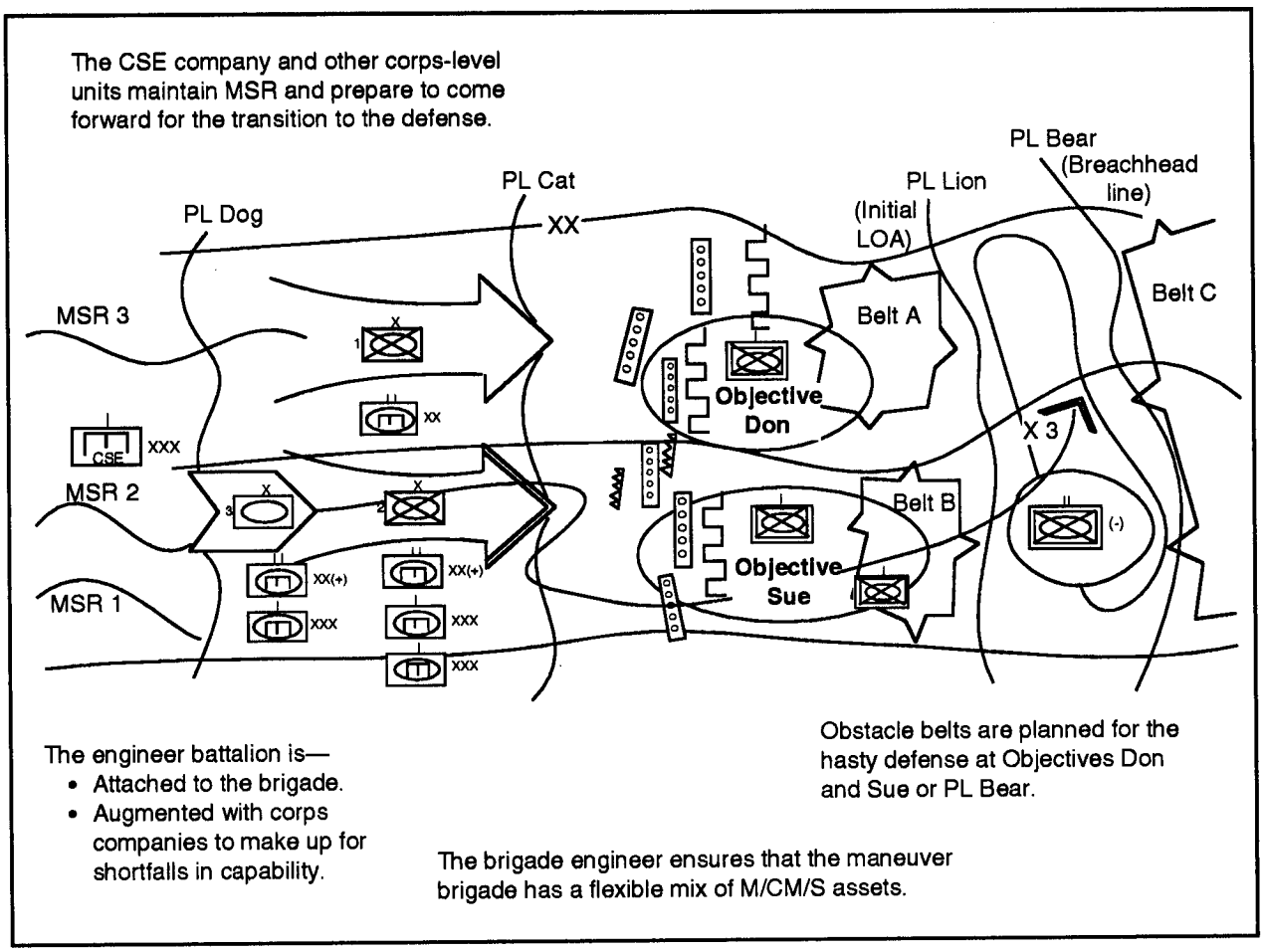
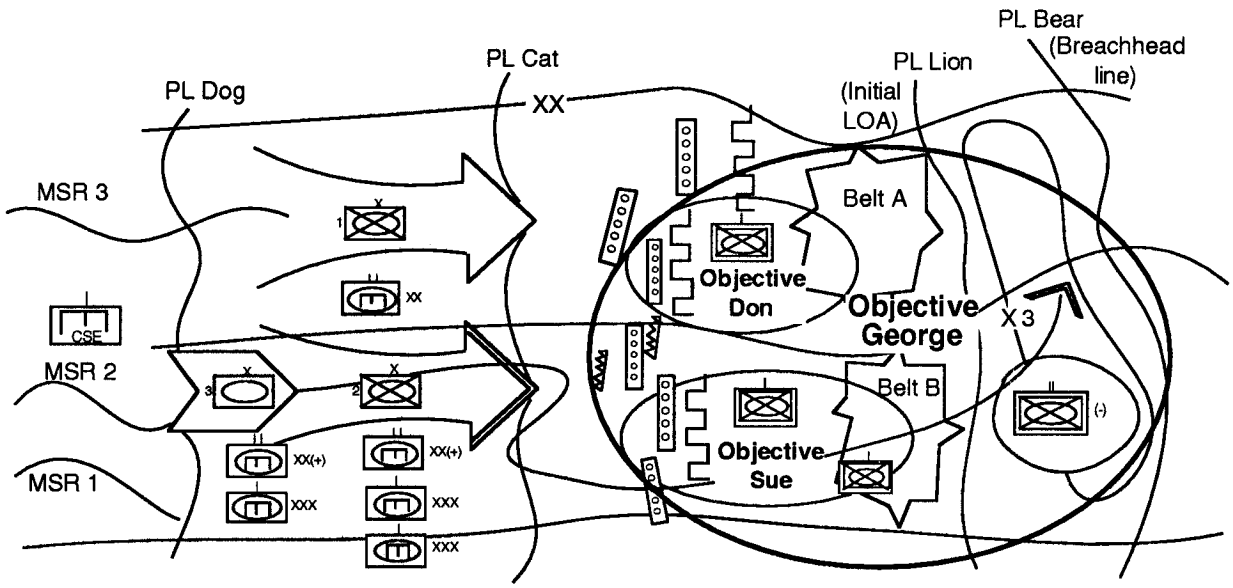


Figure 3-6. Engineer force laydown for a DATK

The brigade engineer focuses on the mobility forward and uses the breaching tenets to develop the breach plan. The brigade staff war-games to predict when and where to apply combat, CS, and CSS assets.



The brigade engineer also considers the following:

- Obstacles for flank protection of the TFs (uses the enemy situation template as the foundation for war gaming).
- Countermobility and survivability for the hasty defense.
- MSR improvement and maintenance (priority to Axis South).
- Countermobility assets with the lead TFs as a contingency for a hasty defense of Objectives Don and Sue.

Figure 3-7. Engineer support to a DATK

The brigade plans, manages, and controls the rehearsals. Whether the brigade or a TF conducts the deliberate breach, key leaders supervise the breaching rehearsal. The rehearsal site reflects the actual obstacle system in as much detail as possible. Rehearsals include a leader-and-key-personnel walk through as well as individual rehearsals by support, breach, and assault forces. Commanders rehearse contingencies that include—

- Possible CATKs by templated enemy forces.
- Attacks by enemy indirect-fire systems.
- Situational obstacles.
- NBC weapons.

Execution. The brigade engineer directs the fight from the command group or lead TF or in a position forward as the breach-force commander. He positions himself where he can best observe, control, and report the breaching operation. The staff engineer monitors the battle and conducts the normal C^2 functions for combat operations. Synchronization is key to the success of deliberate breaching. The timing of artillery (suppression and obscuration) and other supporting fires and the timely movement

of the breach force must be monitored and synchronized.

EXPLOITATION

Although a division is normally the lowest echelon that conducts an exploitation and pursuit, some situations may present themselves where it is lucrative for the brigade to seize the initiative. Exploitation is an offensive operation that follows a successful attack to take advantage of weakened or collapsed enemy defenses. Its purpose is to prevent reconstitution of enemy defenses, prevent enemy withdrawal, secure deep objectives, and destroy C^2 facilities and enemy forces. During the exploitation, the brigade advances on a wide front (if the terrain and the road network permit), retaining only those reserves necessary to ensure flexibility, momentum, and security.

Planning

The brigade engineer best supports an exploitation through detailed planning subsequent to offensive operations. Mobility operations are required to maintain the momentum of the exploiting and follow-on forces. The engineer battalion is task-organized to support in-stride breaching operations and to conduct other mobility operations, such as obstacle reduction and gap crossings. Countermobility operations are required to secure objectives, block enemy forces, provide flank protection, and support a hasty defense. Other considerations include—

- Establishing enemy prisoner of war (EPW) holding areas.
- Clearing and marking routes.
- Marking areas that contain unexploded ordnance.
- Destroying captured enemy munitions/ equipment.
- Establishing obstacle restricted areas for CATK routes.
- Conducting survivability tasks.

Preparation

While the brigade consolidates and prepares for the exploitation, engineer forces reduce obstacles and improve lanes to facilitate movement for the follow-on forces. There is little time to prepare for the mission.

Depending on battle damage and casualty reports, the brigade engineer attempts to reinforce the exploiting force. He allocates engineer forces forward with their primary focus on mobility operations.

Execution

Throughout the exploitation, engineer forces are prepared to conduct combined arms breaching and maintain the freedom of movement along the main supply route (MSR). As the brigade reverts to a hasty defensive posture, engineers begin obstacle and survivability operations. The commander and engineer staff monitor the battle closely. The transition to the defense might change the task organization and require units to link up upon consolidation.

PURSUIT

The pursuit normally follows a successful exploitation. The primary function of the pursuit is to destroy the enemy force. Unlike exploitation, in which the attacking force avoids enemy units in order to destroy its support system, in the pursuit, the brigade may point its advance toward a physical objective; however, the mission is to destroy the enemy's main force.

Planning

Critical engineer tasks are similar to those planned and conducted in an exploitation.

Engineer forces are task-organized with the encircling and direct-pressure forces. Again, the focus is on in-stride breaching. In this scenario, the brigade can expect to encounter hasty conventional and scatterable minefields along its route.

Preparation

The brigade engineer ensures that his forces are in position and capable of supporting the mission. Sustainment operations are critical to resupply major shortages. Mobility operations for the follow-on force is ongoing while the brigade prepares to conduct the pursuit.

Execution

In a pursuit, speed and mobility are maintained. Engineer forces conduct mobility operations, as necessary. Upon consolidation on the objective, engineers orient on the hasty defense. Leaders conduct a quick reconnaissance and begin siting in tactical obstacles. Critical engineer tasks conducted in the exploitation also apply to the pursuit.

CHAPTER 4

Defensive Operations

The main purpose of a defense is to defeat the enemy's attack and gain the initiative for offensive operations. Brigades may perform a variety of missions in support of a division or corps defense. They may attack, defend, or delay across the full spectrum of the defensive framework as part of the security, main-battle-area (MBA), or reserve force. Brigades may also conduct offensive operations across the forward line of own troops (FLOT) while the majority of the division or corps defends, or they may serve as a ground tactical force in support of rear operations. Heavy brigades possess the combat power to conduct an offensively oriented maneuver defense. This could be a mobile defense or a combination of the mobile and area defensive patterns.

Brigade engineer forces provide a critical function in supporting the defense. Like offensive operations, the ultimate goal is integrating and synchronizing engineer operations with other BOSs. The maneuver and engineer commanders must understand the relationship between maneuver planning and obstacle integration. The brigade commander's intent for obstacle and survivability operations provides the impetus for directing the engineer effort. The engineer estimate process is the base planning tool for integrating into brigade defensive plans. While the process remains the same, each step is tailored to the needs of defensive planning.

DEFENSIVE CHARACTERISTICS

The fundamental objective of the defense is to regain the tactical initiative through offensive action. Brigade defenses combine fires, tactical obstacles, and maneuver to destroy the enemy. To effectively support a defense, the engineer must understand the following characteristics of brigade defensive operations:

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

PREPARATION

Defensive operations have a distinct preparation phase that is vital to the brigade's success. The brigade arrives at the battle area before the attacker, making the most thorough preparations that time allows. Brigade engineer forces are a critical component in setting the conditions for combat and giving the brigade the edge against an attacker.

Engineer success in the preparation phase depends largely on the ability of the brigade engineer to conduct integrated planning with the brigade staff and parallel planning with the staff engineers of the subordinate units. The brigade engineer uses engineer channels

to disseminate the information and intent needed to foster early planning at all levels.

Engineer participation in brigade preparations is not limited to the close operation in the MBA. The brigade engineer considers the full range of engineer requirements of the total defensive framework: deep, security, MBA, reserve, and rear operations. Each element of the defensive framework is considered during the mission analysis and accounted for in the brigade scheme of engineer operations.

SECURITY

Defending forces provide security. Since the brigade defends to conserve combat power for use elsewhere, or at a later time, survivability operations are key in protecting the force. The brigade engineer advises the commander on the priorities based on the resources and the time available. He also considers security measures for engineer operations. Combat engineers are frequently exposed while installing tactical obstacles and constructing fighting positions. AD coverage and local protection are planned to protect engineer forces and material.

DISRUPTION

The brigade's defense includes a focused attempt to disrupt the enemy's tempo and synchronization by countering its initiative and preventing it from massing overwhelming combat power. The brigade engineer works closely with the brigade staff to ensure that engineer functions are integrated and synchronized. For example, the staff engineer participates in the target-value analysis (TVA) and recommends HVTs. The brigade staff further war-games the COAs to determine when, where, and how the HVTs are to be destroyed, neutralized, or suppressed. The brigade engineer focuses on the enemy as he develops his scheme of engineer operations. He attempts to deny the enemy a COA while at the same time supporting the main effort.

MASS AND CONCENTRATION

The brigade seeks to mass the effects of overwhelming combat power where it chooses and to shift that mass repeatedly according to its point of main effort. In the defense, the brigade's success depends on its ability to mass the effects of maneuver, direct and indirect fires, and tactical obstacles.

The brigade engineer identifies obstacle-control measures (such as belts and obstacle restricted areas) to focus countermobility effort and maneuver planning. Engineers employ tactical obstacles to support the scheme of maneuver and attack the enemy's ability to maneuver. *FM 90-7* provides the doctrinal base for conducting combined arms obstacle operations.

FLEXIBILITY

Defensive operations involve flexible planning and timely execution. Tactical flexibility stems from detailed planning, particularly in the IPB. The situation template is the focal point for planning CATK routes and the positioning of reserves. The brigade engineer coordinates and integrates engineer operations to support CATK plans. Obstacle-control measures are planned to anticipate CATKs and future operations.

Situational obstacles are further planned to add flexibility and depth to the defense. Through war gaming, the brigade staff synchronizes the use of situational obstacles. The brigade engineer focuses on enhancing the effects of repositioned fires (supplementary positions), separating enemy echelons, and protecting the flanks of counterattacking forces.

BOS INTEGRATION AND SYNCHRONIZATION

In defensive operations, the battalion staff identifies critical tasks and events that must be war-gamed to determine when and

where combat, CS, and CSS assets must be applied to achieve mass and synchronization. *Table 4-1* lists critical tasks for defensive operations; it focuses on the critical tasks that must be integrated (coordinate) and/or synchronized (predict time and effect).

Table 4-1. Considerations for BOS integration and synchronization

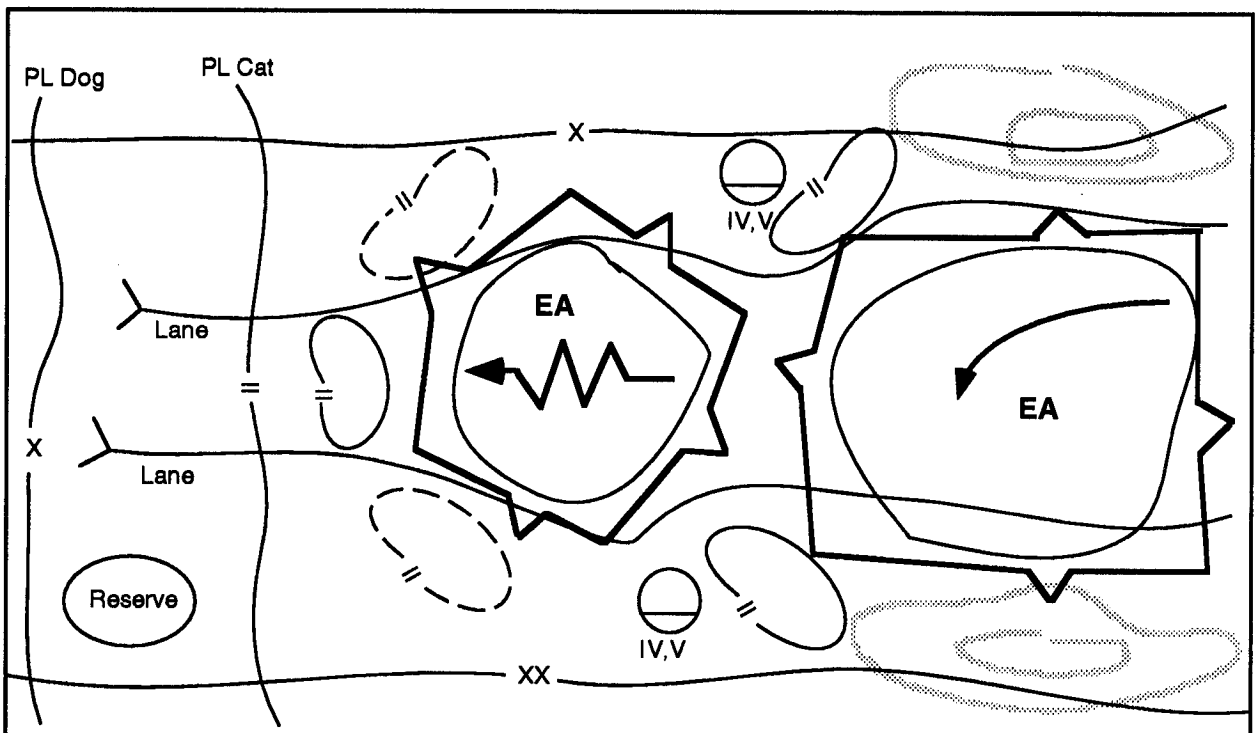
Battlefield Operating Systems	Critical Tasks
Intelligence	• Determine the enemy's breaching capability and its position on the battlefield. • Focus the main effort on the enemy's most probable COA. • Deny the enemy other COAs (secondary effort). • Analyze AAs. • Check templates (include enemy reconnaissance routes). • Use the situation template as the foundation for planning. • Use intervisibility overlays and TerraBase to support direct-fire planning. • Revise templates, as required.
Maneuver	• Determine where the commander wants to kill the enemy. • Develop a clear intent that integrates maneuver, fire control, and engineer effort. • Check EAs, BPs, and engagement criteria. • Monitor the preparation (siting instructions). • Identify lane requirements to prevent fratricide.
M/S	• Allocate engineer forces (mass effort). • Develop and monitor the time line. • Report progress (subordinates keep the commander informed). • Check obstacle plan(s) and confirm feasibility. • Know friendly capabilities (do not promise the world). • Ensure that the EBA reflects friendly capabilities. • Pass the EBA down to subordinates to support their planning. • Identify requirements for SCATMINEs (situational or directed). • Prioritize survivability in the brigade. • Determine best method to control blades (centralized versus decentralized).
FS	• Link FS planning with obstacle effect. • War-game with the FSO and identify fire-control measures. • Determine CFZs for engineer operations. • War-game and template artillery SCATMINE employment. • Recommend HVTs (breaching assets).
AD	• Identify ADA coverage of key supply points and engineer operations. • Identify coverage of critical C^2 nodes.
CSS	• Determine requirements for Class IV/Class V supplies. • Coordinate material requests and haul assets with the brigade S4 and FSB. • Monitor the flow of material. • Identify the locations of Class IV/Class V supplies. • Identify manning requirements for supply points.
C^2	• War-game the deep and close fight (fire control, obstacle integration, tactical-obstacle execution criteria, and repositioning of engineer material and forces). • Monitor countermobility and survivability progress and update overlays. • Submit scatterable minefield reports, records, and warnings. • Track the flow of *DA Form 1355*. • Check the operations of the TOC (message logging, battle tracking, and dissemination). • Ensure that the defensive plan addresses the transition to the offense. • Establish and maintain maneuver graphics, intelligence information, and templates. • Track the DST/synchronization matrix.

DEFENSIVE PATTERNS

Defensive operations usually take one of two traditional patterns: area and mobile. The focus of the area defense is on retaining terrain by absorbing the enemy in an interlocking series of positions and destroying it mainly by fires (see *Figure 4-1*). The focus of the mobile defense is on destroying the attacking force by permitting them to advance into a position that exposes them to a mobile reserve CATK (see *Figure 4-2*).

The brigade commander may elect to defend forward or in depth based on METT-T. In area and mobile defenses, the overall scheme makes the greatest possible use of maneuver and offensive tactics. When the enemy has committed its forces, the defender's chief advantage is the ability to seize the initiative and CATK over familiar ground.

Regardless of the pattern, the brigade commander decides, based on METT-T and the



The brigade engineer and staff consider the following:

- Arraying obstacle-control measures one level down (brigade arrays company teams against MRB-sized AAs).
- War gaming the effects of belts to integrate maneuver, FS, and tactical obstacles.
- Focusing engineer support on the main effort and the most likely AA (belts provide a focus for the EA plan).
- War gaming and templating SCATMINEs (enemy and friendly).
- Locating Class IV/Class V supply points.
- Identifying and marking lanes (war-game closures).
- Developing a time line, reporting statuses, and revising the estimate/time line.

Figure 4-1. Area defense

IPB process, where to kill the enemy. For the brigade engineer, this is the most important factor in developing the engineer scheme of operations. Obstacle integration is a product of knowing where and how the commander wants to kill the enemy.

TACTICAL DEFENSE AND THE BRIGADE ENGINEER

Brigade commanders organize the battlefield for the defense by assigning sectors, battle positions (BPs), strongpoints, or a combination of all three to subordinate battalion TFs. Sectors, the least restrictive control measure, give battalion TFs the freedom to maneuver and decentralize fire planning. TF commanders have the liberty to position or maneuver units within their sector but must prevent penetration of their rear boundary. BPs are used when the brigade commander wishes to retain greater control over the maneuvering and positioning of his TFs.

A strongpoint is a heavily fortified BP tied to existing or reinforcing obstacles to create an anchor for the defense. It is located on a terrain feature that is critical to the defense or that must be denied to the enemy. A strongpoint can be used to fix, disrupt, turn, or stop the attacker. Extensive engineer support is required to successfully establish strongpoints.

PLANNING

The EBA and the IPB are the centerpieces of the defensive planning process. The IPB

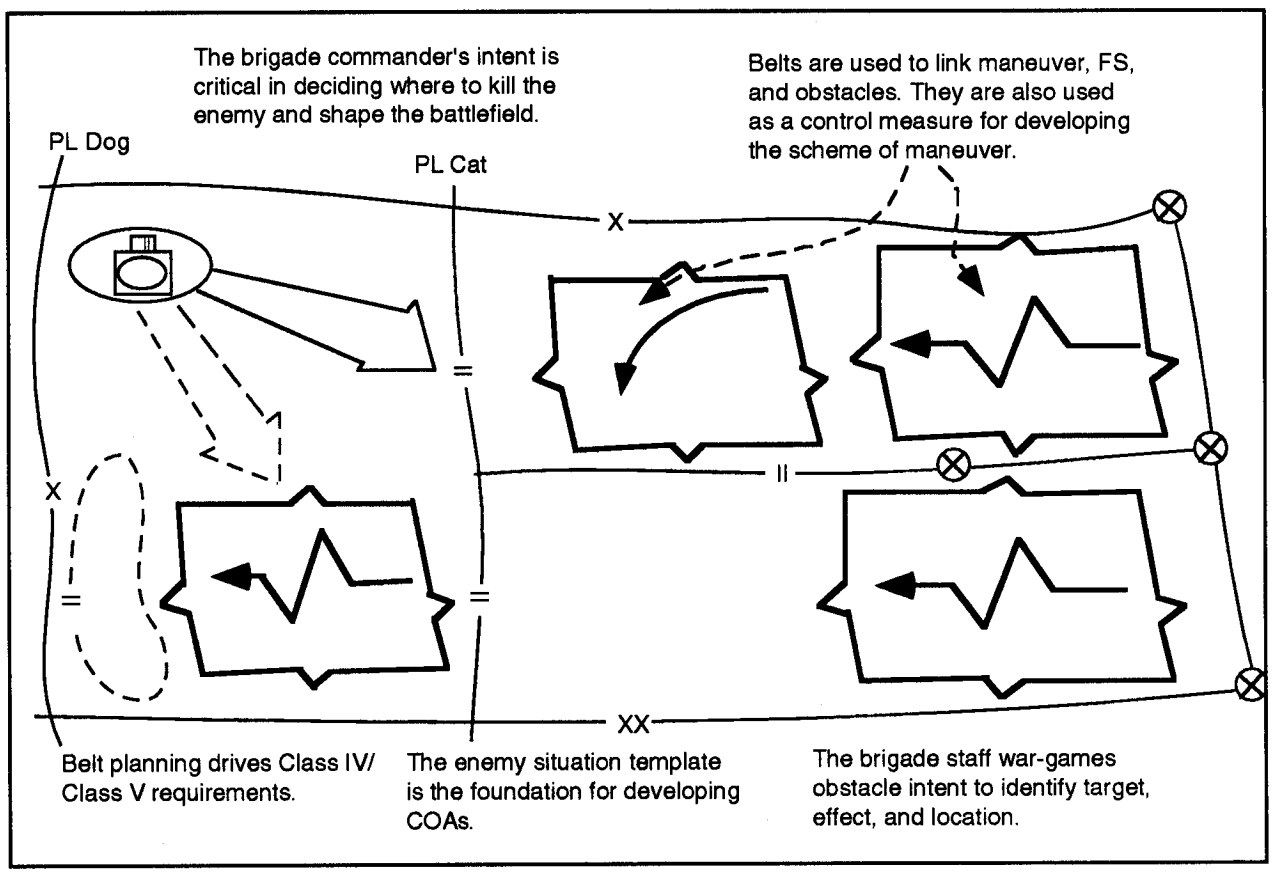


Figure 4-2. Mobile defense

process helps the commander to decide where to kill the enemy and to define the decisive point based on the terrain and enemy tactics and vulnerabilities. The engineer S2, the S3, or the ABE assists the brigade S2 in developing the MCOO and the situation template. He uses all available terrain products and information from the division's terrain detachment (TerraBase and slope overlays).

EBA development begins once the brigade receives the mission. The information that is gathered is used to—

- Develop doctrinal and situation templates (threat engineer order of battle and mobility and countermobility capabilities).
- Recommend IR/PIR.
- Recommend HVTs (mechanical breaching assets).
- War-game and synchronize the defensive plan.
- Identify NAIs/TAIs/decision points.
- Develop the engineer estimate and time line.
- Support subordinate TF planning.

The engineer estimate and time line must be continuously refined. Obstacle and survivability estimates are based on a not later than (NLT) time. The engineer considers the following questions as he conducts the war game and develops the engineer scheme:

- What can the engineer force accomplish in a given period of time?
- Is our estimate based on standard planning factors or METT-T?
- Can our soldiers exceed the standard, or are they inexperienced?

Other planning considerations include—

- Task organization.
- Obstacle-control measures (such as belts and restricted areas).
- Class IV/Class V supply allocation and distribution.
- Mobility requirements for security forces and sustainment operations (location of lanes).
- Priorities for survivability.
- Directed, reserve, and situational obstacle employment.
- Deception operations (displays).
- SCATMINE planning (such as artillery, Volcano, Gator, and a modular pack mine system (MOPMS)).

METT-T dictates task organization. In the defense, the brigade engineer normally weighs the option between general support (GS) or DS. He determines the advantage of massing his battalion versus task organizing his companies to TFs. Special consideration must include the impact on the CSS organization. Survivability operations might be best controlled and maintained by massing the blade effort at battalion level. This centralized operation provides a more responsive fix capability and allows the battalion to concentrate its maintenance effort forward.

The brigade scheme of maneuver influences obstacle-control planning. Brigade commanders use obstacle belts and/or obstacle restricted areas to focus countermobility effort and maneuver. The commander's intent for where and how to kill the enemy is crucial for obstacle integration.

Belts must be positioned inside obstacle zones or approved by the division. The obstacle-belt effect (disrupt, fix, turn, and

block) specifies to TF commanders what impact the scheme of maneuver and tactical obstacles must have on the enemy force.

The war-gaming process synchronizes the effects of fires and tactical obstacles throughout the depth of the battlefield. The engineer S3, maneuver S3, and FSO confirm—

- Trigger lines.
- Target reference points.
- EAs.
- Engagement criteria/fire distribution.
- Contact points.
- Obstacle integration.
- Situational-obstacle execution.

PREPARATION

The brigade engineer and staff monitor defensive preparations, revise the time line, and keep the commander informed of any changes. TF plans and overlays are checked to ensure that EAs are properly developed and that the commander's intent is achieved. Execution matrices should reflect a clear synchronization between the obstacle effect and fires.

There is no substitute for a thorough ground reconnaissance to confirm the defensive plan. Obstacle-siting procedures confirm the linkage between fire control and obstacle effect.

Finally, the brigade engineer uses the brigade synchronization matrix as a tool for leading him through the brigade rehearsal. He will focus on BOS synchronization and obstacle integration. He ensures that commanders understand the current status of M/CM/S operations.

EXECUTION

The brigade engineer and staff continue to monitor the operation. The staff engineer—

- Tracks the DST/synchronization matrix.
- Tracks the battlefield.
- Triggers lane closures.
- Repositions engineer assets.
- Executes situational obstacles.

CHAPTER 5

Other Tactical Operations

Other tactical operations encompass a wide range of special-purpose operations undertaken routinely during offensive and defensive operations. While not the main focus, these operations must be integrated and synchronized.

LINKUP

Linkup operations are conducted to join two friendly forces. They are also conducted to—

- Complete the encirclement of an enemy force.
- Assist the breakout of an encircled force.
- Join an attacking force with a force operating in the enemy's rear.

Regardless of the purpose of the linkup, in execution, the operation takes one of the following forms:

- Linkup of a moving force with a stationary force.
- Linkup of two moving forces.

PLANNING

Early coordination with the stationary force occurs to confirm intelligence and obstacle status. The linkup engineer force focuses on mobility operations. The brigade engineer also plans for subsequent missions and task-organizes accordingly. As in all offensive operations, provisions are made to position Class IV/Class V supplies for a transition to the defense. Priorities are established for survivability if the brigade conducts a hasty defense.

PREPARATION

The brigade engineer confirms linkup and passage points (locations and markings). He ensures that his forces are task-organized and prepared for the operation. Special emphasis is placed on ensuring that the stationary force's obstacle overlay is posted and that lanes/passage points are annotated.

EXECUTION

Once the linkup occurs, engineer companies must be prepared to react to changes in the task organization (situation dependent). Depending on the subsequent mission and/or the enemy situation, the brigade engineer recommends changes to the commander.

RELIEF IN PLACE

A relief in place is an operation in which a unit is replaced in combat by another unit. The incoming unit assumes the replaced unit's responsibilities for the combat mission and the assigned zone of action. A relief may be conducted during—

- Offensive or defensive operations.
- Various combat operations and OOTW.
- All types of weather and light conditions.

The primary purpose for a relief is to maintain the combat effectiveness of committed elements. If possible, it should be conducted during limited visibility to reduce the chance of detection.

PLANNING

Similar to a linkup, units coordinate information on OBSTINTEL and other engineer-related intelligence. The brigade engineer becomes familiar with the existing defensive plan and considers making adjustments based on the subsequent mission. He conducts a reconnaissance of the area to confirm the location, status, and integration of tactical obstacles.

PREPARATION

Intelligence and obstacle overlays are posted and disseminated. Further coordination is conducted to confirm the defensive plan, obstacle handover, and subsequent missions. Route clearance and marking is also coordinated to facilitate movement along designated routes.

EXECUTION

The incoming and outgoing engineer commanders link up and monitor the handover of reserve targets and overlays, verifying the status of tactical obstacles. It is important that the lanes through minefields or other obstacles are confirmed to facilitate the passage of reconnaissance forces.

BATTLE HANDOVER AND PASSAGE OF LINES

A battle handover is a coordinated operation between two units in the close-in battle which transfers the responsibility for fighting an enemy force from one unit to another. It is designed to sustain the continuity of the combined arms fight and protect the combat potential of both forces involved. Battle handover may occur during offensive or defensive operations. It is usually associated with conducting a passage of lines.

A passage of lines is an operation in which one unit passes through the positions of another. An example is when elements of a covering force withdraw through the forward edge of the MBA (rearward) or when an exploitation force moves through the elements that conducted the initial attack (forward).

PLANNING

Mobility and terrain management are major concerns during a battle handover or a passage of lines. The passing engineer coordinates with the stationary brigade engineer concerning the following:

- Threat engineer intelligence.
- Location and status of tactical obstacles.
- Location of lanes and bypasses.

The location of friendly obstacles should influence the selection of passage lanes. Some obstacles may have to be reduced to facilitate the movement along designated routes. In this regard, coordination for opening and closing lanes must be made at the contact points. Further planning is required to support the follow-on mission.

PREPARATION

The brigade engineer ensures that commanders understand the location and description of friendly obstacles along the passage lane. At the rehearsal, he covers

lane marking and actions to be taken at the obstacle crossing. He also discusses the engineer scheme for the follow-on mission.

EXECUTION

The brigade engineer links up with the stationary engineer at the contact point and monitors the passage. He confirms the location of obstacles and marked lanes or bypasses along the passage lane. Whether it be a forward or rearward passage of lines, the brigade engineer monitors the movement and begins focusing his efforts on the follow-on mission.

FOLLOW AND SUPPORT

Follow-and-support forces are assigned missions to assist the lead forces by relieving them of tasks that would slow their advance.

PLANNING

The scheme of engineer operations is similar to the scheme used in supporting the follow-and-support force in a pursuit. The critical engineer tasks are—

- In-stride breaching.
- Obstacle reduction.
- Clearing operations.
- Obstacle/lane handover.

The brigade engineer focuses on the bypass criteria, anticipating what mobility requirements are needed and then task-organizing them accordingly.

PREPARATION

Engineer forces link up early and prepare for combat. The brigade engineer coordinates with the lead brigade to obtain OBSTINTEL and to arrange for possible obstacle handover.

EXECUTION

The engineer battalion moves with the lead TFs. The brigade engineer monitors the situation and anticipates future missions. Engineer forces conduct critical engineer tasks that are similar to those conducted in an exploitation/pursuit.

DELAY IN SECTOR

A delay in sector is an operation in which maximum damage is inflicted on an advancing enemy without the delaying force becoming decisively engaged in combat. The force in contact trades space for time. A delay operation is usually conducted to—

- Provide time to concentrate or withdraw forces.
- Establish defenses in greater depth.
- Economize in an area.
- Complete offensive operations elsewhere.

PLANNING

The delay forces the brigade engineer to focus on the mobility and protection of the force. To support the delay, he considers employing SCATMINEs in the situational, directed, or reserve role. Time is a critical factor in determining what (conventional or scatterable minefields) and how the asset is used. The war-gaming sessions work out the details for integrating and synchronizing the obstacle effort.

PREPARATION

At the rehearsal, the integration of tactical obstacles is addressed. The brigade engineer confirms the integration of obstacles by ensuring that direct- and indirect-fire plans support the obstacle plan. He ensures that subordinate TFs understand the positioning of belts and their overall effect. He also rehearses the execution of situational and reserve obstacles, ensuring that all players understand the triggering conditions.

EXECUTION

The brigade engineer and his staff monitor the situation and track the battle using the DST/synchronization matrix. As conditions that trigger the execution of engineer tasks are met (such as the employment of SCATMINE systems and the repositioning of engineer forces and material), the brigade engineer informs the brigade commander.

WITHDRAWAL

A withdrawal is a disengagement from the enemy, either unassisted or assisted by another force. It is conducted so that the battle may be handed over to another unit positioned to the rear of the withdrawing force, allowing the withdrawing force to prepare for future operations. Withdrawals may or may not occur under enemy pressure.

PLANNING

The scheme of engineer operations for the withdrawal is similar to the scheme used for a delay operation. Time is a critical factor in employing tactical obstacles in depth. The brigade engineer considers the scenario (presence of enemy forces) and his capability to emplace conventional or scatterable minefields. Through war gaming, the staff determines the obstacle-control-measure requirements for the operation (belts and restricted areas). The brigade engineer further assesses his M/S capabilities to provide protection for the detachment left in contact (DLIC).

PREPARATION

The brigade engineer and his staff monitor the progress of obstacle and survivability operations and keep the commander informed. At the brigade rehearsal, the following areas are addressed:

- Obstacle-integration piece to ensure that maneuver and FS provide adequate overwatching fires.
- Withdrawal of the DLIC.
- Identification and proper marking of lanes.

Situational and reserve obstacles are rehearsed to confirm timing and execution requirements.

EXECUTION

The battalion staff—

- Tracks the DST/synchronization matrix.
- Monitors situational- and reserve-obstacle employment, lane closures, and the repositioning of engineer forces and material.

RETIREMENT

A retirement is a retrograde operation in which a force not in contact moves away from the enemy. In the retirement, the brigade conducts either a tactical or administrative move to the rear.

PLANNING

Mobility of the force is the critical task. The brigade considers route reconnaissance and clearing operations to support the retirement. The engineer battalion is task-organized to conduct in-stride breaching and other mobility tasks dictated by the situation. If tactical obstacles are emplaced, plans must be made to recover or dismantle the obstacles.

PREPARATION

Routes are reconnoitered and engineers are placed at critical points to maintain the movement of the forces. An engineer element is task-organized to the rear guard to conduct mobility operations and execute directed/reserve obstacles along the route.

EXECUTION

The brigade engineer monitors the movement and activities of his assets and ensures the mobility of the force. The engineer element supporting the rear guard conducts limited survivability tasks and executes planned/directed obstacles.

BREAKOUT FROM ENCIRCLEMENT

A breakout is an offensive operation that an encircled force conducts. A force is considered encircled when all ground routes of evacuation and reinforcements are cut off by the enemy.

PLANNING

M/CM/S are all critical tasks. The engineer battalion must be flexible and anticipate changes in task organization and directed missions. Once encircled, measures are taken to reinforce the defense and improve the survivability of the force. Depending on the direction of the attack and the existence of friendly obstacles along the route, plans are made to clear the obstacles.

PREPARATION

The brigade engineer continues to monitor the engineer effort and prepares for the breakout operation. He considers the combined arms breaching tenets when organizing and preparing his engineer forces for the breakout. He focuses on the POP and determines the forces required to support the rupture force, initially the main effort. Most of the engineer forces support the rupture and reserve forces. Conventional or FASCAM minefields are planned to—

- Support the initial rupture.
- Isolate the point of attack.
- Support the rear guard as it disengages or delays toward the rupture.

EXECUTION

Once the initial rupture/breach is conducted, engineer forces could move forward to reinforce the reserve force as it moves forward to assume the lead. The brigade engineer normally directs the fight from a position forward where he can influence the positioning of his forces. FASCAM employment is closely monitored and reported.

RIVER CROSSING

River crossings are characterized as hasty, deliberate, and retrograde. Divisions assign brigades a crossing area to control. The brigade is organized into the following components:

- Support force.
- Bridgehead force.
- Breakout force.

Normally, maneuver brigades require a division combat engineer battalion to support the combat operations of the breakout and bridgehead forces and a corps combat engineer battalion with two ribbon bridge companies to support the river-crossing support force.

One corps ribbon bridge company is capable of supporting a TF crossing. It can also support a brigade unopposed crossing if it has sufficient bridging to bridge the river. A brigade or division crossing requires additional corps bridge companies. Normally, each TF requires the assets of a bridge company to support its crossing sites. A brigade crossing normally requires a minimum of two bridge companies; this depends on the width of the river and the number of crossing sites required to support the scheme of maneuver.

If the brigade is conducting an opposed river crossing, the commander of the corps combat-engineer battalion becomes the crossing-area engineer. The engineers supporting the assault force are separate and distinct from the engineers conducting the crossing. They are task-organized with the bridgehead and breakout forces on the far shore conducting combat missions, not the tasks associated with the river crossing.

PLANNING

The brigade engineer is a critical player in this operation. The brigade commander relies on his expertise in planning the river crossing. The brigade is augmented with corps bridging assets to conduct the operation. Special planning considerations include—

- Determining the locations of crossing sites.
- Determining the method and means of crossing.
- Determining the types and number of vehicles involved in the crossing.

The crossing operation may involve virtually every type of engineer activity, such as—

- Combined arms breaching.
- Bridge and raft construction and control.
- Mobility operations along the routes to the crossing sites.
- Countermobility operations to prevent the enemy from reaching the bridgehead.
- Survivability at the bridgehead.

In planning for the operation, the brigade engineer may want to consider the following sources of information:

- Maps.
- Local inhabitants and prisoners.
- Aerial photographs and visual reconnaissance.
- Hydrographic studies.
- Strategic studies.
- Ground reconnaissance.
- Division's terrain detachment.

The brigade engineer has the staff lead in planning the overall river-crossing operation and advising the brigade commander. The focus of his battalion, however, is on M/CM/S support to the bridgehead and breakout forces. The brigade engineer is located with the tactical CP or in a position where he can best control these operations.

The commander of the corps combat-engineer battalion is located with the crossing-area HQ and reports to the crossing-area commander (normally the brigade XO). The corps commander focuses on—

- Running the near- and far-shore engineer regulating points (ERPs).
- Clearing routes to the crossing sites.
- Operating the crossing sites.

The crossing-area HQ is established by locating the crossing-area engineer's CP with the crossing-area commander's CP (normally the maneuver brigade main CP).

The operation is planned in the following phases:

- Phase 1: Advance to the river.
  - Determine the locations of crossing sites.
  - Determine the method and means of crossing.
  - Determine the types and number of vehicles involved in the crossing.
  - Define crossing-area control measures (engineer equipment parks (EEPs), ERPs, traffic control points (TCPs), staging areas (SAs), and call-forward areas (CFAs)).
- Phase 2: Assault across the river.
  - Determine the crossing means (RB-15 and/or raft).
  - Designate the support force.
- Phase 3: Advance from the exit bank.
  - Designate the exit bank and intermediate and bridgehead objectives.
  - Designate the crossing-site security.
- Phase 4: Secure the bridgehead line.
  - Designate the bridgehead objective.
  - Determine the flow of follow-on forces.

PREPARATION

The river-crossing rehearsal includes the—

- Positioning of assets on the near side of the river.
- Assault and clearing of obstacles from the far side.
- Preparation of each bank.
- Construction of the bridges and rafts that transport the forces across the river.

The rehearsal only ensures the physical preparation of the crossing site. The brigade engineer reviews the crossing and movement schedule to confirm the timing and positioning of forces. In addition to the actual river crossing, engineers must rehearse the flow of traffic to each crossing point as well as emplacing obstacles to protect the bridgehead from enemy CATKs.

When possible, night operations are rehearsed at night. Key players participate in the rehearsal. The brigade constructs a mock crossing area to rehearse the critical tasks of the support, bridgehead, and breakout forces. The rehearsal site includes all crossing-area control measures and the synchronization matrix for the operation

EXECUTION

Engineer forces initially concentrate on clearing obstacles on the far river bank and preparing the entrance and exit ramps for each crossing. Simultaneously, other engineer elements begin constructing rafts, bridges, and any other assets used to cross the river.

Outside of the actual crossing activities, engineers are required to maintain the road network leading to and away from the crossing sites. Also, countermobility and survivability operations may be required to protect the assault force from enemy CATKs.

BRIGADE AS A COVERING FORCE

A covering force is a tactically, self-contained security force that operates a considerable distance to the front or rear of a moving or stationary force. The mission of the covering force is to—

- Develop the situation early.
- Defeat hostile forces, if possible.
- Deceive, delay, and disorganize enemy forces until the main force can handle the situation.

PLANNING

Mobility is the critical task. The brigade engineer considers the following:

- Tactical and technical reconnaissance.
- Combined arms breaching.
- Route clearance and marking.
- Obstacle/lane handover.

The brigade engineer assists the brigade S2 in developing OBSTINTEL and in orienting his reconnaissance effort. He task-organizes his forces to support the lead TFs' mobility. He further positions forces to the rear of the covering force to mark routes and prepare the MSRs for the division's main body to use.

PREPARATION

During the rehearsal, the brigade engineer ensures that his forces are integrated and that engineer operations are synchronized. With a myriad of tasks to accomplish, he ensures that subordinates understand their mission. He disseminates current OBSTINTEL, as required.

EXECUTION

The brigade engineer monitors the battle. Engineer forces are positioned and prepared to conduct mobility operations. The brigade engineer's main concern is the trafficability of the axis for the division's main body.

REAR

Rear operations entail mobility, survivability, and general engineering operations for the brigade. The brigade engineer's focus is on the support to forward units. Usually, brigade support consumes the capabilities of the engineer battalion. Corps combat engineer units provide the bulk of engineer support to rear operations. This structure consists of an engineer group controlling three combat engineer battalions and a CSE company.

The engineer battalion conducts limited mobility, survivability, and general engineering in the brigade rear. Small equipment excavators (SEEs) and M9 armored combat earthmovers (ACEs) can be used to maintain routes and protect critical Class III/ Class V facilities. Additional equipment may be needed to meet the survivability requirements of the FSB and other units located in the brigade support area (BSA). The engineer battalion rear CP controls and coordinates the work and priorities of these assets.

ENGINEER BATTALION TF

The division engineer battalion may be task-organized to operate independently or with additional engineer or combat/CS elements to meet a variety of mission requirements, to include—

- Offensive operations. The engineer battalion may be organized as the breach force for a brigade deliberate breach or as a mobile obstacle detachment to provide flank security.
- Defensive operations. The engineer battalion may be organized to conduct countermobility and survivability operations in support of a brigade or division EA.
- OOTW. The engineer battalion may be organized to construct refugee camps and EPW compounds, conduct humanitarian missions, destroy enemy equipment, clear areas of unexploded ordnance, develop/mark combat roads and trails, and initially construct base camps in support of follow-on United Nations or coalition forces.

For any of these missions, the engineer battalion may have the following attached/OPCON to it:

- Infantry or armor platoon or company teams.
- Corps-level engineer assets (to include national guard or reserve elements).
- MPs.
- Emergency ordnance disposal (EOD) elements.
- AD assets.
- FISTs (to include combat observation lazing teams (COLTs)).
- Chemical smoke-generator platoons.

The engineer commander and staff must have a working familiarity with the capabilities of each asset. It is also essential to have predrawn SOPs, checklists, and plans so these assets can be rapidly integrated into the scheme of maneuver/concept of the operation.

Organizing an engineer TF, particularly for combat missions, frequently requires units to plan and prepare with minimal time available. Major challenges include assembling the TF, issuing orders, and conducting rehearsals. Planning considerations include—

- Assembling the force. As soon as the brigade commander decides to form an engineer TF, the engineer S3 coordinates with the brigade S3 to locate terrain that is suitable for an assembly area. The engineer battalion CSM is sent to that location to conduct quartering operations and assign sectors to subordinate elements. The assembly-area location is disseminated in the brigade WO or OPORD. The brigade WO and OPORD direct the task organization and linkup times at the assembly area. Unit first sergeants (1SGs) or noncommissioned officers in charge (NCOICs) are sent to that location with their quartering parties to coordinate with the engineer CSM.
- LOs/NCOs. Once the order is received, LOs are dispatched to the engineer main CP. The LOs provide information on the current status of their respective units, unique or critical supply requirements, and the closure times of their units into the assembly area. The LOs participate in the planning process, ensuring their operating system or function is properly integrated and/or synchronized.

- Communications. Communications must be worked out early in the planning process. Units may not have the latest in modern communication equipment (such as frequency hopping, single-channel, ground-to-air radio systems (SINCGARSs) or MSE. Some elements may not have secure FM communications capability. A communications plan must be developed which allows all elements to remain in contact throughout the operation.
- Night-vision capability. If operations are to be conducted during hours of darkness, it is essential that all elements have appropriate night-vision capability.
- Command relationships. The normal command relationship is OPCON with the parent unit providing logistics support.
- Logistics. Although logistics responsibility may rest with the parent unit, the engineer TF rear CP must be aware of the logistics status of each subordinate element and ensure that coordination is made to meet their requirements. Specific considerations include—
  - Ammunition. Resupply for tanks, Bradleys, and TOWs must be coordinated. Additionally, the types and amount of small arms that a unit uses must be determined.
  - Fuel. The type of fuel that a unit uses must be determined. Some units from echelons above division may have equipment which uses motor gasoline (MOGAS) or diesel. These types of fuel are not readily available in a division which predominately uses JP-8. Smoke generators require a steady supply of fog oil.
  - Repair parts and maintenance support. Normally, the engineer battalion establishes separate combat trains to meet these requirements (see *Chapter 6*).
  - Casualty collection and treatment. The engineer battalion does not have an organic aid station. Support must be arranged for direct evacuation to the field hospital in the BSA or on an area basis with another TF's aid station.
- TLP. WOs are issued as soon as possible. Leaders conduct PCIs of their units. The battalion order includes specific missions for subordinate units and a detailed execution matrix defining when and where units must execute critical tasks. Key leaders conduct rehearsals and back briefs to ensure that all leaders understand the plan.
- C^2. Engineer TFs require a dedicated C^2 facility. Consequently, if the engineer main CP and/or tactical CP are located with their brigade counterparts, one or both may need to be detached to act as the TF CP.

ENGINEER COMPANY SEPARATE FROM THE ENGINEER BATTALION

There are circumstances that cause the brigade engineer to attach one or more companies for an extended period of time to a deploying maneuver TF or another engineer battalion (light or heavy).

PLANNING

The company is supported with a service-support slice from the battalion HQ company. The normal command relationship is attached. This slice may include all or some of the following assets:

- Maintenance.
  - One NCOIC.
  - Six mechanics.
  - One prescribed load list (PLL) clerk.
  - One M88.
  - One contact truck.
  - One unit-level logistics-system (ULLS) computer.
- Petroleum, oils, and lubricants (POL).
  - One fuel handler.
  - One heavy expanded mobility tactical truck (HEMTT), fuel.
- Medical (two medics).
- Mess.
  - One NCOIC.
  - Three cooks.
  - One vehicle with a mobile kitchen trailer (MKT) or one kitchen, company-level field feeding (KCLFF).

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. In preparation for the detachment, the brigade engineer should ensure that the gaining TF commander understands the capabilities, limitations, and requirements associated with gaining an engineer company. The brigade engineer and the TF commander coordinate the linkup point and time and the size of force (personnel and equipment) being transferred.

EXECUTION

The detached company maintains communications with the engineer battalion. It reports equipment, personnel, and mission status according to unit SOPs. Although the brigade engineer has no tasking or command authority over the detached company, he must anticipate reattachment and be prepared to refit/rearm the company, as needed.

HEAVY/LIGHT

The primary concern in heavy/light operations is integrating the two forces and understanding their capabilities and limitations. For the brigade engineer, he must be familiar with the light engineer organization. In most cases, the light, air-assault, and airborne TFs have a light engineer platoon attached to them. The following are planning considerations for offensive and defensive operations:

- Breaching capability (assault and covert breaching are light-force norms).
- Lane-marking scheme.
- Vehicle haul capacity (none in the light platoon).
- Individual load-carrying capability (Class V supplies).
- Employment/C^2 of Volcanoes.
- Class IV/Class V resupply (pre-positioning).
- Transporters for obstacle operations.
- Survivability (two to four SEEs) and countermobility estimates (capabilities).

The primary weapon of the light infantry battalion is the M16 assault rifle. In addition, the battalion also has the following:

- Sixty-five M203 grenade launchers.
- Eighteen M60 machine guns.
- Eighteen dragons.
- Four TOW AT missiles.
- Four 81-millimeter mortars.
- Six 60-millimeter mortars.

The light engineer is equipped much like his light infantry counterpart. He is well versed in light infantry tactics and is a part of the combat formation.

LIGHT TF ATTACHED TO A HEAVY BATTALION

One aspect of heavy/light operations is a light TF attached to a heavy brigade. The brigade engineer can expect a light engineer platoon (at a minimum) to support the light TF.

Planning

Once notified of the task organization, the brigade engineer has his staff initiate actions to accept the light engineer platoon into the battalion. These actions include determining the–

- Status of equipment and personnel.
- Requirements for maintenance support.
- Requirements for augmenting the platoon with heavy assets.

The light TF normally provides CSS support to the light engineer platoon. This may solve any maintenance or special Class V problems.

Preparation

In many cases, the light TF has an infiltration/covert-breach mission as part of the brigade plan. The brigade engineer must fully understand the light engineer platoon's mission to ensure success. The key part of knowing the mission is the rehearsal. The brigade engineer should include the light engineer platoon in his battalion OPORD, to include back briefs with his engineer company commanders.

Execution

As a part of the light TF's infiltration/covert-breach mission, the light engineer platoon can provide obstacle intelligence. The key to success is communications between the light engineer platoon and the brigade engineer (main CP or tactical CP). This allows for timely and accurate reporting and further allows the brigade engineer to see the battlefield and make timely recommendations to the brigade commander. If the light engineer platoon is tasked with breaching a lane for heavy forces, the lane marking must be understood and should be according to the unit SOP. The brigade engineer must consider marking material for the light engineer platoon which is not cumbersome to carry and is easy to install. Light engineer platoons normally mark the initial lane-marking pattern.

HEAVY BRIGADE ATTACHED TO A LIGHT DIVISION

The other aspect of heavy/light operations is the heavy brigade attached to the light division. The brigade engineer has at his disposal more engineer assets and capability than the light DIVEN. The brigade engineer can anticipate to have one or more engineer companies task-organized to a light brigade within the division.

Planning

The brigade engineer must quickly integrate into the light engineer's planning cycle. This is normally conducted by either going to the DIVEN HQ or sending a representative to conduct initial coordination. To integrate the heavy engineer within the framework of supporting a light division, consider the following:

- Advising the DIVEN on the–
  - Best routes for maneuvering the armored brigade.
  - Areas that would be best defended by heavy forces.
- Task-organizing one or more engineer companies to other light brigades.
- Accepting one or more light or corps engineer units into the brigade.
- Advising the DIVEN to place corps engineer units under the brigade engineer's control. The brigade engineer can determine the task organization based on METT-T.
- Identifying supply requirements and their impact on mission accomplishment. An accurate logistics estimate is always helpful in anticipating logistical shortfalls.

Preparation

As with any operation, the rehearsal is the key to success. The brigade engineer may have to deal with a variety of engineer units (heavy, corps, and light) within his AO. A detailed engineer rehearsal before the brigade rehearsal helps resolve any conflicts that may arise. The brigade engineer must rely on his subordinate commanders to ensure that PCIs are conducted and that units are combat ready.

Execution

The capabilities of each engineer unit vary. The mechanized engineer should provide support to an armored force. The light engineer can provide invaluable obstacle intelligence to the brigade engineer. In addition, the light engineer can prebreach/identify lanes for the armored force. The mechanized engineer battalion main CP is the collection point for all engineer information on the battlefield. The engineer commander and his staff refine the information and advise the brigade commander on the engineer effort as it develops. In the defense, the brigade engineer should task all available SEEs to dig in the light forces. If D7 dozers from the corps engineers are provided, they should be used to construct deliberate fighting positions and assist the M9 ACE in constructing hasty positions. This saves wear and tear on the M9 ACE and further saves it for offensive operations.

Chapter 6

Combat Service Support

The battalion commander plans his tactical and CSS operations concurrently. He ensures that his scheme of engineer operations is logistically supportable. If CSS planners identify constraints, the commander must evaluate the risks and, if necessary, establish new priorities or modify his tactical plan to eliminate or reduce their effects. The personal involvement and on-the-scene appraisal of the situation by CSS personnel are as important to mission accomplishment as is the personal involvement of combat leaders. CSS planners must—

- Understand the commander's intent and priorities.
- Track/monitor the battle.
- Anticipate requirements and use initiative to meet them.
- Pre-position supplies and equipment.
- Actively push support forward.
- Use established routines during lulls in the battle to rearm, refuel, and repair.

The organization and procedures employed depend on the combat mission and the capabilities of the battalion CSS organization. The brigade task organization determines how the battalion organizes, coordinates, and executes CSS operations. For example, an engineer battalion attached or OPCON to a maneuver brigade requires the battalion to conduct independent CSS operations. An engineer company placed in DS to a battalion TF requires the engineer battalion to consider the company's limitations and coordinate with the supported TF for maintenance and medical support. CSS planning and command/support relationships are discussed in more detail in the following paragraphs:

CSS PERSONNEL

The battalion commander works primarily with his XO, S4, S1, and BMT to anticipate and plan requirements for CSS and to employ his service-support assets to ensure mission accomplishment. The XO directs staff coordination from the main CP. He is assisted by the—

- S4.
- S1.
- BMT.
- HHC commander.
- CSM.
- Support-platoon leader.

SUPPLY

The S4 is the focal point of logistics planning in the battalion. He—

- Serves as the OIC of the battalion's combat trains, if applicable.

- Serves as the primary staff officer in the areas of supply, transportation, and field services.
- Serves as the logistics planner, focusing on future operations.
- Anticipates requirements.
- Controls the combat trains' CP operations, if applicable.
- Supervises the S4 section with help from the battalion supply sergeant.

ADJUTANT

The S1 is the primary administrative planner. The personnel and administrative center (PAC) supervisor and the personnel staff noncommissioned officer (PSNCO) assist him with his duties. His key focus is on manning the battalion. He—

- Performs personnel service-support functions.
- Performs strength accounting, replacement operations, and casualty reporting.

BATTALION MAINTENANCE OFFICER

The BMO—

- Serves as the OIC of the battalion unit maintenance collection point (UMCP), if applicable.
- Controls maintenance support and establishes maintenance guidelines for the maintenance section.
- Shifts assets to respond to work-load demands and the battalion commander's priorities.
- Structures maintenance assets to meet the battalion's requirements.
- Anticipates maintenance requirements and problems.

HHC COMMANDER

The HHC commander is the OIC of the field trains. He—

- Coordinates support for the battalion in the BSA.
- Acts as the LO to the brigade rear CP.
- Coordinates the flow of information between the combat trains' CP(s) and the field trains' sections through communications with the S4.
- Directs the company supply sergeants in the formation of the logistical packages (LOGPACs).
- Makes decisions affecting CSS operations in the absence of the XO.

COMMAND SERGEANT MAJOR

The CSM assists in the CSS effort by troubleshooting the system and providing information on the current logistics situation.

SUPPORT-PLATOON LEADER

The support-platoon leader is a CSS executor. He focuses on CSS operations forward. He spends the majority of his time on the road conducting CSS operations.

CSS ORGANIZATIONS

The organic and supporting units execute battalion CSS missions. The administrative logistics center (ALOC) coordinates the functions of these units. The support platoon and the communications, medical, mess, S1, and S4 sections are organic to the

battalion. The FSB and other CSS assets organic to the brigade provide additional CSS.

S1 SECTION

The S1 section is located in the BSA. It—

- Performs the general administration of the battalion.
- Performs the critical tasks of strength accounting, replacement operations, and casualty reporting.
- Performs personnel actions and services (legal, administrative, and financial).
- Performs EPW operations and medical planning.
- Coordinates with the S2 for interrogation of prisoners and the S4 for the processing of captured equipment and transportation requirements for EPWs.
- Coordinates with the medical-section leader to ensure that patient treatment and evacuation are planned and coordinated throughout the battalion.

MEDICAL SECTION

The medical section provides unit-level medical support to the line companies. It has definite limitations and requires augmentation to further treat and evacuate the sick and injured.

S4 SECTION

The S4 section—

- Requests and distributes supplies to company supply sections.
- Turns in captured supplies and equipment, as directed.
- Is located in the BSA.
- Performs transportation and field-service functions.

In combat, the S4 section concentrates heavily on the following classes of supply: Classes I, II, III, IV, V, and VII. The support-platoon leader, working with the S4 and HHC commander, coordinates requisition, receipt, preparation, and delivery of Classes I, III, and V supplies. The S4 section requests, receives, and delivers Classes II, IV, and VII supplies.

The S4 section and support platoon are responsibile for obtaining maps. The supply and service (S&S) company of the main support battalion (MSB) stocks the maps. It requests the maps through the supply company of the FSB. The S2 distributes the maps, as required.

SUPPORT PLATOON

The support platoon has a HQ, a transportation section, and a maintenance section. Although the support-platoon leader works for the S4, the HHC commander in the BSA is his supervisor.

MAINTENANCE SECTION

The maintenance section performs unit maintenance on all battalion equipment except COMSEC equipment. Class IX supplies (repair parts) and The Army Maintenance Management System (TAMMS) records are centralized within the maintenance administrative section. The PLL is loaded on cargo trucks and trailers. To facilitate rapid repair, high-usage PLL items are loaded on the forward contact trucks.

The recovery-support section provides limited welding and backup recovery support to the maintenance teams. The section has two M88 recovery vehicles and one HEMTT wrecker for recovery operations. With only two M88s in the battalion, provisions are made to use recovery assets from other units.

MESS SECTION

The mess section is designed to operate from the BSA. It has two MKTs and one water trailer. Normally, the MKTs are consolidated in the field trains, and Class I supplies are delivered as part of the LOGPAC.

BATTALION LOGISTICS ESTIMATES

Logistics estimates analyze factors affecting mission accomplishment. Logistics planners use estimates and logistical status (LOGSTAT) requests to make recommendations and conclusions concerning proposed COAs and to develop plans to support selected schemes of engineer operations. The key concerns of logistics planners are the status of supplies (Classes III, IV, V, and VIII) and the operational status of combat vehicles.

Logistics estimates are rarely written. They are frequently formulated in terms that answer the following questions:

- What is the current status of maintenance, supplies, and transportation?
- How much supplies are needed to support the concept of operation?
- How will the supplies get to where they are needed?
- What type of external support (FSB or supported unit) is needed?
- How can the requirements be met using LOGPAC operations? Will other techniques be necessary?
- What are the negative impacts on other CSS plans?

The XO ensures that the S1, S4, and BMO stay abreast of the situation in each of their respective areas. He does this by war gaming COAs with the CSS staff officers and by ensuring that the CSS sections aggressively execute a fully developed plan. The XO participates in and directs CSS rehearsals and conducts network calls on the A/L network to coordinate the plan.

The main CP monitors key CSS factors such as—

- Last LOGPAC resupply.
- Number of operational combat systems.
- Overall personnel status.

The ALOC updates the main CP on these factors when a significant change is noted, or it can be updated on a recurring basis as established in the tactical SOP.

OPERATION OF TRAINS

The operation of trains varies according to the mission and task organization. Trains may be centralized in one location (unit trains), or they may be echeloned in three or more locations (echeloned trains). Unit trains are formed in AAs and during extended tactical marches. Forming unit trains eases coordination and control and increases the security of trains.

Battalion CSS assets are normally echeloned into company trains, engineer battalion or maneuver TF combat trains, and battalion field trains. Combat trains are organized to provide immediate critical support for combat operations. Field trains are normally in the BSA under the HHC commander's control. He coordinates with the brigade S4 and FSB commander for the security and positioning of field trains. The composition of field and combat trains varies according to the factors of METT-T.

The most forward CSS elements are the company trains. Medical teams and company maintenance teams (CMTs), when forward, operate from the company trains. The company 1SG positions these elements, task-organizes the medical teams, and establishes work priorities for the CMTs.

When operating in echeloned trains, the company supply sergeant usually operates from the field trains. Coordination between the company supply sergeant and 1SG is conducted through the battalion or supported TF over the A&L network. It is supplemented by face-to-face coordination during LOGPAC operations.

Combat trains can expect to move frequently to remain in supporting distance (normally 4 to 10 kilometers from the FLOT). The following factors govern the positioning of combat trains:

- Communications between the combat trains' CP, the main CP, the rear CP, and the forward units are required.
- Cover and concealment from both air and ground observation are desired.
- The ground must support vehicle traffic.
- A suitable helicopter landing site should be nearby.
- Routes to logistics release points (LRPs) or to company positions must be available.

RESUPPLY OPERATIONS

The LOGPAC is the most efficient method for resupply of forward units. It is a method in which resupply elements are formed on the basis of the unit's logistics requirements. The company supply sergeant, under the supervision of the HHC commander and the support-platoon leader, organizes the LOGPAC in the field trains. A LOGPAC is organized for each company and is moved forward on a routine basis. When possible, the LOGPAC is moved forward with a march unit under the control of the support-platoon leader. If a company is supporting a TF, the company's LOGPAC is moved forward with the TF's LOGPAC. When a company is attached to a TF, the CSS necessary to support it is also attached.

The battalion staff, under the guidance of the XO, must plan and coordinate LOGPAC operations, ensuring that they fully support the commander's tactical plan. The battalion tactical SOP establishes the standard LOGPAC. Normally, the company LOGPAC consists of the following:

- Unit supply truck. This vehicle contains Class I supplies, which are based on the ration cycle—normally, one hot meal and two meals, ready-to-eat (MREs) per soldier. The supply truck tows a water trailer, if available, and carries full water cans for direct exchange. In addition, the truck carries any Class II supplies that the unit requests. The truck may also carry replacement personnel.
- POL truck. This vehicle carries bulk fuel and packaged POL products. Normally, one fuel HEMTT (2,500 gallons) loaded with diesel is more than adequate to resupply an engineer company. Five-gallon cans of MOGAS are transported on POL trucks or on 1 1/2-ton trailers, and direct exchange with the unit is accomplished.
- Ammunition truck. This vehicle contains a mix of ammunition for the weapon systems of the company. The unit SOP establishes the load;

however, reports and projected demands may require changes to this standard load. Other unit basic-load items, such as munitions expended for missions, may also be replenished. Large items, such as the mine-clearing line charge (MICLIC)/Volcano reloads, also require special attention.

- Additional vehicles. These vehicles are used to carry additional supplies and replacements.

After the company LOGPAC is formed, it is moved forward under the control of the supply sergeant. If the LOGPAC is being moved forward with a supported TF, the support-platoon leader normally coordinates the linkup. If the support-platoon leader organizes a convoy of all company LOGPACs, it remains under his control as it moves forward. The convoy may contain additional vehicles carrying Class IX supplies, which are being moved to the UMCP.

The company LOGPAC is moved along the MSR to a LRP where the 1SG or unit guide takes control of it. Maintenance personnel and equipment from the UMCP may link up with the LOGPAC at the LRP. At the LRP, the 1SG or unit guide controls the LOGPAC and conducts resupply. The unit 1SG informs his supply sergeant of the requirements for the next LOGPAC.

The supply sergeant collects personnel (including those killed in action), EPWs, outgoing mail, and equipment for movement back to the field trains. Then the LOGPAC is returned to the LRP or to the field trains. Subordinates must ensure that resupply vehicles are returned to the LRP as soon as possible so they can be returned to the field trains to prepare for the next mission.

The S4 or unit 1SG determines LRP locations, based on the tactical situation, and coordinates them with the HHC commander. LOGPAC convoy arrival times at the LRP and the length of time it remains are normally established by the SOP. LRPs, MSRs, and combat-trains and field-trains locations are included on the operations overlay. If not, the graphics are on the CSS overlay.

When possible, the support-platoon leader or HHC 1SG sends a LOGPAC to the battalion main CP. If this is not possible, a representative from the main CP goes to the LRP and arranges for resupply.

SECURITY OF TRAINS

CSS elements behind the FLOT must be prepared to defend themselves against guerrillas and partisans, enemy forces that have broken through or bypassed the defense, and enemy air assaults and airborne insertions.

The S4 ensures the security of trains when operating in a unit-trains configuration. When trains are echeloned, the S4 ensures the security of combat trains and the HHC commander ensures the security of field trains. The HHC commander coordinates with the FSB commander and brigade S4 to integrate the battalion's field trains into the BSA defensive plan. When trains occupy a new position, a perimeter is immediately planned before support activities begin.

SUPPLY FUNCTIONS

The supply system provides many types of supplies to the battalion. The most important of these are food and water, ammunition, POL, and repair parts for weapon systems. The battalion maintains some combat-essential supplies and repair parts, such as combat loads, basic loads, and PLL. Normally, the division or higher directs the minimum stockage level. These loads enable a unit to sustain itself in combat for a limited period should there be an interruption in the resupply system. This period is normally 15 days for general supplies and two to three days for Classes I, III, and V supplies.

The battalion uses the following methods to replenish its supply stock:

- Supply-point distribution. The battalion, using organic transportation, goes to a distribution point to pick up supplies. The support platoon uses this method to pick up supplies.
- Unit distribution. Supplies are delivered to a unit by transportation assets other than its own. The battalion uses unit distribution to resupply its subordinate elements.
- Throughput distribution. When feasible, supplies are shipped directly from the issuing agency as far forward as possible, provided the receiving unit has the material-handling equipment (MHE) necessary to down load the shipping containers. For example, Class IV/Class V materials are shipped directly from the corps to the designated Class IV/Class V supply points in the brigade sector.

CLASSES OF SUPPLIES

There are 10 classes of supplies (Classes I through X).

CLASS I

Class I consists of subsistence and gratuitous health and welfare items. They are automatically requested based on daily strength reports. Companies forward their strength reports to the battalion's combat trains CP or directly to the field trains, which in turn instructs the mess section to prepare the rations.

The support platoon draws subsistence from the FSB supply company's Class I supply point in the BSA. Rations are usually prepared in the field trains and delivered to the companies as part of the LOGPAC.

CLASS II

Class II consists of such items as clothing, individual equipment, tentage, hand tools, administrative and housekeeping supplies, and chemical-defense and decontamination items. When Class II items are lost, destroyed, or worn out, the unit supply sergeant sends replacement requests through the S4 to the FSB. The S4 supply section or the company supply sergeant picks up Class II items from the FSB supply company in the BSA and delivers them to the unit during LOGPAC operations.

CLASS III

Class III consists of POL, including petroleum fuels, lubricants, hydraulic and insulating oils, preservatives, liquids and gases, bulk chemical products, coolants, deicer and antifreeze compounds, components and additives of petroleum and chemical products, and coal. The transportation section from the supply company's Class III supply point in the BSA normally obtains POL.

Empty fuel-handling vehicles and containers presented at a supply point are sufficient to obtain POL without a formal request. Company requests are not required for POL resupply.

CLASS IV

Class IV consists of construction materials, including all fortification and barrier materials. These are items for which allowances are not prescribed. The management of Class IV supplies for survivability is most efficient when there is a shared interest between the maneuver and engineer logisticians.

CLASS V

Class V consists of all types of ammunition, including chemical, radiological, and special weapons; bombs; explosives; mines; fuzes; detonators; pyrotechnics; missiles; rockets; propellants; and other associated items. Class V supplies are based on a required supply rate (RSR) and a controlled supply rate (CSR).

RSR is the amount of ammunition, usually expressed in round per weapon per day, estimated to be required to sustain operations, without restriction, for a specific period. The brigade S3 develops the RSR based on the situation and data from *FM 101-10-1/2.*

CSR is the rate of ammunition consumption that can be supported (considering availability, facilities, and transportation) for a given period. The CSR may well be less than the RSR.

The battalion receives ammunition from the ammunition transfer point (ATP) in the BSA. The FSB supply company operates this ATP. The nondivisional ammunition company operates the backup ATP positioned in the division support area (DSA). If required, corps and division trucks and helicopters can deliver ammunition directly to the battalion's combat trains or to a Class IV/Class V supply point. The preferred method for receiving Class V supplies is by throughput distribution.

CLASS VI

Class VI consists of all personal-demand items, such as candy, cigarettes, soap, and cameras (nonmilitary sales items). Sundry packs are also Class VI items. The S1 consolidates and submits requests for Class VI support through supply channels when a post exchange (PX) is not available. Resupply flow is the same as for Class I.

CLASS VII

Class VII consists of major end items, such as launchers, tanks, mobile machine shops, vehicles, and organizational tool sets. The COSCOM delivers large items directly to the battalion's trains. The support platoon picks up smaller items at the distribution point in the DSA or BSA.

CLASS VIII

Class VIII consists of medical material, including repair parts peculiar to medical equipment. The medical-section leader coordinates with the S4 for additional supplies based on the S1's loss estimate and projection for mass casualty situations or as required.

CLASS IX

Class IX consists of repair parts and components, including kits, assemblies, and subassemblies (repairable and unrepairable), that are required for maintenance support of all equipment.

The battalion's stock of repair parts is based on a combat PLL. Repair parts are issued

by request or repairable exchange (RX). RX for selected repairable items is handled by exchanging an unserviceable item, with an attached *DA Form 2765-1*, for a serviceable item. The battalion obtains repair parts from the Class IV supply point in the BSA. Parts are moved forward to the UMCP during routine LOGPAC operations or as required. The maintenance section requests Class IX items (less RX) and quick supply store (QSS) items by submitting single-line requests *(DA Form 2765)* to the FSB maintenance company. Low-dollar-value, high-demand parts, such as light bulbs, wiper blades, and common bolts and nuts, can be obtained without a formal request from the QSS that the FSB maintenance company operates. In some cases, controlled exchange and cannibalization may be required to obtain Class IX supplies.

CLASS X

Class X consists of materials to support nonmilitary programs, such as agriculture and economic development. The S4 requests Class X items based on requirements from the civil military and/or operations channels.

MAINTENANCE OPERATIONS

Maintenance operations involve inspecting, testing, servicing, repairing, requesting, recovering, and evacuating. Repair and recovery are completed as far forward as possible, at the lowest capable echelon. When equipment cannot be repaired on-site, it is moved only as far as necessary to repair. When all maintenance requirements for the battalion cannot be met, the battalion commander, or XO if delegated, determines maintenance support priorities for subordinate units based on the operational requirements of the battalion and recommendations from the S4 and BMT.

CATEGORIES OF MAINTENANCE

TAMMS consists of the following levels of maintenance: unit, intermediate, and depot.

Unit

Unit maintenance consists of preventive maintenance tasks that the operator, crew, and unit mechanics perform. Unit mechanics isolate faults with test equipment, make visual inspections and minor adjustments, and repair end items by exchanging faulty modules and components. These actions can be performed on-site or in the UMCP. Unit mechanics also perform recovery tasks.

Intermediate

Intermediate maintenance can be either DS or GS.

Direct Support. DS mechanics diagnose and isolate equipment or module failure, adjust and align modules and components, and repair defective end items. FSB maintenance support teams (MSTs) operate from the UMCP. If equipment cannot be repaired at the UMCP because of time constraints (work load) or the tactical situation, it is evacuated to the FSB maintenance company in the BSA for repair.

General Support. GS maintenance involves repairing modules and components by replacing internal pieces or parts and repairing end items. The division MSB and the corps maintenance battalions provide GS.

Depot

Depot maintenance personnel rebuild end items, modules, components, and assemblies; perform cyclic overhauls and inspections; and

complete modifications requiring extensive disassembly or elaborate testing.

FORWARD SUPPORT MAINTENANCE

Engineer effort is maximized when equipment is repaired as far forward and as quickly as possible. The BMT, in coordination with the battalion XO, directs the maintenance effort for the battalion by using established maintenance time guidelines and coordinating maintenance actions. The S4 monitors the maintenance status for the XO. The BMT assists in coordinating support with the FSB and MSB maintenance units. He is a key troubleshooter for the battalion. Battle-damage assessment and diagnosis indicate the repair time. An item is repaired on-site or recovered directly to the appropriate maintenance echelon based on the—

- Tactical situation.
- Echelon of work required.
- Availability of required repair parts.
- Current work load in each area.
- Maintenance time guidelines.

Maintenance time guidelines establish the maximum time that unserviceable equipment remains in various support areas. *Table 6-1* lists typical maintenance time guidelines; they should not be considered restrictive.

Table 6-1. Maintenance time guidelines

Time for Repair (Hours)	Location
Less than 2	On-site
2 to 6 (can be towed until repaired)	UMCP
6 to 24 (or less than 6, if vehicle cannot be towed)	Battalion's trains/FSB maintenance company in the BSA
24 to 36	DSA

BATTLEFIELD MAINTENANCE CONCEPTS

In the following paragraphs, the discussion of battlefield maintenance concepts places the various maintenance echelons in the proper perspective. It also illustrates how echelons overlap to provide continuous maintenance support to forward units.

The HHC maintenance section leader (the BMT) task-organizes his section based on his analysis of current and anticipated requirements. He is concerned with providing appropriate support at each of the following locations:

- Engineer companies.
- UMCP.
- Battalion's field trains.

Normally, the BMT positions CMTs with each company. This provides a quick-fix capability for those items that can be repaired in less than two hours and a well-forward recovery capability for those items requiring more extensive repairs. The CMT operates from the UMCP and can be augmented with DS mechanics.

PLL must be configured at the battalion to support operations at the—

- UMCP.
- Battalion's trains in the BSA.

- Line companies.

A PLL truck at the location of the battalion's trains supports primarily wheeled-vehicle PLL. Three PLL trucks must be configured to support line companies. Normally, these trucks remain at the UMCP. Additionally, some high-demand, low-volume parts are carried on the contact trucks.

The CMT contact trucks with crews operate forward in the company trains. These vehicles carry tool boxes, some unit-level manuals, and a limited number of special tools and repair parts. The CMT usually repairs the damage on-site if the repair can be accomplished within two hours. If a damaged vehicle cannot be repaired within two hours, it is recovered to the UMCP or the battalion's trains. However, before a recovery vehicle is committed, other recovery means are attempted (including self-recovery and use of like vehicles to tow the vehicle to the UMCP). For this purpose, every platoon carries a tow bar.

The MSTs from the FSB maintenance company trains repair damaged vehicles at the UMCP. When not involved in on-site repairs, the CMTs may also repair vehicles in the UMCP. This is especially true for repairs requiring sensitive diagnostic test equipment or requiring the shelter of a maintenance tent.

Vehicles that cannot be repaired within six hours or that would otherwise overload the capability of the UMCP are recovered to the battalion's trains or directly to the FSB/MSB maintenance collection point for repair. This recovery may be accomplished by—

- A battalion or TF recovery vehicle.
- A CMT recovery vehicle at the UMCP or MSR.
- UMCP recovery assets.
- A heavy-equipment transporter (HET) (for special circumstances).
- A combination of these (requested through the FSB maintenance company).

Crew members accompany the vehicle to the rear to assist the mechanics and return the vehicle when repaired.

The UMCP usually displaces when the battalion or maneuver TF relocates. During periods of frequent displacement, the UMCP may have to displace by echelon. In this case, some assets of the maintenance section/team continue making repairs at the old UMCP before displacing to the new location. During rapid forward moves, such as in an exploitation, the UMCP conducts only essential repairs and simple recovery. Other disabled vehicles are taken to collection points on the MSR and remain there until repaired or evacuated. The BMT coordinates the repair or evacuation of this equipment with the maintenance section sergeant at the battalion's trains.

NIGHT OPERATIONS

Vehicles are processed and integrated into the work program as soon as they are damaged. At night, they are positioned in lightproof or light-suppressing shelters. Permanent structures, such as warehouses, civilian garages, and barns, are used. Work continues until the repairs are completed. If large shelters are not available, mechanics repair small components, on or off the vehicle, under a lean-to or some other makeshift shelter.

SUSTAINMENT

The BMT maintains the status of all battalion vehicles, which includes the vehicle service status. During lengthy pauses in combat action, the HHC commander and the

BMT schedule vehicles through services. The battalion XO provides the priority according to operational requirements. He ensures that C^2 systems are given priority.

FIELD, PERSONNEL, AND ADMINISTRATIVE SERVICES

The battalion S1 is responsible for the following:

- Strength accounting.
- Replacement operations.
- Casualty reporting.
- Graves registration.
- Other administrative services.
- Other field services.
- EPWs.

STRENGTH ACCOUNTING

Companies submit a personnel daily-summary report to the battalion S1 at the ALOC CP. The S1 forwards a consolidated report to the DIVEN S1 who then submits it to the Assistant Chief of Staff, G1 (Personnel) (G1)/Adjutant General (AG). The battalion S1 also provides an information copy to the brigade S1. These reports are the basis for individual replacements and Class I resupply. Accurate strength reports also provide the commander and staff with information to plan operations.

When companies are attached, they submit strength reports to the unit they are supporting. They continue to receive replacements from the battalion. The S1 monitors the reports and ensures that double counting does not occur. He tracks the status of replacements since engineer military occupational specialty (MOS) replacements are sent to the battalion's trains.

REPLACEMENT OPERATIONS

The PAC monitors the replacement flow. The HHC commander establishes a replacement receiving point (RRP) in the battalion's trains. All the replacements or hospital returnees are brought to the RRP for initial processing. The division AG ensures that replacements are taken to the BSA.

CASUALTY REPORTING

The S1 ensures that both strength and casualty reporting occur in a timely and accurate manner. Initial reports are usually oral. Written reports should be done as soon as possible. A squad leader, vehicle commander, or any individual having knowledge of the incident initiates the written report. All small-unit leaders carry a *DA Form 1155* to report battle and nonbattle casualties. It provides initial information for notifying next of kin and for payment of benefits. When a soldier is reported missing or missing in action or when the remains are not under US control, *DA Form 1155* accompanies *DA Form 1156*. The 1SG ensures that the DA forms are forwarded to the ALOC CP. The S1 cross-checks the DA forms, requests any clarification, adjusts unit strength reports, and forwards the DA forms through the PAC.

GRAVES REGISTRATION

The MSB S&S company provides graves-registration services. Graves registration at the battalion level consists of the following functions: collection, identification, and evacuation. The soldier who has knowledge of the casualty completes *DA Forms 1155* and *1156* and sends them to the battalion's trains with the returning LOGPAC. Remains and personal effects are placed in human-remains pouches. They are evacuated with the returning

LOGPAC. If necessary, companies evacuate the remains to the MSR and report the location to the ALOC. The remains are evacuated as rapidly as possible to the maneuver brigade collection point in the BSA.

OTHER ADMINISTRATIVE SERVICES

During lulls in the battle, the S1 and PAC complete all other necessary actions, such as awards and decorations. These are completed by forming personnel contact teams that move forward to company locations. Special consideration is given to the timely processing of awards and decorations.

OTHER FIELD SERVICES

The MSB S&S company provides clothing exchange and bath (CEB) services. Normally, there is one CEB per BSA. This service is obtained for engineer companies through coordination with the battalion S4.

The FSB supply company provides salvage services. It establishes a salvage point in the BSA.

The corps CSS units provide laundry and renovation services when the tactical situation permits. The S4 coordinates this service.

PRISONERS OF WAR

The S1 plans and coordinates EPW operations, collection points, and evacuation procedures. EPWs are evacuated from the forward area as quickly as possible. The capturing unit—

- Guards the prisoners until they are relieved by the proper authority.
- Recovers weapons and equipment.
- Removes documents with intelligence value.
- Reports to the combat trains for the processing and initial interrogation of prisoners.

EPWs are evacuated to the brigade EPW collection point on a returning LOGPAC. The S4 coordinates the evacuation of large amounts of enemy equipment.

MEDICAL SUPPORT

The battalion medical section has the following personnel assigned: one section NCO and six combat medic specialists. This enables the section to provide two medics per company, one medic per platoon, and one medical coordinator at the battalion to assist in medical resupply and evacuation coordination.

Each medic carries a combat first-aid medical kit to provide emergency medical treatment. With this limited capability, self-aid and buddy aid are critical. Unit training must emphasize combat lifesaving techniques beyond first-aid training. There should be one combat lifesaver per squad. Unit SOPs must require all vehicles to carry combat first-aid medical kits. They should also specify what these medical kits should contain.

Medical treatment beyond what the aidman can do must be accomplished at the closest maneuver battalion aid station (BAS) and medical clearing station in the BSA. The FSB medical company operates the medical clearing station. It is essential that all elements of the forward companies know the locations of these facilities.

The battalion has no organic ambulances or dedicated evacuation means. Each company has to evacuate its own casualties to

the BAS. Coordination with the medical platoon of the closest TF is essential to provide ambulance evacuation. Tracked ambulances may be located with the TF's combat trains or forward with each maneuver company.

Medical evacuation is the responsibility of the next higher level of medical support. For example, the FSB medical company evacuates patients from the BAS or coordinates with corps resources for medical evacuation. Patients are evacuated no further to the rear than conditions require and are returned to duty as soon as possible.

ENGINEER MISSION SUPPORT

Engineer missions require a well-coordinated and timely flow of CSS to enhance success. The following areas are important considerations for planning and ensuring CSS operations in support of engineer missions.

FORECASTING AND INITIAL LOGISTICS FLOW

This process begins with the receipt of the mission. The battalion S3 and S4 make initial estimates of the amount of munitions and materials needed to support an upcoming mission. Additionally, they identify equipment and personnel resources required but not currently available in the brigade. For example, corps bridging assets must be forecasted well in advance to ensure their availability and timely arrival.

The battalion staff makes initial estimates and submits these requirements to the DIVEN staff. The DIVEN staff revises its estimates based on the input received from the battalion. This process of estimating/revising plans is an ongoing process that continues until the operation is completed.

It is essential that the flow of logistics begins as early as possible due to the time required to mass large amounts of munitions and materials. Rough estimates are used early to get this flow moving forward. Adjustments/adaptations are made, as required.

Figure 6-1 shows the flow of requesting and reporting supplies. For example, to receive Class IV/Class V supplies, a request must be sent to the brigade S4. He forwards the request through the FSB. The FSB handles and monitors the remaining flow of supplies. The supplies are requested and delivered in the quickest mode possible.

Coordination must be made with other elements of the brigade staff to ensure that assets are available to deliver logistics. The brigade S4 and FSB commander are the principal players. The flow of obstacle material within the maneuver brigade sector is a maneuver unit responsibility. However, it is a shared responsibility between the engineer, the maneuver unit, and the FSB that is very effective.

LINE-HAUL OPERATIONS

The most efficient material-delivery technique is line haul from the point of origin directly to the Class IV/Class V supply point. This is called throughput and should be used whenever possible. This form of logistics delivery is well suited for large quantities of Class IV/Class V supplies. Because of the size of most loads being transported on corps transporters, MHE is often needed to off-load the material. Normally, the equipment accompanies the transporters from the DSA/BSA to the Class IV/Class V supply point.

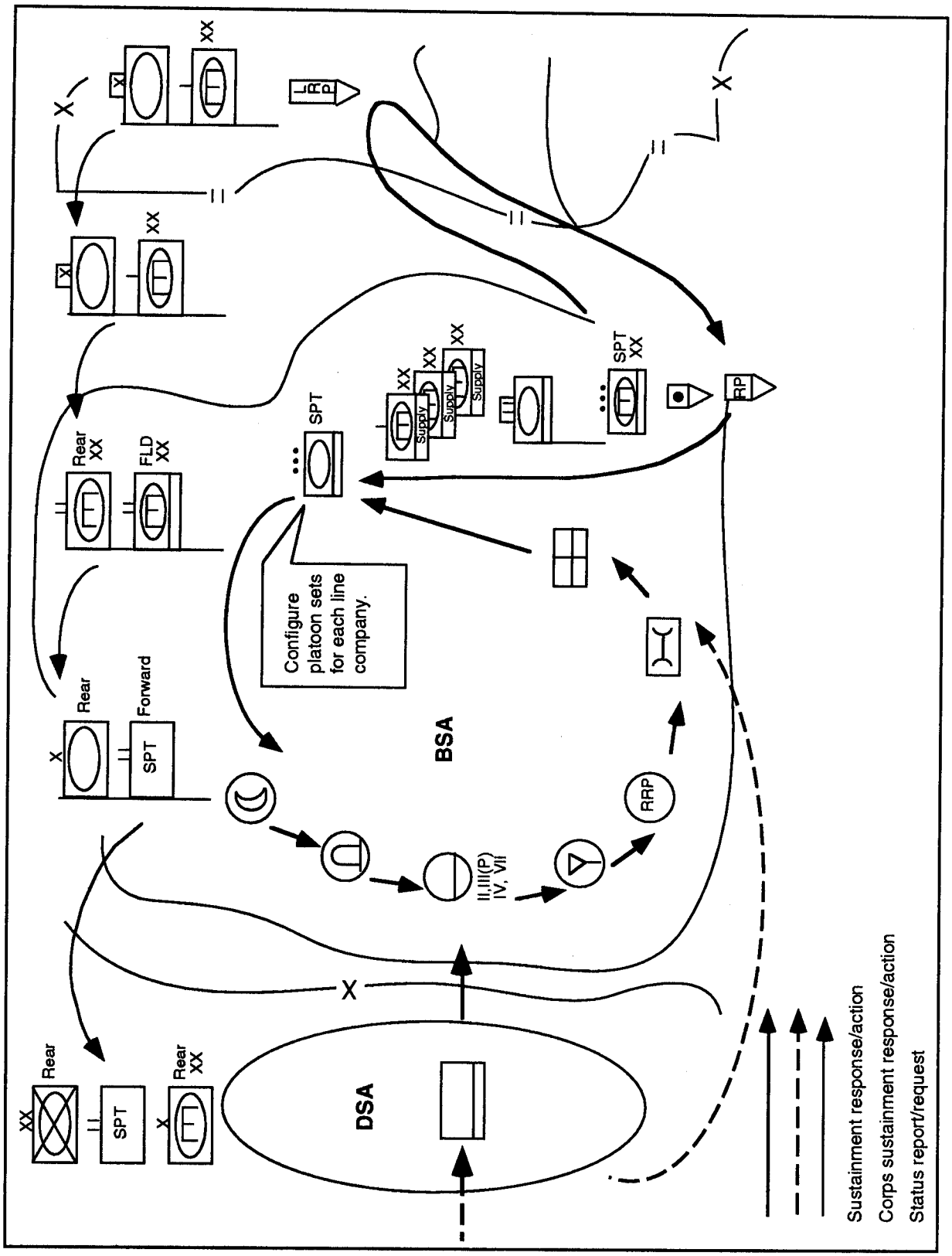


Figure 6-1. Sustainment for mechanized DIVENs

CLASS IV/CLASS V SUPPLY POINT

The Class IV/Class V supply point is the central receiving point of obstacle material, such as mines, wire, and pickets. It is the point at which the maneuver unit receives and transfers control of the obstacle material that corps and/or division throughput haul assets pushed forward. The maneuver unit establishes and operates the supply point. It is centrally located to support obstacle operations (see *Figure 6-2).*

The focus of Class IV/Class V supply-point operations is receiving, task-organizing, and uncrating bulk mines as they arrive on corps and division trucks. There must be a dedicated S4 representative to track the flow of mines in and out of the supply point. An engineer representative is also required to ensure the proper task organization of mines and other material. Class IV/Class V supply points are normally the responsibility of the maneuver TF in whose sector the obstacles are being constructed. The engineer battalion may have to establish and run a Class IV/Class V supply point when—

- Supporting a light TF defense.
- Constructing an obstacle system in support of a brigade or division EA.
- Supporting an economy-of-force mission.
- Conducting engineer TF operations.

The engineer S3 and brigade S4, in coordination with the FSB, plan Class IV/Class V supply points along the route of march. The battalion S4 is the key player in Class IV/Class V supply-point operations. Additionally, an engineer representative is needed to ensure that loads are properly configured. The backbone of the supply point is the work party. They unload, configure, and reload Class IV/Class V supplies to efficiently support the emplacing unit(s).

Personnel requirements include the—

- Battalion S4 (or representative)—
  - Tracks and accounts for the flow of Class IV/Class V supplies in and out of the supply point.
  - Ensures that Class IV/Class V supplies are properly stockpiled.
  - Coordinates for Class I and III supplies for a Class IV/Class V supply point.
  - Coordinates for medical support and develops an evacuation plan.
  - Coordinates for transportation support, if required.
- Engineer representative.
  - Ensures that Class IV/Class V supplies are broken down in the proper configuration, according to the tactical plan.
  - Ensures that mines, fuzes, boosters, and antihandling devices are properly configured with minefield packages.
- Work party OIC/NCOIC—
  - Divides personnel into unload, configuration, and load crews.
  - Supervises the work effort and ensures that loads are properly configured.
  - Develops a site security plan, to include access control in and out of the supply point.
  - Forms reaction teams.

Transportation requirements include—

- MHE, such as a forklift, combat engineer vehicle (CEV) boom, or HEMTT cargo boom, to load and unload vehicles.
- Tin snips and crow bars to uncrate mines.
- Engineer tape and pickets to mark the Class IV/Class V supply-point layout.

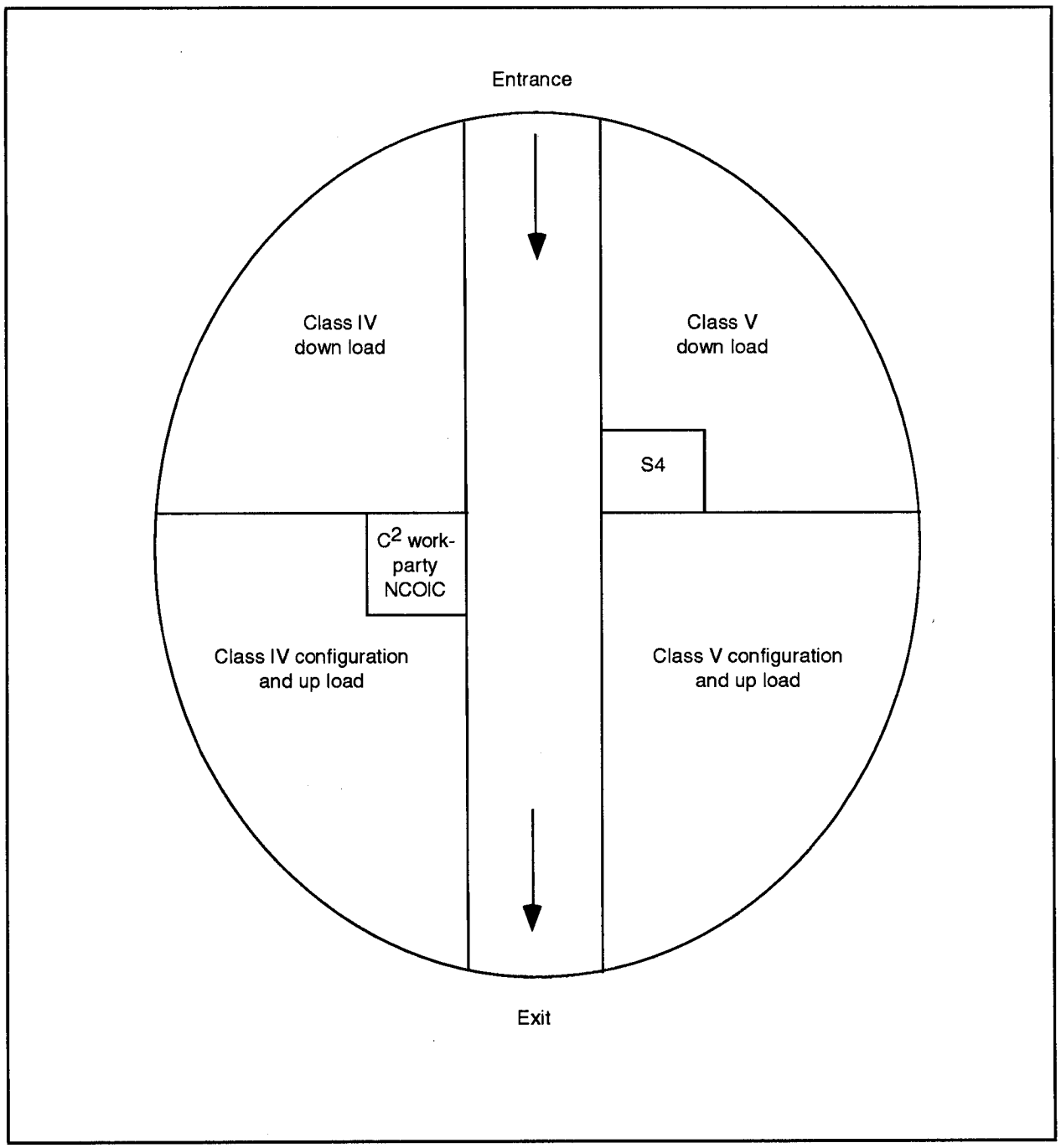


Figure 6-2. Class IV/Class V supply-point layout

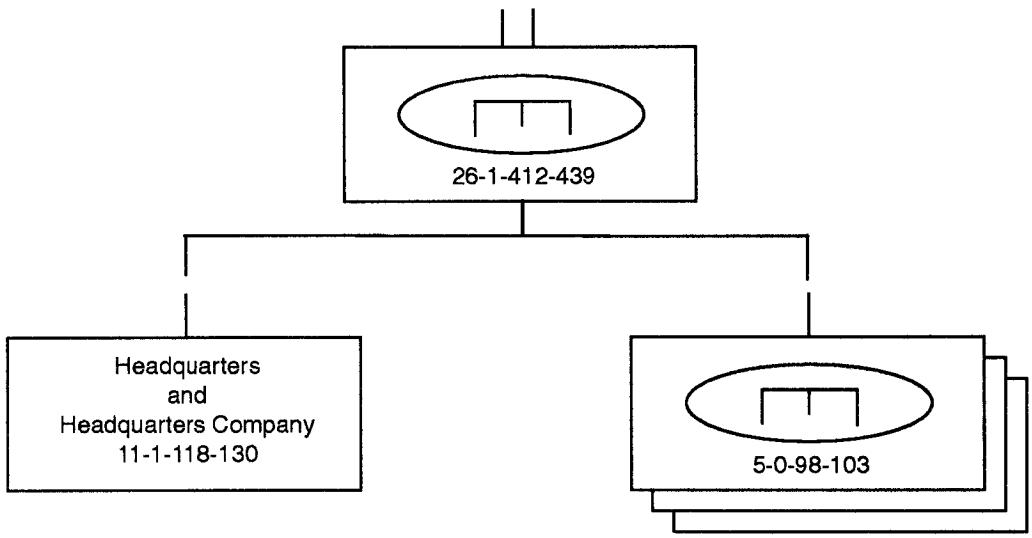
APPENDIX A

Engineer Organizations

This appendix contains engineer organizations that typically support brigade operations (see *Table A-1*). *Figures A-2 through A-11, pages A-2 through A-12*, show current tables of organization and equipment (TOEs) and are subject to modifications.

Table A-1. Engineer organizations

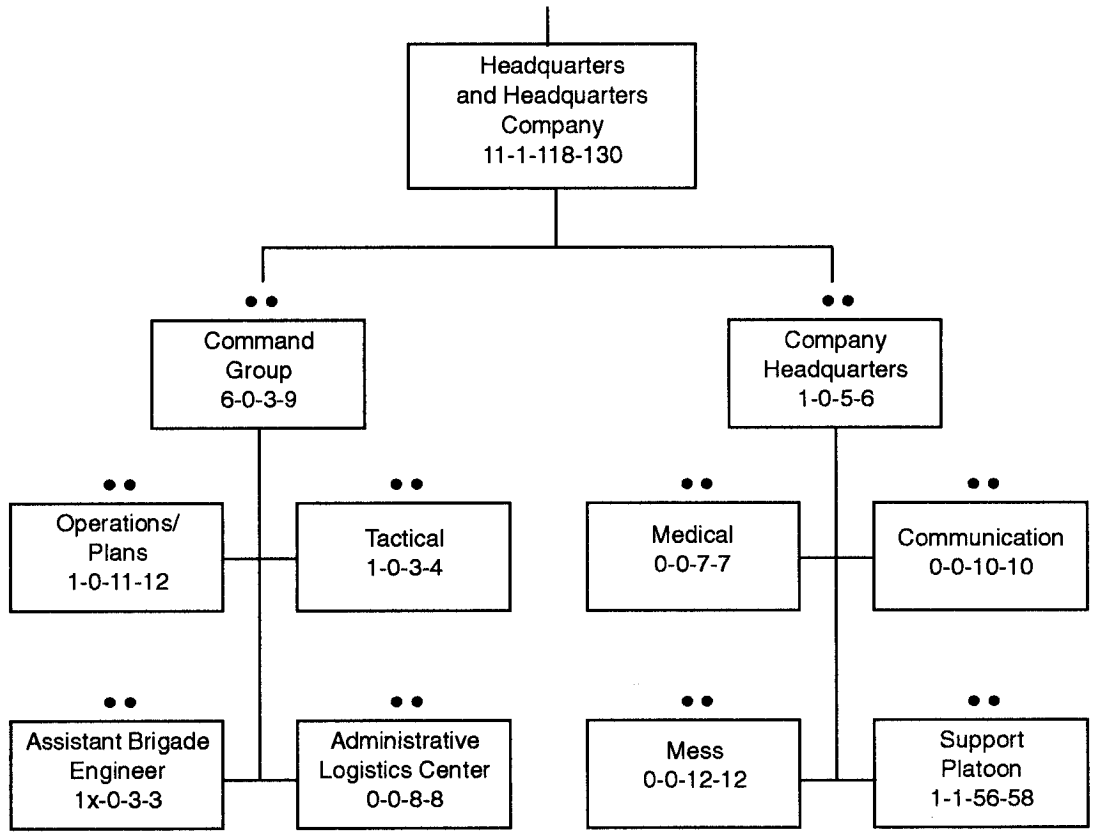
Organizations
Division engineer battalion
HHC, division engineer battalion
HHC, division engineer battalion breakout
Support platoon, HHC
Engineer company, division engineer battalion
Line platoon, engineer company
Engineer combat battalion, corps, wheeled
Line company, engineer combat battalion, corps, wheeled
Engineer combat battalion, corps, mechanized
Line company, engineer combat battalion, corps, mechanized
Combat support equipment company



Equipment Recapitulation

28	APC	6	Volcano
6	Carrier, CP	6	M548
6	CEV	8	HEMTT, cargo
12	AVLB	21	ACE
12	MICLIC	4	HEMTT, fueler
2	M88	7	3-man reconnaissance boat
27	HMMWV	1	HEMTT, wrecker
1	Shop truck	3	Contact truck
11	2 1/2-ton truck	3	5-ton truck (drop side)
60	Mine detector	30	Chain saw
2	3/4-ton trailer	26	1 1/2-ton trailer
2	MKT	4	400-gallon water trailer
10	Mark 19 grenade launcher	4	STE-ICE
34	50-caliber machine gun	12	2 1/2-ton trailer
3	KCLFF	6	SEE

Figure A-1. Division engineer battalion



Equipment Recapitulation

1	– APC	2	– M88
3	– Carrier, CP	1	– Shop truck
12	– HMMWV	1	– STE-ICE
4	– 2 1/2-ton truck	1	– HEMTT, wrecker
2	– HEMTT, cargo	6	– Mine detector
4	– HEMTT, fueler	2	– MKT
2	– 3/4-ton trailer	1	– 400-gallon water trailer
1	– 1 1/2-ton trailer	1	– 3-man reconnaissance boat
4	– 50-caliber machine gun	1	– Mark 19 grenade launcher
3	– Contact truck	3	– KCLFF

Figure A-2. HHC, division engineer battalion

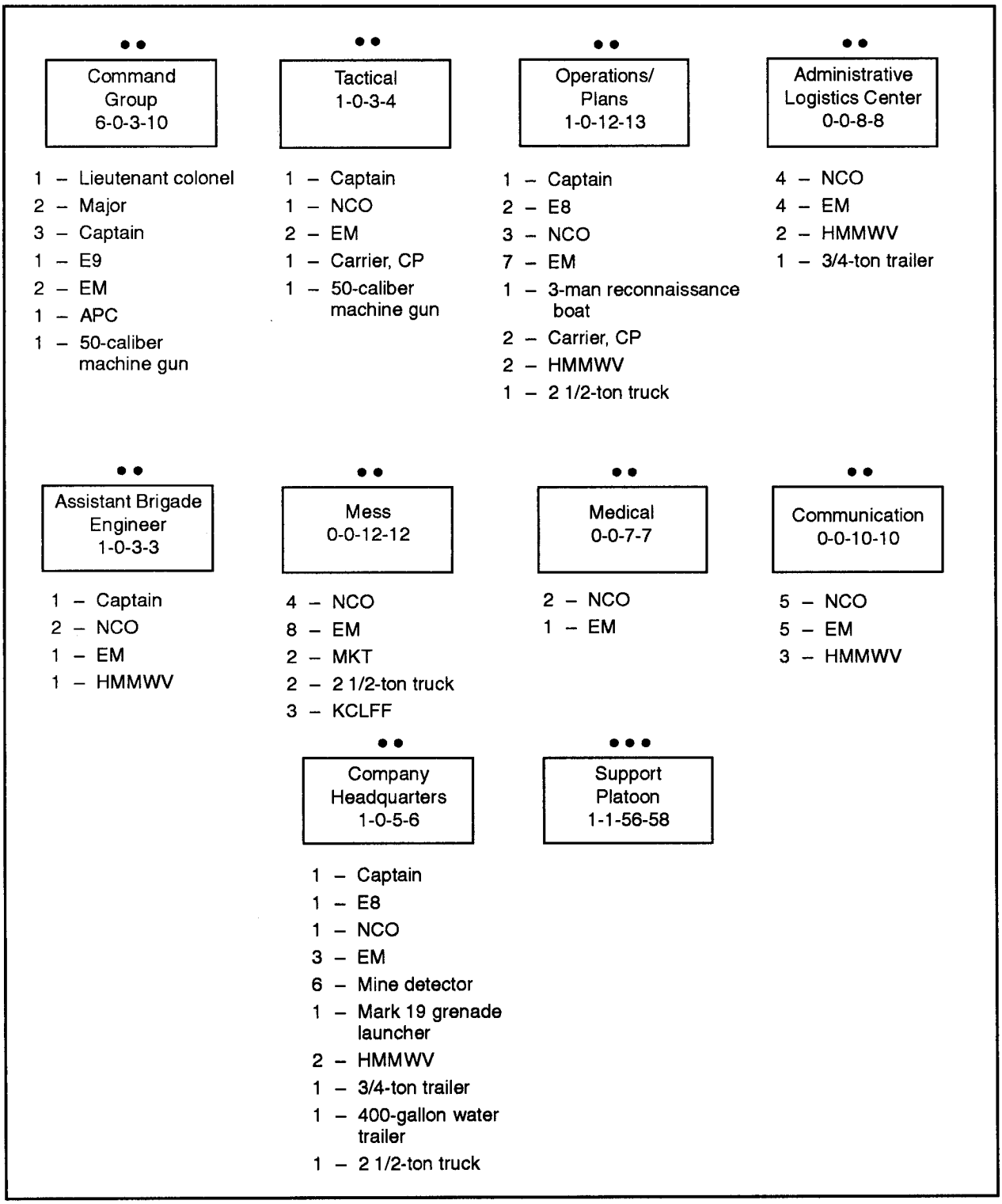


Figure A-3. HHC, division engineer battalion breakout

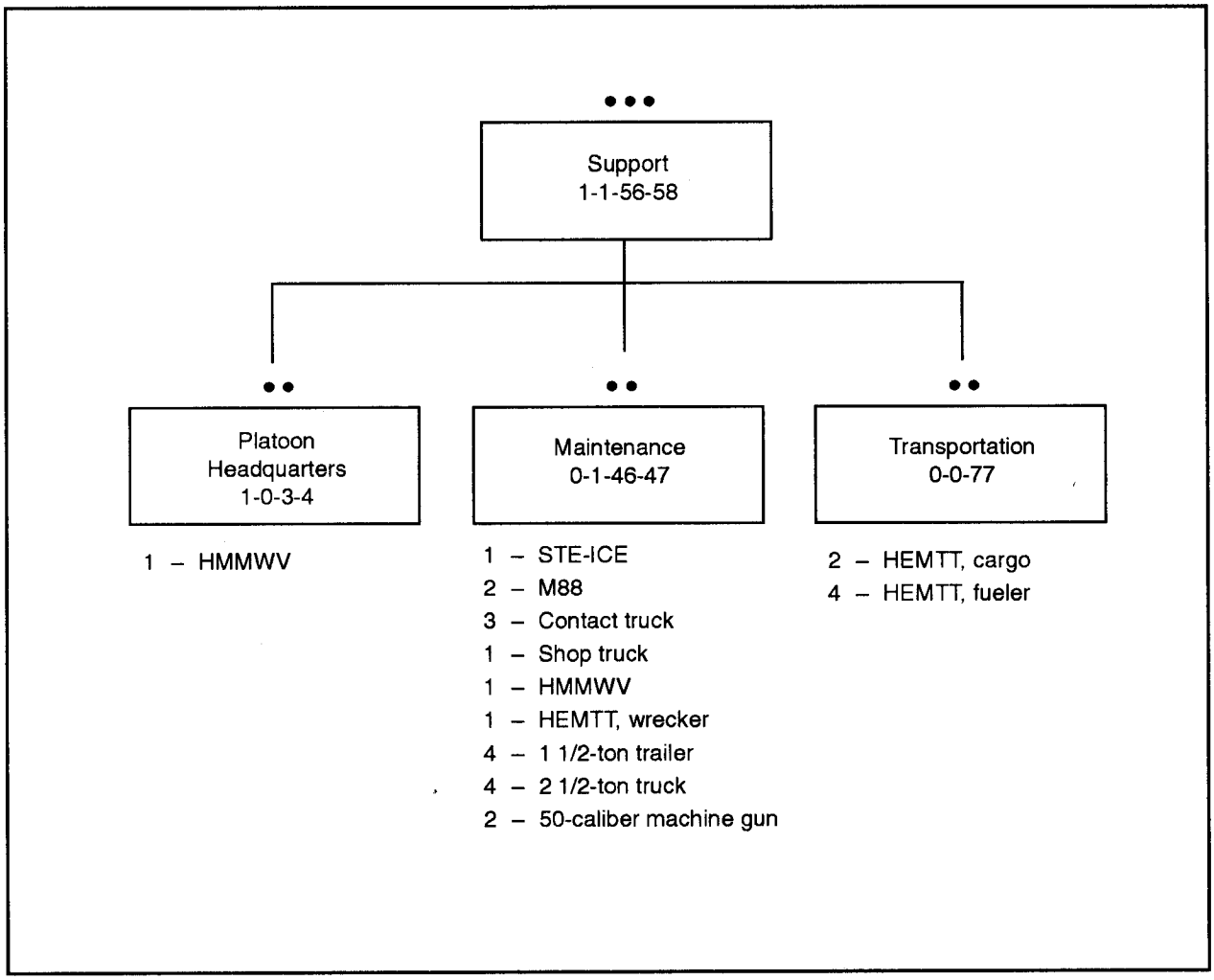
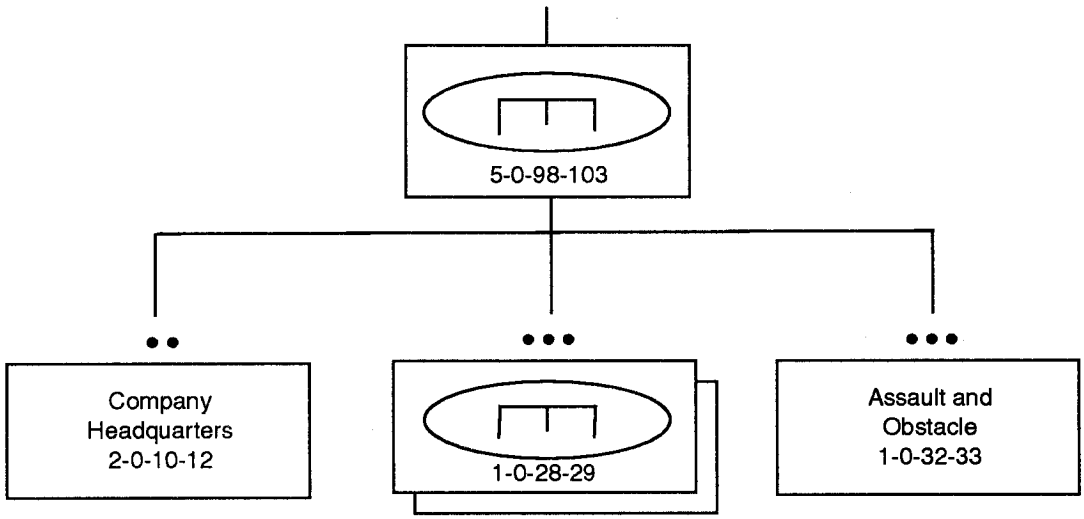


Figure A-4. Support platoon, HHC



Equipment Recapitulation

9	– APC	2	– Volcano
2	– CEV	2	– M548
4	– AVLB	2	– HEMTT, cargo
4	– MICLIC	7	– ACE
10	– Chain saw	2	– 3-man reconnaissance boat
7	– 1 1/2-ton trailer	5	– HMMWV
1	– 2 1/2-ton truck	1	– 5-ton truck (drop side)
10	– 50-caliber machine gun	18	– Mine detector
1	– Carrier, CP	3	– Mark 19 grenade launcher
4	– 2 1/2-ton trailer	2	– SEE
1	– STE-ICE		

Figure A-5. Engineer company, division engineer battalion

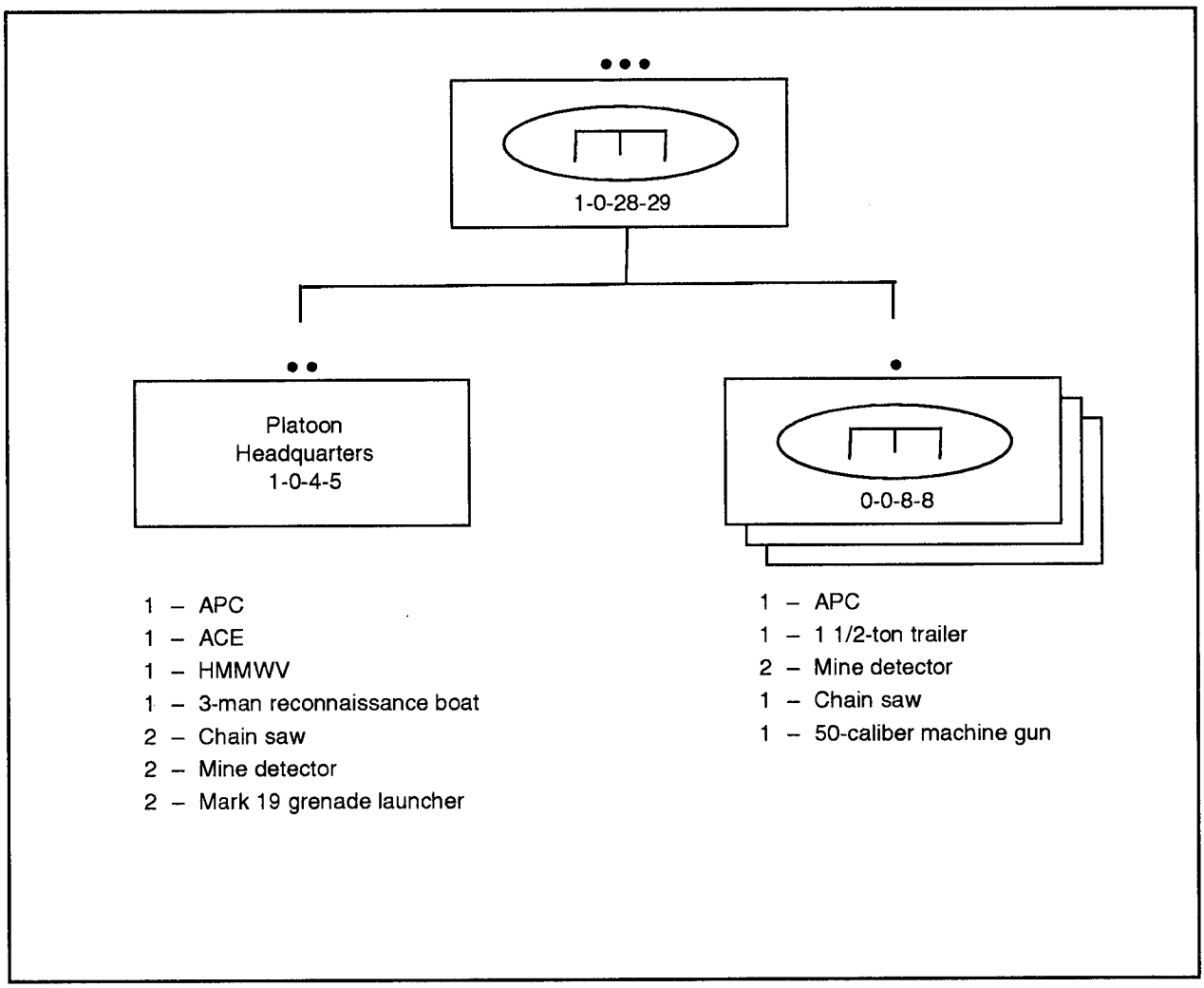
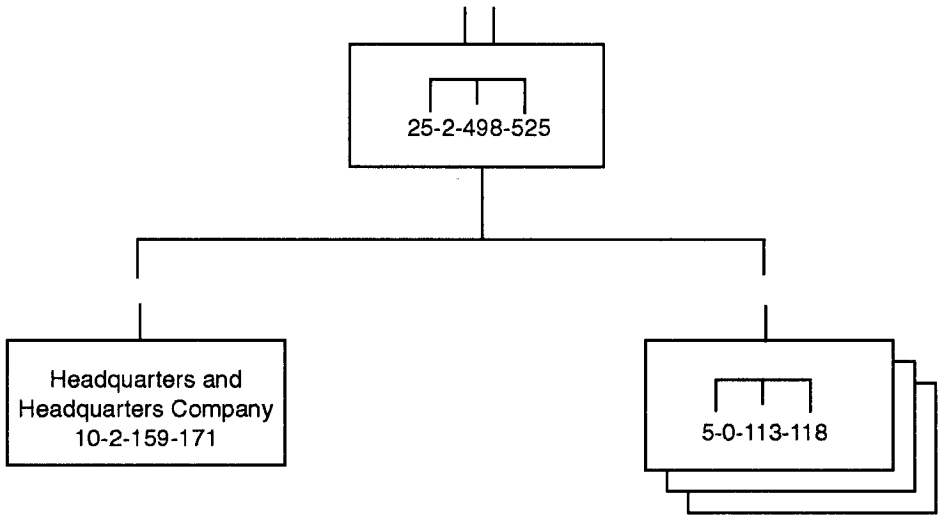


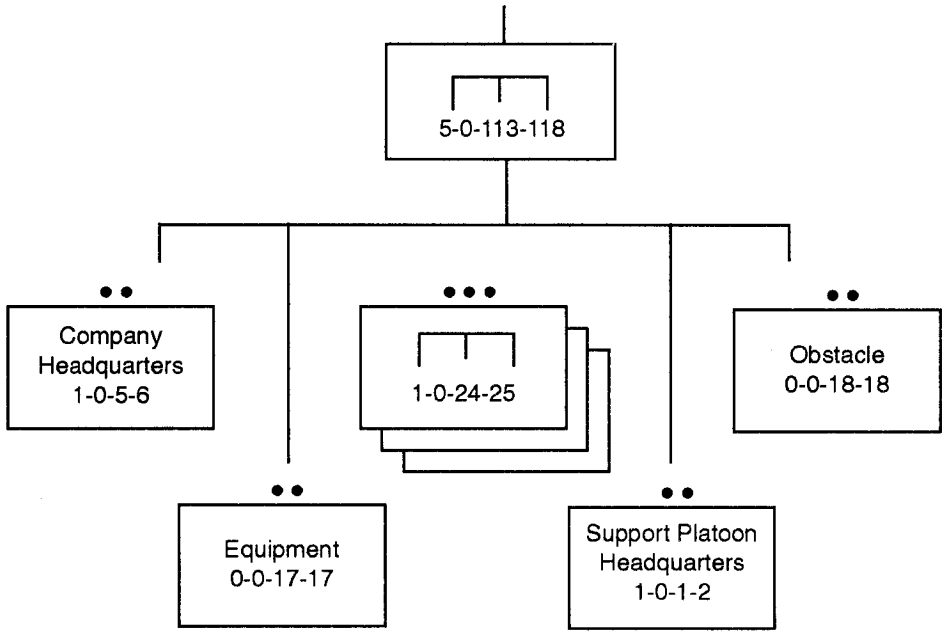
Figure A-6. Line platoon, engineer company



Equipment Recapitulation

6	Volcano	12	M916
3	25-ton crane	4	Welder, trailer-mounted
9	Road grader	12	D7 bulldozer
2	MKT	36	4-ton bolster trailer
6	Scoop loader	3	3/4-ton trailer
1	Lube trailer	9	1 1/2-ton trailer
3	Roller, vibrating, towed	3	400-gallon water trailer
3	Roller, sheepsfoot, towed	17	2 1/2-ton truck
12	MICLIC	54	5-ton truck
18	SEE	1	10,000-pound forklift
13	HEMMT, cargo	34	HMMWV

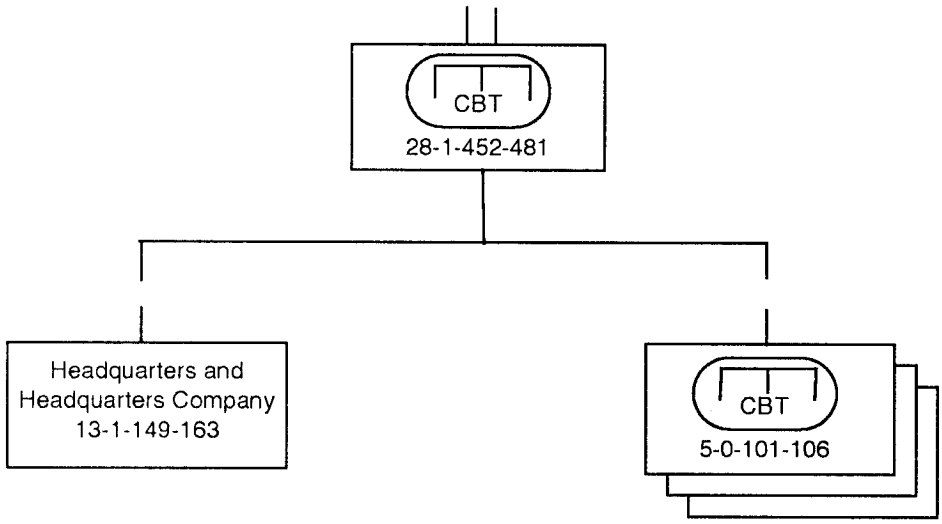
Figure A-7. Engineer combat battalion, corps, wheeled



Equipment Recapitulation

18	5-ton dump truck	1	1 1/2-ton trailer
2	HEMTT, cargo	4	MICLIC
1	2 1/2-ton truck	12	4-ton bolster trailer
4	M920	4	2 1/2-ton trailer
4	40-ton low-bed trailer	7	HMMWV
4	D7 bulldozer	28	Mine detector
2	Volcano	6	SEE
17	Chain saw	1	25-ton crane
1	2,500-gallon water distributor	3	Road grader
2	Scoop loader	1	Roller, vibrating, towed
1	Roller, sheepsfoot, towed		

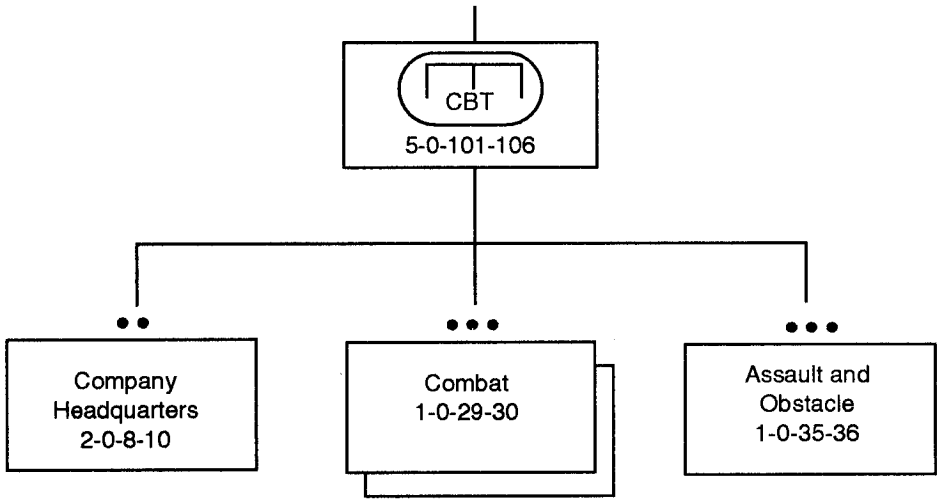
Figure A-8. Line company, engineer combat battalion, corps, wheeled



Equipment Recapitulation

27	APC	12	MICLIC
2	Carrier, CP	6	M548
18	ACE	6	SEE
21	2 1/2-ton truck	12	5-ton dump truck
12	2 1/2-ton trailer	12	AVLB
3	Contact truck	3	Volcano
4	HEMMT, POL	33	HMMWV
13	HEMMT, cargo	1	Shop truck
3	HEMMT, wrecker	7	3-man reconnaissance boat
3	M88	58	Mine detector
38	1 1/2-ton trailer	6	4-ton bolster trailer
3	400-gallon water trailer	1	Lube trailer
2	3/4-ton trailer	1	Welder, trailer-mounted
2	MKT	7	Mark 19 grenade launcher
47	50-caliber machine gun	6	CEV

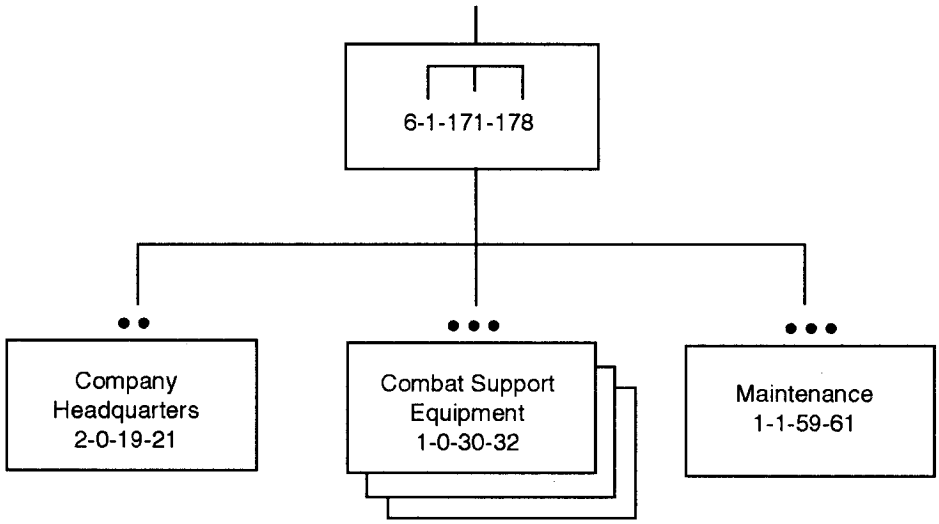
Figure A-9. Engineer combat battalion, corps, mechanized



Equipment Recapitulation

9 – APC	1 – Volcano
2 – CEV	2 – M548
4 – AVLB	4 – 5-ton dump truck
4 – MICLIC	6 – ACE
11 – Chain saw	2 – 3-man reconnaissance boat
9 – 1 1/2-ton trailer	6 – HMMWV
1 – 2 1/2-ton truck	2 – 4-ton bolster trailer
13 – 50-caliber machine gun	18 – Mine detector
2 – SEE	2 – Mark 19 grenade launcher

Figure A-10. Line company, engineer combat battalion, corps, mechanized



Equipment Recapitulation

1	– STE-ICE	6	– SEE
3	– 2,500-gallon water distributor	12	– HMMWV
3	– Bomag compactor	1	– HEMTT, wrecker
3	– 25-ton crane	3	– HEMTT, fueler
8	– Mine detector	6	– M916
6	– Road grader	6	– D7 bulldozer
1	– MKT	3	– 1 1/2-ton trailer
3	– Scoop loader	1	– 400-gallon water trailer
3	– 250-CFM air compressor	6	– 2 1/2-ton truck
3	– Roller, vibrating, towed	9	– 5-ton dump truck
6	– Scraper	12	– 20-ton dump truck
6	– 40-ton low-bed trailer	1	– 5-ton tractor
3	– PLL van	1	– 5-ton wrecker

Figure A-11. Combat support equipment company

APPENDIX B

C^2 Facilities

This appendix provides an example of how to man, equip, and organize the engineer battalion CP. The battalion's C^2 laydown is normally influenced by its supported maneuver brigade and assigned mission.

MAIN CP

The engineer battalion either collocates with the maneuver brigade or establishes a separate CP (see *Figure B-1, page B-2, and Figure B-2, page B-3*). In both cases, the XO is the OIC of the main CP. The S3 spends the majority of his time in the brigade planning cell with the ABE. If the battalion decides to collocate with the brigade, a dedicated standard integrated command post system (SICPS) for battalion planning is required. *Table B-1, page B-3*, is an example of a shift schedule for a 24-hour operation.

The soldiers who are not on the shift schedule assist in their respective areas. The ABE element primarily focuses on future operations; however, it also assists in C^2. Tactical personnel support the main CP when the tactical CP is not operational. If the tactical officer is committed to the tactical CP, one of the NCOs will act as the shift officer.

TACTICAL CP

The battalions second command track or M113 with SICPS or extension is collocated with the brigade tactical CP (see *Figure B-3, page B-4*). It is staffed to monitor the current battle only. Once the battle has culminated, the tactical CP breaks down and returns to the main CP.

REAR CP

The rear CP is established from either an M113 with SICPS or a single SICPS attached to the FSB main CP (see *Figure B-4, page B-5*). This facilitates coordination in the rear and enhances CSS operations. *Table B-2, page B-5,* is an example of a shift schedule for a 24-hour operation.

In this scenario, the S1 and S4 use the rear CP as their base. They rely on their respective NCOICs to run the CP and keep them informed.

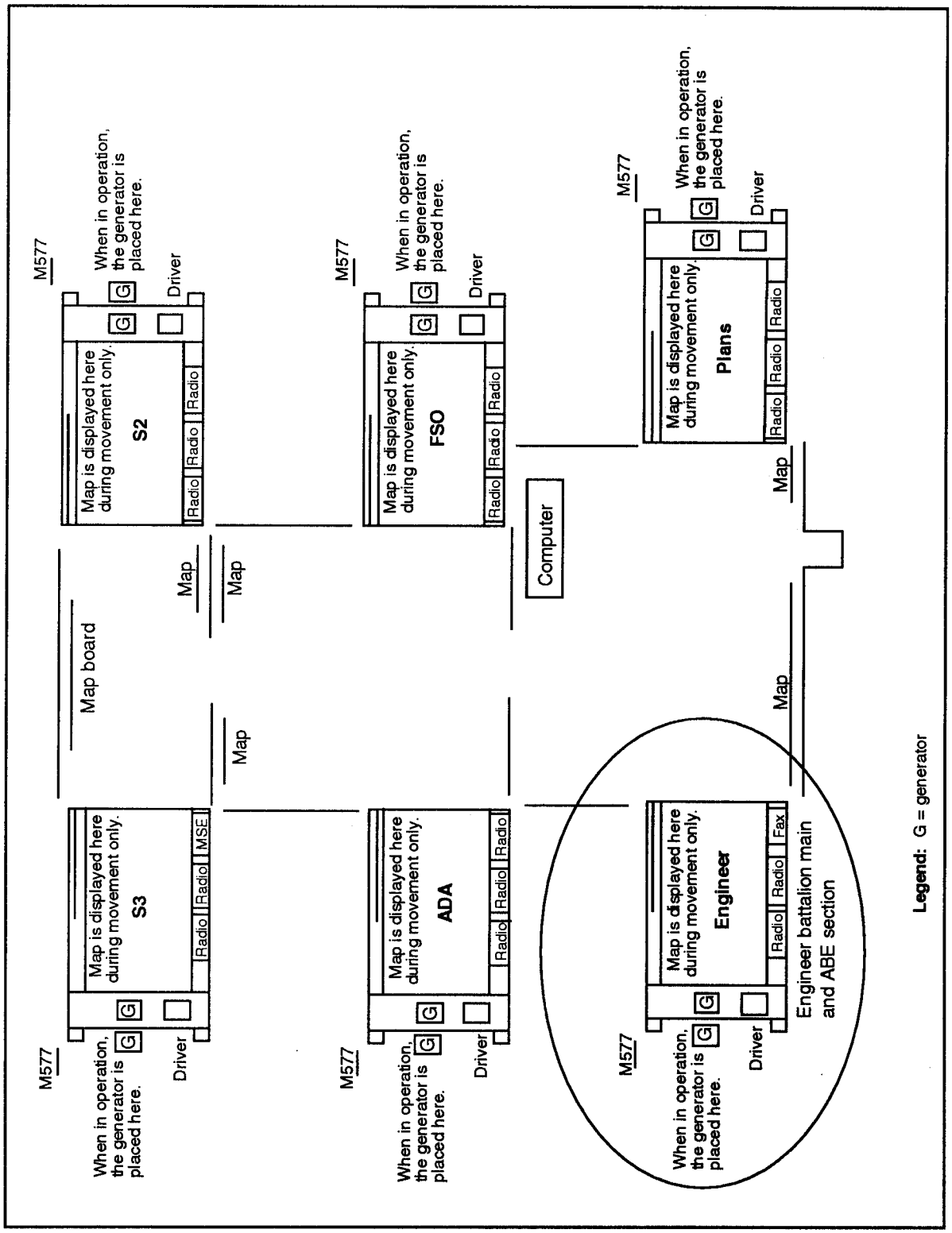


Figure B-1. Engineer battalion collocated with the brigade main CP

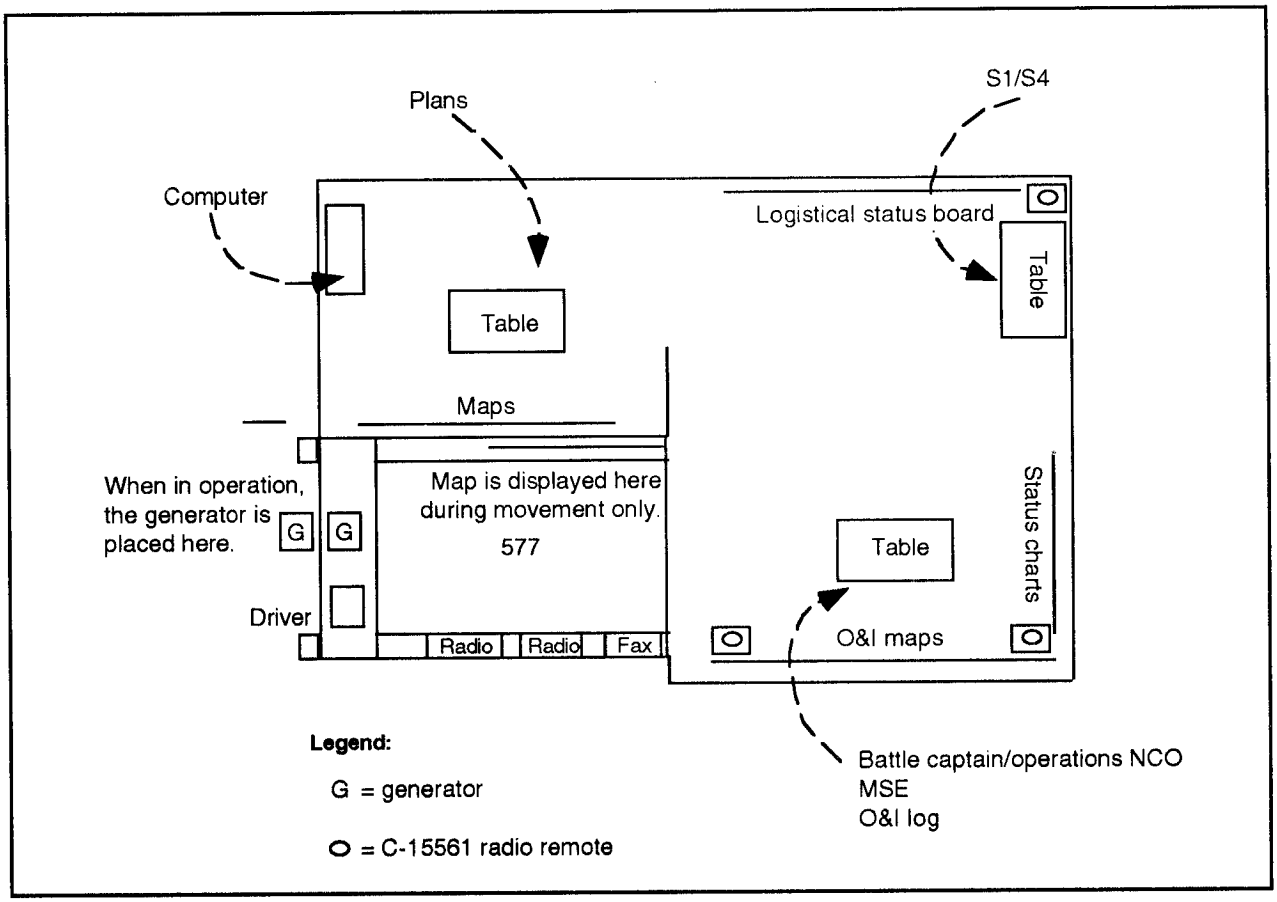


Figure B-2. Engineer battalion main CP

Table B-1. Main CP shift schedule

Shift 1	Shift 2
Operations officer	Operations officer
Construction sergeant	Reconnaissance sergeant
Two junior enlisted	Two junior enlisted

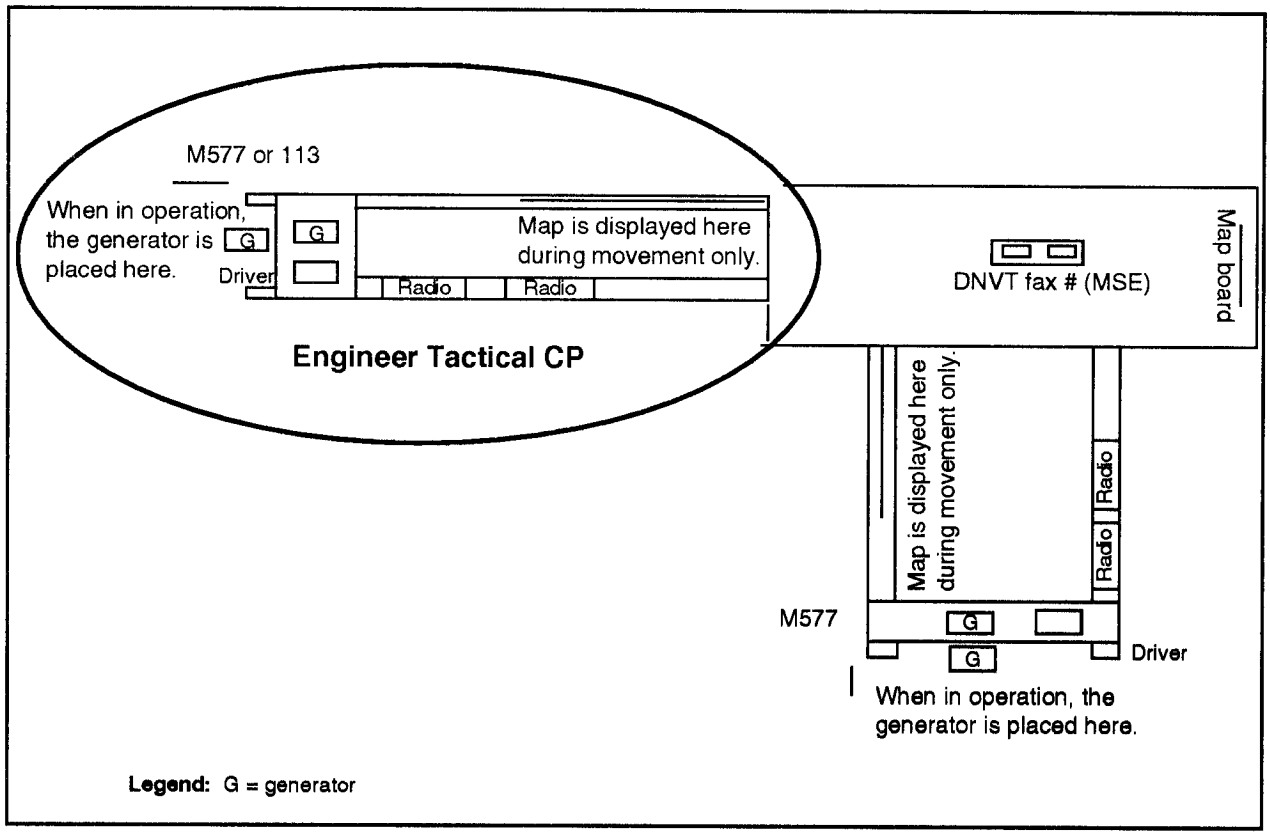


Figure B-3. Engineer tactical CP

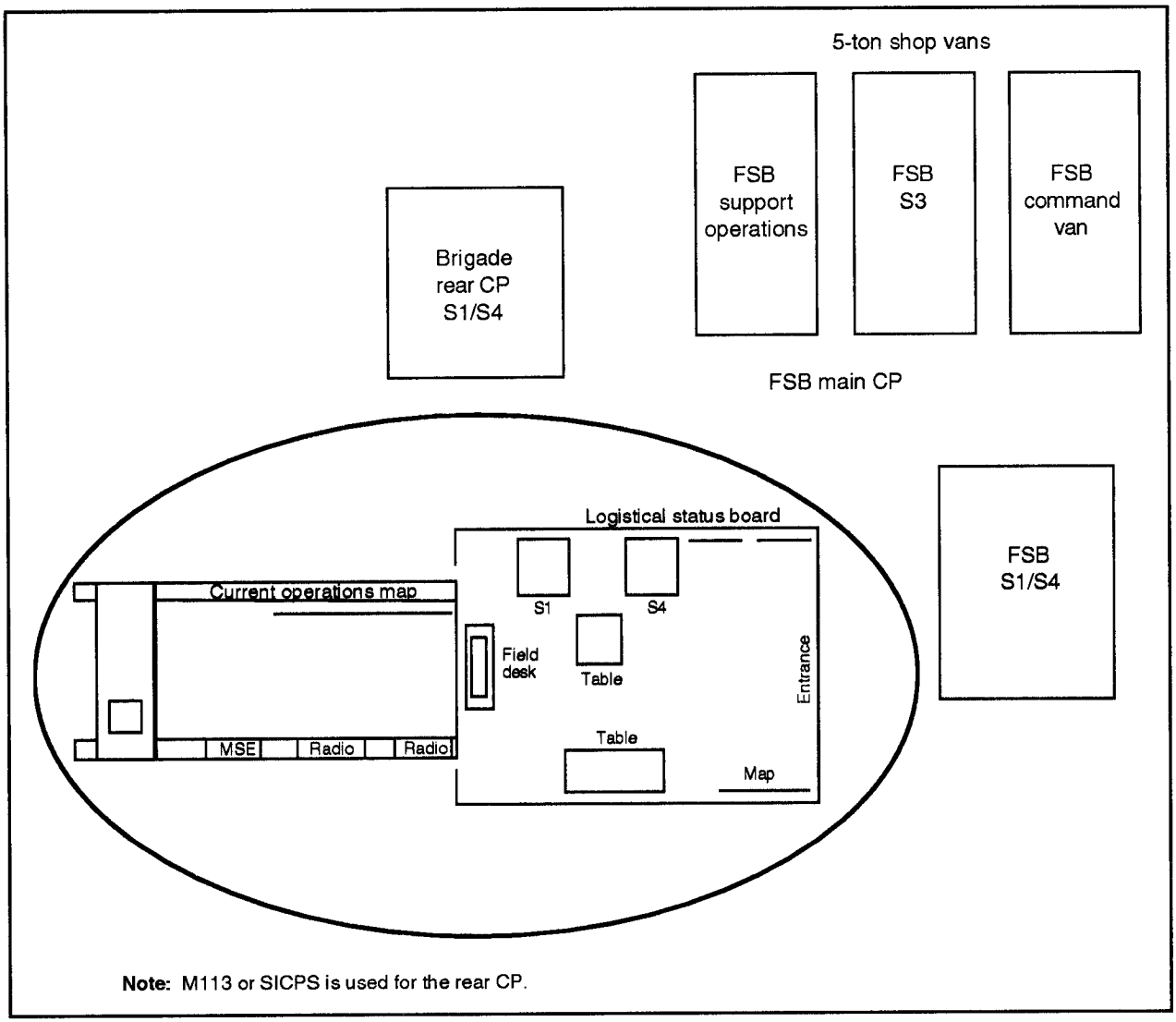


Figure B-4. Engineer rear CP

Table B-2. Rear CP shift schedule

Shift 1	Shift 2
S1	S4
S1 NCOIC	S4 NCOIC
Two junior enlisted	Two junior enlisted

APPENDIX C

TerraBase

TerraBase is a computer software program that aids in the analysis of terrain. It provides a way to integrate a wide variety of terrain data in a flexible manner using computer-screen images and hard-copy products. Samples of these products are shown in *Figures C-1 through C-6, pages C-3 through C-8.* These products enhance the brigade commander's ability to make informed battlefield decisions. TerraBase is most useful when employed in the brigade planning cell where the staff officers can analyze the effects of terrain on their particular battlefield function. Terrain products can be viewed while developing or analyzing COAs and can further be saved on a floppy disk or printed to support subordinate units' planning. Much time can be saved by saving and copying the products on a floppy disk instead of printing them.

The forms of data supported by TerraBase are—

- Digital terrain elevation data (DTED), level 1.
- Landsat thematic mapper data.
- Tactical terrain-analysis data-base (TTADB) factor overlays (the user inputs the data).

Additionally, point/area/linear (PAL) feature data that are taken from maps, aerial photos, and other sources are used to produce a customized terrain analysis of operational areas. The end product is in the form of maps, overlays, and three-dimensional visual aids.

TerraBase users, with a little training, can create line-of-sight (LOS) profiles; assess placement locations for weapons, radar, and radios; and view three-dimensional representations of the terrain. They may compute and map cross-country mobility (CCM), make user-specific analysis maps, classify and make maps with Landsat data, and obtain climate- and weather-related facts. In addition, the user may add digitized PAL features from photographs and/or maps to the data base, as required by the mission. This data base may be searched using limits that the user establishes to produce overlays or textural reports.

TerraBase was designed to run on Zenith 248 computers and Epson-compatible Alps American printers. The minimum configuration is—

- Zenith 248 with a 20-megabyte hard disk (or any International Business Machine (IBM) AT compatible with 512K memory and an enhanced graphics adapter (EGA)).
- Zenith color monitor (or any EGA red, green, and blue (RGB) monitor).
- Alps printer (or any Epson FX compatible).

TerraBase supports the brigade's planning process with tailored topographic products. TerraBase provides terrain information to analyze the following:

- AO.
- Cover.
- Concealment.
- Lines of communication (LOC).
- CCM.
- Combined obstacle overlay (COO).
- Helicopter landing zone/drop zone (HLZ/DZ).

Special or tailored products can also be produced to support the user. Examples are air-assault packets, target folders, infiltration routes to a specific objective, weapons placement, and river-crossing/ford sites. TerraBase can also produce computer-generated products using DMA's DTED, to include LOS profiles, placement/location of weapons systems, radar or radios, and three-dimensional representations of the terrain. The following describes the DTED products and what they can be used for when analyzing terrain:

- LOS profile. This product is a direct LOS from point to point using a six-digit universal transverse mercator (UTM) grid coordinates for each point. It can be used to determine the LOS for radio, retrans, and radar sites (see *Figure C-2, page C-4).*
- Visible area plots (VAPs). This product shows an area "visible" from one location. The area can be thought of as LOSs radiating from the center of a circle. This can be a full 360 degrees or part of a circle (fan angle) from 10 degrees to 360 degrees. When developing this type of product, the user must provide a six-digit coordinate for the observer position, a six-digit coordinate for the target or observed position, a fan angle (10 degrees to 360 degrees), a map scale (1:250,000 - 1:12,500), and a description of the observer and target locations (for example, Hill 345 to the intersection of Highway 3 and Route 3052). Detachment personnel adjust the coordinates to get the best "visible" area possible. This product can be used for placement of listening posts/observation posts (LPs/OPs), weapons, antennas, special surveillance equipment or personnel, and possible enemy LPs/OPs (see *Figures C-3 and C-4, pages C-5 and C-6*).
- Oblique view. This product is a three-dimensional view of a piece of terrain. It can be enhanced with LOC, major rivers, major cities, and UTM grid ticks. The requester must provide a boundary using one of two methods. The first method is to use a six-digit coordinate for every turn in the boundary. The second method is to outline the boundary on a map or piece of acetate. This product is mainly used to give the commander and his staff a feel for the terrain in their AO (see *Figure C-5, page C-7*).
- Perspective view. This product is also a three-dimensional view that shows what people would see if they were actually standing on the ground or hovering in a helicopter at a given location. The user must provide a six-digit coordinate for the observer location, a height of up to 1,500 meters (man size = 2 meters), and a six-digit coordinate of the target area to be observed (this can also be expressed as a cardinal direction in degrees). This product is used to show the commander and his staff the terrain of a specific area as seen from the ground (see *Figure C-6, page C-8*).

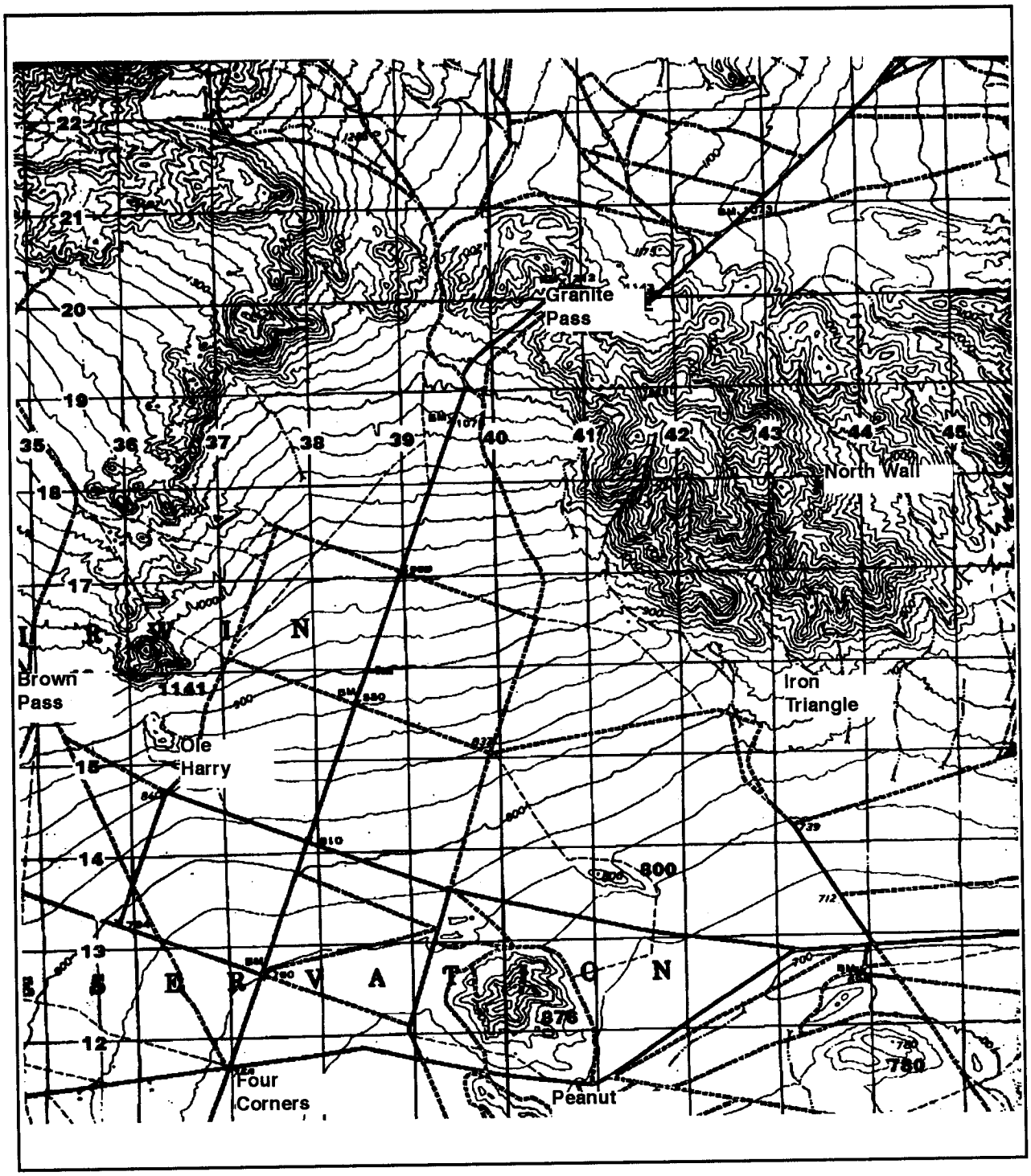
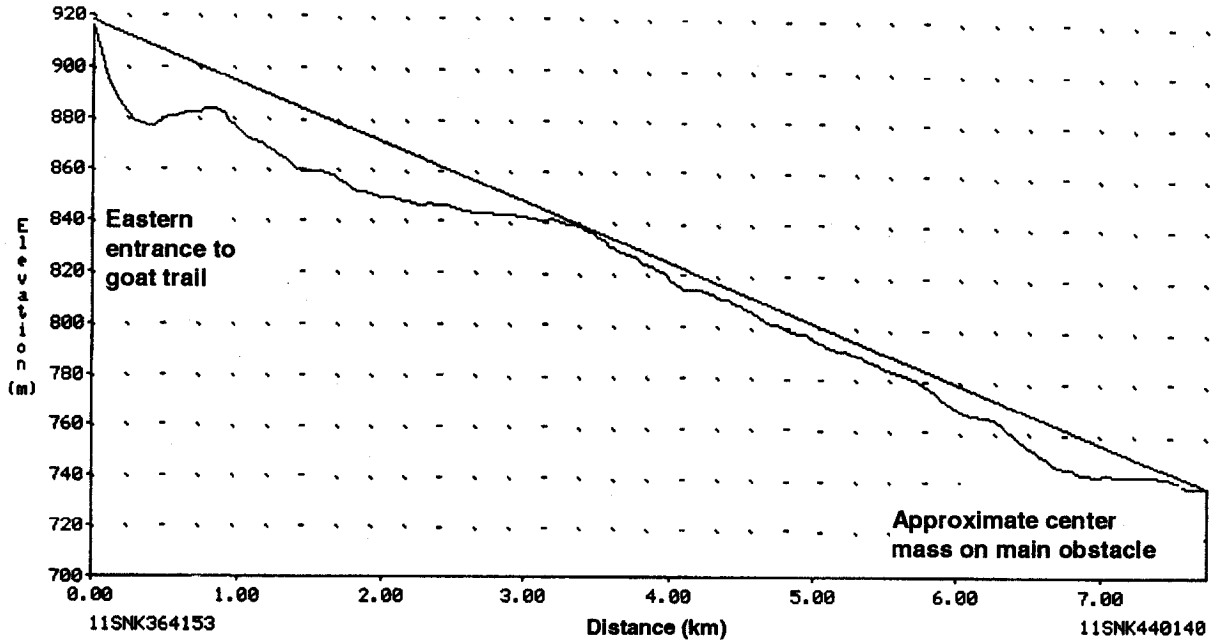


Figure C-1. Scanned image of the actual working area for all products shown in *Figures C-2 through C-5*



Product Legend

Area of Operation

11SMK550839----------11SNK902842

Current Cell

11SNK001283----------11SNK454284

N35W117W

11SNJ001729---11SNJ457730

11SMJ542175----------11SNJ91979

Curvature drop (m): 4
Vertical exaggeration: 20.76
Observation: Visible

Figure C-2. LOS

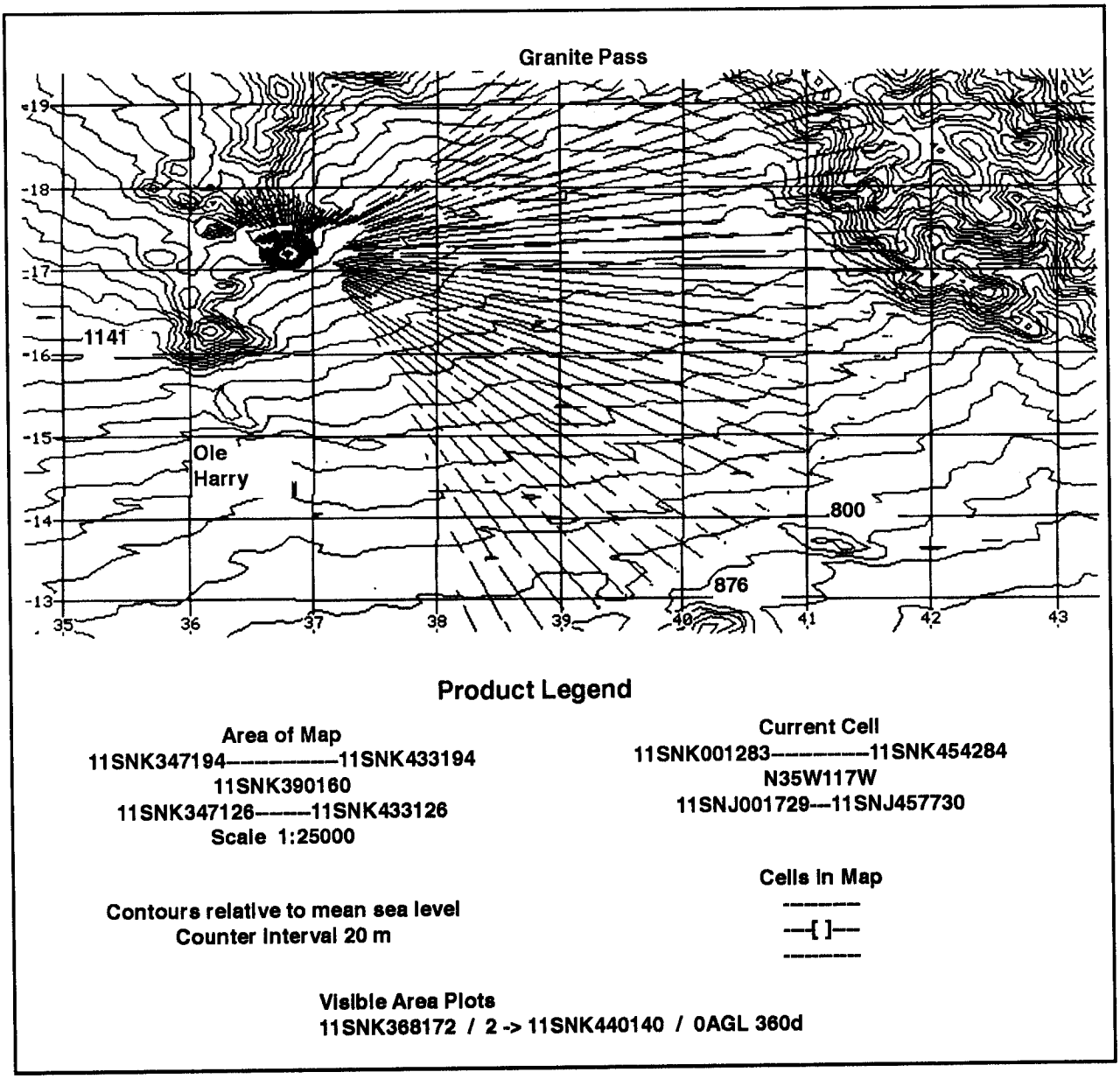
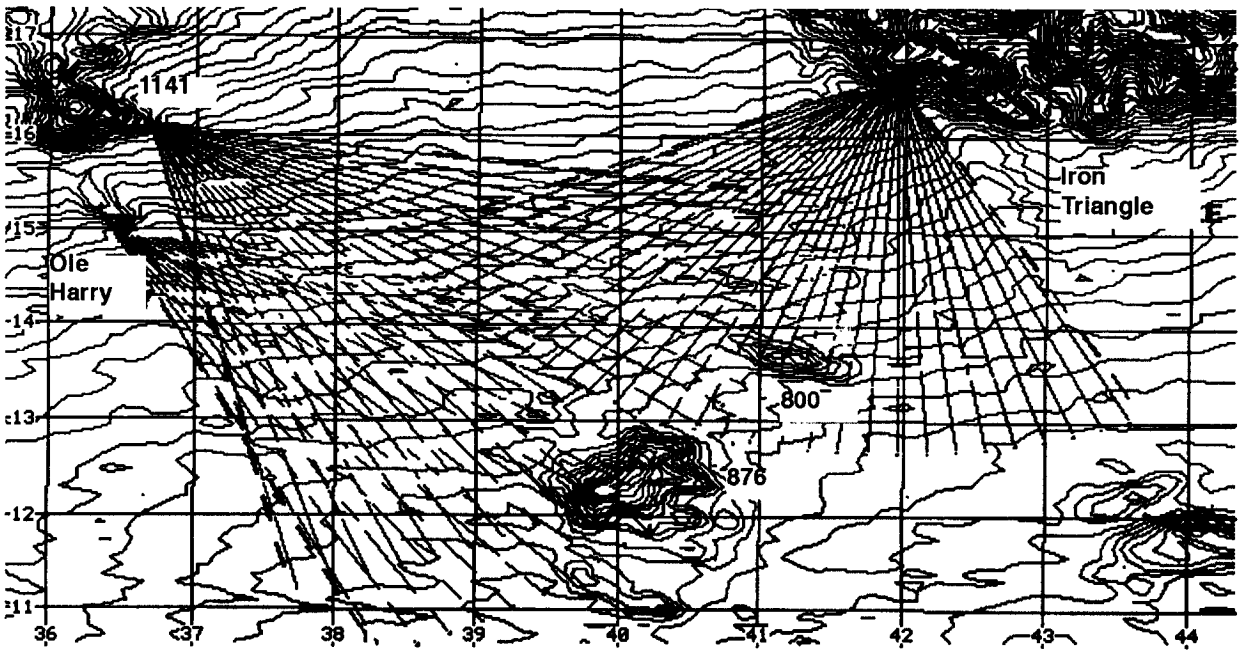


Figure C-3. VAP with UTM grids overlay



Product Legend

Area of Map
11SNK357174----------11SNK433174
11SNK400140
11SNK357106------11SNK433106
Scale 1:25000

Current Cell
11SNK001283----------11SNK454284
N35W117W
11SNJ001729---11SNJ457730

Contours relative to mean sea level
Counter interval 10 m

Cells in Map

---[ ]---

Visible Area Plots
11SNK41951666 / 2 ->11SNK405125 / 0AGL 90d
11SNK367161 / 2 ->11SNK405125 / 0AGL 70d
11SNK364151 / 2 ->11SNK405125 / 0AGL 70d

Figure C-4. VAPs

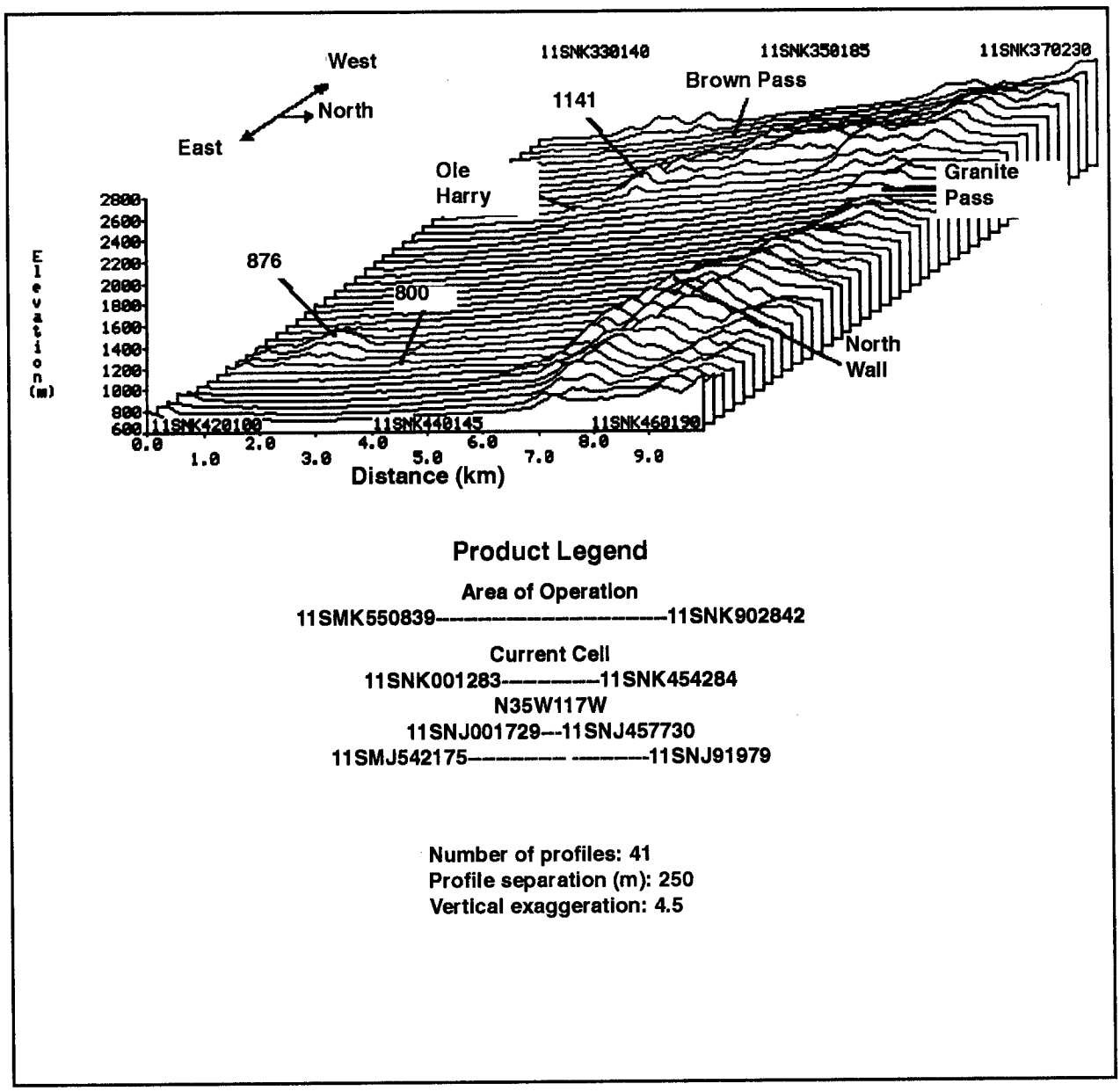
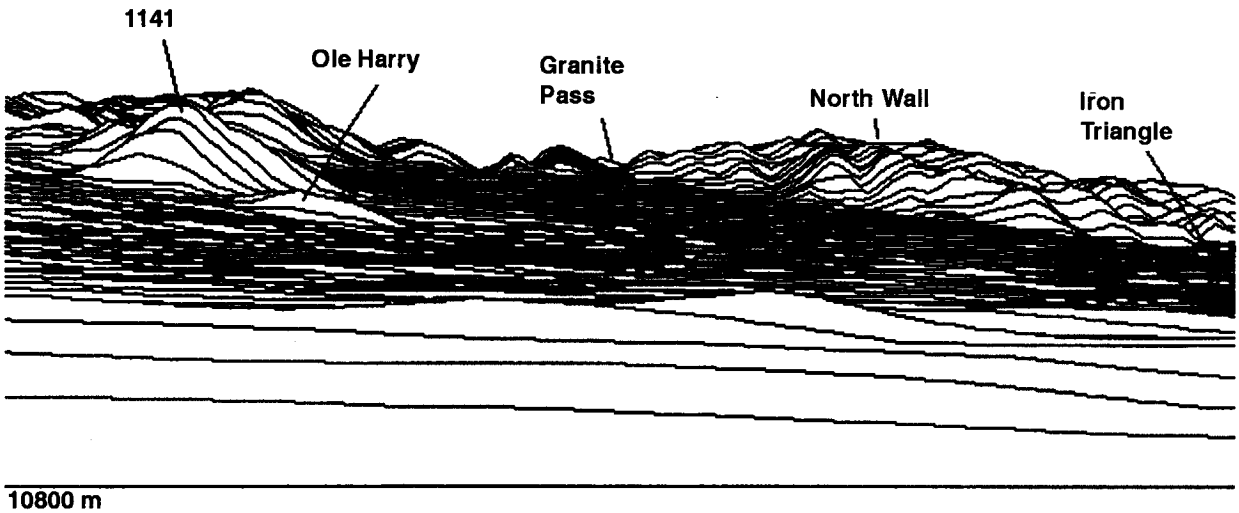


Figure C-5. Oblique view



Product Legend

Area of Operation
11SMK550839----------11SNK902842

Current Cell
11SNK001283----------11SNK454284
N35W117W
11SNJ001729---11SNJ457730
11SMJ542175---------- --------11SNJ91979

Observer location: 11SNK350110
Observer height (m): 2
Observed location: 11SNK408202
Observed height (m): 0
Vertical exaggeration: 2.8
Range lines every 100 m
Every 10th line highlighted
Last range line (m): 10,900

Figure C-6. Perspective view

APPENDIX D

Orders and Annexes

Orders and annexes are critical components of the engineer battalion's C^2. The brigade engineer, through the brigade commander, exercises functional control over engineer operations within the brigade sector by including critical instructions in the brigade order and the engineer annex. The supporting battalion commanders issue unit orders to exercise control over engineer forces under their command.

BRIGADE OPORD

Figure D-1, pages D-2 through D-7, is a sample format of the brigade OPORD. Paragraphs requiring engineer input contain bulletized information.

ENGINEER ANNEX

The engineer annex contains information not included in the base brigade order that is critical to the engineer plan to support the brigade's concept of the operation or required for subordinate engineer planning. It does not include instructions or orders directly to engineer units. All instructions or tasks are addressed to the supported units, not supporting engineer units. More importantly, the engineer annex covers critical aspects of the entire engineer plan, not just parts that pertain to engineer units. The engineer annex is not a replacement for an engineer battalion order. For example, it does not give subunit orders and service-support instructions to engineer units remaining under brigade control; those orders and instructions are contained in the engineer battalion order. An engineer annex should meet the following general criteria:

- Includes critical information derived from the EBA process.
- Contains all critical information and tasks not covered in the base order.
- Does not contain items covered in SOPs unless the mission requires a change to the SOP.
- Contains information and tasks directed to major subordinate elements of the brigade, not supporting engineer units.
- Avoids qualified directives and is clear, complete, brief, and timely.
- Includes only information and instructions that have been fully coordinated with other parts of the OPORD, brigade commander, and staff.

CLASSIFICATION
(Place the classification at the top and bottom of every page of the OPORD.)

Copy___of___copies
Issuing headquarters
Place of issue (coordinates)
Date-time group of signature

OPERATION ORDER _____ (code name, if used)

Reference(s): Map(s) and other references required.

Time Zone Used Throughout the Order:

Task Organization:

- Reflects the engineer task organization of the units supporting maneuver battalions, including the command or support relationship.
- Lists units under a brigade commander's control.

1. SITUATION.

a. Enemy Forces. Include recent enemy engineer activities or capabilities critical to maneuver battalion commanders or essential to understanding the supporting engineer plan.

b. Friendly Forces. Include engineer units not under brigade control that are working in the brigade's sector.

c. Attachments and Detachments.

- State the effective time for engineer task organization if it differs from other units.
- Clarify or highlight changes in engineer task organization that occur during a phase of an operation.

2. MISSION.

3. EXECUTION.

Intent

a. Concept of Operations.

(1) Maneuver.

(2) Fires.

Figure D-1. Brigade OPORD

(3) Reconnaissance and Surveillance.

(4) Intelligence.

- Include the focus of intelligence-collection efforts that impact on a maneuver plan.
- Provide subordinate units with information requirements (developed by the S2 and the brigade commander) that are command PIR.

(5) Engineer (Scheme of Engineer Operations [SOEO]).

- Describe (in narrative format) the M/S tasks that support a maneuver plan, regardless of which unit performs the task. For example, address artillery-delivered FASCAM in this paragraph.
- Explain what the essential M/S tasks are and how they support a scheme of maneuver.
- Use a maneuver unit's concept of operations as a carrier wave. (For example, generally operations are phased. A SOEO uses the same phases. [Prephase I is not a phase unless a supported unit has something called Prephase I.] If a supported unit does not use phases for its operations, a SOEO uses the same format the supported unit uses for its concept of the operation.)
- Address four areas under each phase in a SOEO (general comments, countermobility, survivability, and mobility). Address each of these in the order of priority for that particular phase. (For example, if the priority for Phase I is countermobility, survivability, and then mobility, then the comments would appear in this order: general comments, countermobility, survivability, and mobility. If the priority in Phase II changes to mobility, countermobility, and then survivability, then the comments would appear in the following order: general comments, mobility, countermobility, and survivability.) Do not address these four areas as separate bullet comments but as four clearly identified parts of a narrative. For example, the format does **not** look like the following:

SOEO
(1) Phase I
(a) General...
(b) Mobility...
(c) Countermobility...
(d) Survivability...

Figure D-1. Brigade OPORD (continued)

If there is no support provided in a specific area during a phase, then do not mention that type of support. (For example, if no brigade element receives survivability support during a phase, then do not mention survivability.)

- Ensure that the support addressed under each phase applies to the M/S effort that supports a maneuver unit during that phase, no matter when the effort was completed. (For example, if engineers construct three obstacle belts that support TFs during Phase III, then address the obstacle belts during that part of a SOEO that addresses Phase III. Likewise, if an engineer battalion provides breaching support to the brigade during Phase II, then address the breaching support as part of Phase II.)

- Ensure that each of the four areas covered under each phase provides a standard set of information with a general format as follows:

  — General comments. A brief, one-sentence comment about M/S support for the phase.

  — Countermobility. Each obstacle belt, in order of its priority, its intent (target, effect, and relative location), and which maneuver unit it supports. Provide execution criteria for reserve targets and situational obstacles.

  — Survivability. Explanations for each survivability task, relative location (BP, vicinity of an EA, and so forth), and which maneuver unit is supported.

  — Mobility. Explanations for each mobility task (for example, reducing obstacles, marking lanes, providing guides, and maintaining a route), relative location (route, objective, and so forth), the priority of the reduction asset used (for example, use plows first, then MICLIC), and which maneuver unit is supported.

The following is an example of an SOEO for a four-phase brigade's defensive mission. In this case, the four phases are 1) counterreconnaissance; 2) defeat of two motorized rifle regiments (MRRs) in EAs Dog and Cat; 3) counterattack by the brigade reserve to destroy the trail MRR; and 4) reorganization, reconstitution, and passing of the division reserve forward.

Figure D-1. Brigade OPORD (continued)

Example:

SOEO:

Phase I — Engineers support the brigade's counterreconnaissance fight. Engineers mark lanes on Routes Red, Blue, and Silver through all obstacles under construction to support movement of the counterreconnaissance force. Engineers emplace obstacle belt A1 to turn enemy reconnaissance elements off the covered and concealed routes forward of OP 32.

Phase II — Engineers support the brigade's fight in EAs Dog and Cat with 3 obstacle belts (A2, A3, and A4) and fighting positions in BPs Armor and Mech. A2 is coordinated with TF Armor to fix the northern MRR into EA Dog, vic PL Zinc. A3 is coordinated with TF Armor to fix the northern MRR in EA Dog. A4 is coordinated with TF Mech to fix the southern MRR vic EA Cat. The priority for survivability effort in all BPs is the fire-support team vehicle (FIST-V), M1, M2, and M3. Priority of support is TF Armor then TF Mech.

Phase III — M/S support to the brigade CATK to destroy the trail MRR. Engineers provide breaching support for TF Destroy along Axis Frog. Priority for breaching is plows, MICLIC, and dismounted engineers. Situational obstacle belt A5 (area denial artillery munition [ADAM]/ remote antiarmor mine system [RAAMS]) will disrupt the trail MRR.

Phase IV — Engineers support the brigade's reorganization and prepare to pass TF 7-7 forward as the division resumes the offensive. Engineers create and mark lanes along Routes Red and Blue to pass TF 7-7.

NOTE: Every planned obstacle belt (directed, situational, or reserve) must be addressed in a SOEO (a SOEO has no subparagraphs). Other information (zones, belts, restrictions, and so forth) is part of the coordinating instructions.

(6) Air Defense.

(7) Information Operations.

b. Tasks to Maneuver Units. List—

- Mission-essential tasks to be accomplished by a specific maneuver element.
- Mission-essential tasks to be accomplished by engineers task-organized to maneuver elements.

c. Tasks to CS Units. Include brigade-level tasks assigned to engineers retained under brigade control. List tasks to inform TF commanders of tasks under brigade control being performed by brigade-level forces.

d. Coordinating Instructions. Include—

Figure D-1. Brigade OPORD (continued)

- Critical instructions common to two or more maneuver units.
- SOP information only if it is needed for emphasis.
- Times or events in which obstacle zones become effective, if they differ from the effective time of the order.
- Any restrictions to an obstacle belt (for example, belt restrictions may preclude the use of certain types of mines or obstacles or the use of obstacles on specific routes through the zone).
- References to survivability/countermobility time lines, as applicable.
- Relevant environmental considerations/protection measures. These may be placed in an appendix to the engineer annex.

4. SERVICE SUPPORT.

a. Support Concept. Include the concept for—

- Push of Class IV/V supplies.
- Logistics support of engineers task-organized to maneuver battalions, if not listed in the service-support annex.

b. Materiel and Services.

(1) Supply. Include the—

- Allocation of Class IV or engineer Class V supplies, if not contained in the engineer annex.
- Tentative locations for the Class IV/V supply point.

(2) Transportation.

(3) Services.

c. Medical Evacuation and Hospitalization.

d. Personnel Support.

e. Civil-Military.

5. COMMAND AND SIGNAL.

Figure D-1. Brigade OPORD (continued)

a. Command.

b. Signal.

Acknowledge:

Commander's last name
Rank

OFFICIAL:
(Authentication)

Annexes:

Distribution:

CLASSIFICATION

Figure D-1. Brigade OPORD (continued)

The engineer annex includes any combination of written instructions, matrices, or overlays to convey the necessary details of the engineer plan. The engineer annex outlined in the following paragraphs provides a standard format for both offensive and defensive operations. This format standardizes the organization of information included as written instructions. The actual content depends on the type of brigade operation and engineer plan. A standardized annex format makes it easier for the engineer staff officer to remember what should be included and for subordinate staff officers to find required information. The format tailors the standard five-paragraph order to convey critical information.

Matrices may be used as part of the body of the engineer annex or as separate appendices. Matrices are used to quickly convey or summarize information not needing explanation, such as logistics allocations, obstacle-belt priorities and restrictions, or task summary (execution matrix). Finally, overlays are used to give information or instructions and expedite integration into the overall combined-arms plan. At brigade level, information included on overlays may include but is not limited to—

- All existing and proposed friendly obstacles and control measures (obstacle belts, restrictions, and lanes; directed or reserve targets; and brigade-level situational obstacles, including associated NAI/TAI and decision points).
- Known and plotted enemy obstacles (must also be on situation template).
- Logistics locations and routes, as they apply to engineer operations.
- NBC-contaminated areas.

Figure D-2, pages D-9 through D-13, is a sample format of a written engineer annex. *Figure D-3, page D-14*, provides a sample matrix and overlay.

ENGINEER UNIT ORDERS

A battalion commander uses a unit order to exercise unit control over engineer units remaining under his command. At the outset of an operation, a battalion commander uses his order to—

- Effect the necessary task organization of engineers in the brigade.
- Assign initial missions.
- Establish sustainment integration with the FSB.

Once the task organization is effective and during combat operations, the battalion commander directs subsequent unit orders only to those engineers under his command. Orders, missions, and instructions to engineers supporting maneuver battalions/TFs in command relationships are included as tasks to the battalions in brigade FRAGOs. A brigade engineer issues WOs to all engineers supporting the brigade to facilitate parallel planning within engineer units and any engineer TFs. WOs to engineers supporting maneuver battalions/TFs are used for planning only.

BRIGADE ENGINEER WO

The purpose of the WO is to help engineer staff officers and engineer units initiate planning and preparations for an upcoming operation. The WO is critical to foster parallel planning at the engineer unit and maneuver battalion levels.

Classification
(Place the classification at the top and bottom of every page of the annex.)

ANNEX _____ (ENGINEER) TO OPORD _____

1. SITUATION.

a. Enemy Forces.

(1) Terrain. Critical aspects of the terrain that impact engineer operations.

(2) Weather. Critical aspects of the weather that impact engineer operations.

(3) Enemy Engineer Capability/Activity. Include the—

- Known and plotted locations and activities of enemy engineer units.
- Significant enemy maneuver and engineer capabilities that impact engineer operations.
- Expected employment of engineers based on the most probable enemy COA.

b. Friendly Forces. List the—

- Designation, location, and activities of higher HQ and adjacent engineers impacting the brigade or requiring coordination.
- Nonengineer units capable of assisting in engineer operations.
- Nonengineer units capable of emplacing SCATMINEs.

c. Attachments and Detachments.

- List units attached or detached, only as necessary to clarify task organization.
- Highlight changes in engineer task organization occurring during operations along with effective times or events.

2. MISSION. State the mission of engineers in support of the basic OPORD.

3. EXECUTION.

a. SOEO.

- Describe (in narrative format) the M/S tasks that support a maneuver plan, regardless of which unit performs the task. For example, address artillery-delivered FASCAM in this paragraph.

Figure D-2. Engineer annex

- Explain what the essential M/S tasks are and how they support the scheme of maneuver.

- Use a maneuver unit's concept of operations as a carrier wave. (For example, generally operations are phased. A SOEO uses the same phases. [Prephase I is not a phase unless the supported unit has something called Prephase I.] If a supported unit does not use phases for its operations, a SOEO uses the same format that a supported unit uses for its concept of the operation.)

- Address four areas under each phase in a SOEO (general comments, countermobility, survivability, and mobility). Address each of these in the order of priority for that particular phase. (For example, if the priority for Phase I is countermobility, survivability, and then mobility, then the comments would appear in this order: general comments, countermobility, survivability, and mobility. If the priority in Phase II changes to mobility, countermobility, and then survivability, then the comments would appear in the following order: general comments, mobility, countermobility, and survivability.) Do not address these four areas as separate bullet comments but as four clearly identified parts of a narrative. For example, the format does **not** look like the following:

  SOEO
  (1) Phase I
  (a) General...
  (b) Mobility...
  (c) Countermobility...
  (d) Survivability...

  If there is no support provided in a specific area during a phase, then do not mention that type of support. (For example, if no brigade element receives survivability support during a phase, then do not mention survivability.)

- Ensure that the support addressed under each phase applies to the M/S effort that supports a maneuver unit during that phase, no matter when the effort was completed. (For example, if engineers construct three obstacle belts that support TFs during Phase III, then address the obstacle belts during that part of a SOEO that addresses Phase III. Likewise, if an engineer battalion provides breaching support to the brigade during Phase II, then address the breaching support as part of Phase II.)

- Ensure that each of the four areas covered under each phase provides a standard set of information with a general format as follows:

Figure D-2. Engineer annex (continued)

— General comments. A brief, one-sentence comment about M/S support for the phase.

— Countermobility. Each obstacle belt, in order of its priority, its intent (target, effect, and relative location), and which maneuver unit it supports. Provide execution criteria for reserve targets and situational obstacles.

— Survivability. Explanations for each survivability task, relative location (BP, vicinity of an EA, and so forth), and which maneuver unit is supported.

— Mobility. Explanations for each mobility task (for example, reducing obstacles, marking lanes, providing guides, and maintaining a route), relative location (route, objective, and so forth), the priority of the reduction asset used (for example, use plows first, then MICLIC), and which maneuver unit is supported.

b. Tasks to Subordinate Units.

- List engineer tasks to be accomplished by a specific subordinate unit of a brigade that are not included in the base OPORD.
- Include brigade-level tasks assigned to an engineer organization.
- Use to inform subordinate unit commanders of tasks being performed by forces under brigade control.

c. Coordinating Instructions. Include—

- Critical engineer instructions common to two or more maneuver units not already covered in the base OPORD.
- SOP information, only if needed for emphasis.
- Times or events in which obstacle belts become effective, if they differ from the effective time of the order.
- Brigade PIR that must be considered by subordinate engineer staff officers or that require reports to a brigade engineer.
- Obstacle restrictions.
- Mission reports required by a brigade engineer (if not covered in the signal paragraph or the unit's SOP).

Figure D-2. Engineer annex (continued)

- Explanation of countermobility/survivability time lines, as necessary.
- Relevant environmental considerations and protection measures. These may be placed in an appendix.

4. SERVICE SUPPORT.

a. Command-Regulated Classes of Supply.

- Highlight subunit allocations of command-regulated classes of supply that impact the operation's CSR.
- Summarize in a matrix or table.

b. Supply Distribution Plan.

- Give tentative locations for Class IV/V supply points or locations for linkup of corps push packages directly to units.
- Give the allocation of Class IV/V supplies by TF, belt, or a combination, if not summarized in a matrix or table.

c. Transportation. List the—

- Allocation and priority of support of division and brigade haul or airlift assets dedicated to moving a brigade's Class IV/V supplies.
- Requirements for the brigade to supplement division transportation of mission loads (for example, a brigade is responsible for haul forward of PL_____).

d. Combat Health Support. Address the support for corps engineer units that are performing brigade-level missions in a brigade's area.

e. Host Nation. List the—

- Type and location of HN engineer facilities, assets, or support.
- Procedures for requesting and acquiring HN engineer support.
- Limitations or restrictions on HN support (for example, HN personnel not authorized forward of PL_____).

Figure D-2. Engineer annex (continued)

5. COMMAND AND SIGNAL.

a. Command.

- List the location of key engineer leaders and C^2 nodes throughout the operation.
- Designate a logical chain of command.
- Designate the HQ that controls the effort within work lines on an area basis.

b. Signal.

- Identify communication networks monitored by a brigade engineer for reports, if different than the SOP.
- Identify the designated critical engineer reporting requirements of subordinates, if not covered in the coordinating instructions or the SOP.

Acknowledge:

Commander's last name
Rank

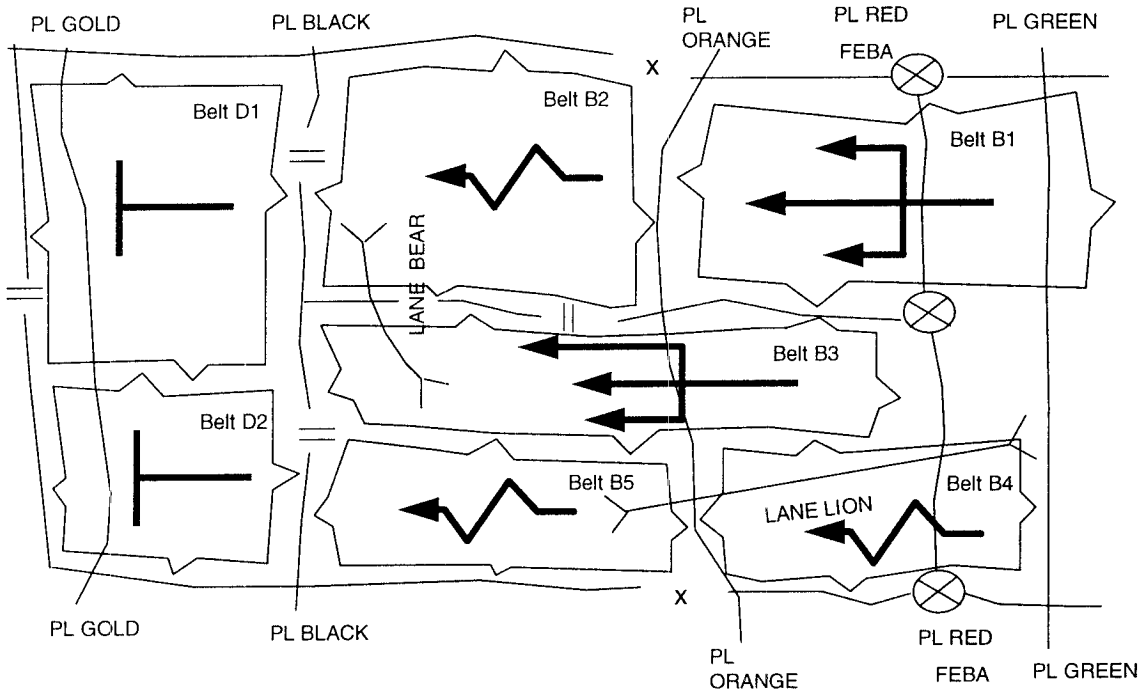
OFFICIAL:

Appendices:
1. **Engineer overlay**
2. **Countermobility execution matrix/time line**
3. **Survivability execution matrix/time line**
4. **Obstacle execution matrix (directed, situational, and reserve)**
5. **Environmental considerations**

Distribution:

CLASSIFICATION

Figure D-2. Engineer annex (continued)



Unit	Belt	Priority	Restrictions
TF 1-8	B1	5	Surface-laid mines only on Lane Bear
	B2	6	
TF 2-8	B3	1	Surface-laid mines only on Lane Lion
	B4	3	No SCATMINEs
	B5	2	
TF 3-8	D1	7	
	D2	4	

Figure D-3. Obstacle overlay

There is no prescribed format for the WO. It may be either written or verbal but should include the following information:

- Heading.
- Situation.
- Attachments and detachments.
- Earliest time of move.
- Nature and time of operation.
- Time and place of orders group.
- Administrative/logistical information.
- Acknowledge.

Heading

WOs must always begin with the words "Warning Order." This is to ensure that recipients understand the information is for use only as a basis for planning and will be followed by orders. Addressees should also be listed in the heading. The brigade engineer's WO to the unit should address all engineer units supporting the brigade.

Situation

This section includes a brief description of friendly and enemy situations and critical events. It may also include probable missions for the brigade and specified or implied tasks, and it may assign tentative tasks for planning only to engineer units. Situation templates and EBA products may be included with a WO if they are available.

Attachments and Detachments

This section gives tentative and known changes to the task organization. However, it must be clear to engineers supporting maneuver battalions that changes in task organization are for planning and are not effective until after an order is received by the supported battalion from the brigade.

Earliest Time of Move

This section states the earliest possible time that units must be ready to move. The battalion commander may give actual movement times, if known, to units under his command. The earliest time of move is critical to synchronizing sustainment operations to support future missions.

Nature and Time of Operation

This section provides recipients with as much information about the brigade plan as possible to foster parallel planning and preparations and to set priorities. Depending on the maturity of the planning process, this section may include a concept of engineer operations or tentative scheme of engineer operations. Orders for preliminary action may also be included, such as—

- Assigning engineer tasks, such as tactical/technical reconnaissance.
- Establishing Class IV/Class V supply points.
- Moving to linkup points.

These orders are normally qualified as "be-prepared" or "on-order" tasks, depending on how the plan is established. Orders to engineers supporting maneuver battalions are always on-order tasks, with execution instructions coming through maneuver headquarters-generated orders.

Time and Place of Orders Group

Engineer units under the brigade commander are told when and where to receive the entire order and who will attend. Units should identify the composition of the orders group in their SOP.

Administrative and Logistical Information

This includes instructions and warning information on changes in unit logistics operations and linkup with maneuver sustainment systems, as required by future operations. This information may also direct movement to assembly areas and provide instructions for sustainment after movement.

Acknowledge

An acknowledgment of receipt is always required to ensure that the WO is received by all addressees.

ENGINEER BATTALION OPORD

The battalion commander issues an OPORD to all engineer units under his command. Once the task organization is effected, all

instructions and missions to engineers supporting maneuver battalions/TFs are conveyed in brigade orders and are addressed to maneuver battalion commanders. The engineer battalion OPORD is outlined in the following paragraphs (see *Figure D-4, pages D-17 through D-23,* for an example). *Figure D-5, page D-24,* shows an engineer execution matrix. When an order is an operation plan (OPLAN) instead of an OPORD, the assumptions on which the plan is based are included at the end of the "Situation" paragraph.

ENGINEER BATTALION FRAGO

The battalion commander frequently needs to modify his OPORD to make changes in engineer operations that allow the brigade to take advantage of tactical opportunities. He can do this by issuing a FRAGO. The battalion commander issues FRAGOs only to engineer units under his command. Changes in instructions to engineers supporting maneuver battalions in command relationships are conveyed through input to a brigade FRAGO. A FRAGO does not have a specified format, but an abbreviated OPORD format is usually used. The key to issuing a FRAGO is to maximize the use of the current OPORD by specifying only information and instructions that have changed. The battalion commander is rarely afforded the opportunity to issue FRAGOs to his subordinate leaders face-to-face. He normally issues them over the radio. The battalion commander may use his XO or CSM to issue a FRAGO in person to subordinates. This ensures that direct coordination is made and that graphics are distributed to platoon leaders. A FRAGO usually contains the following elements:

- Changes to task organization. Lists any required changes to unit task organizations made necessary by modifications to the OPORD.
- Situation. Includes a brief statement of current enemy and friendly situations, which usually gives the reason for the FRAGO. It may also update subordinates on the current status of brigade-level engineer missions.
- Concept. Gives changes to the scheme of engineer operations and the corresponding changes to subunit tasks. It must also include any changes in the brigade or company commander's intent.
- Coordinating instructions. Includes changes to "Service Support" and "Command and Signal" paragraphs of the current OPORD made necessary by the change in the scheme of engineer operations.

Classification
(Place the classification at the top and bottom of every page of the OPORD.)

Copy___of___copies
Issuing headquarters
Place of issue (coordinates)
Date-time group of signature

OPERATION ORDER NUMBER ____ (code name, if used)

Reference(s): Map(s) or other references required.

Time Zone Used Throughout the Order:

Task Organization:

- Include all engineer HQ of units under brigade control.
- Include all engineer HQ of organic units if the OPORD is the initial order for an operation.
- List companies and special platoons task-organized to HQ other than their parent unit.
- List special equipment if not clear in the unit task organization.
- Streamline C^2.
- Address command or support relationships, as necessary.

1. SITUATION.

a. Enemy Forces.

(1) **Terrain and Weather.** Include—

- Critical aspects of the terrain that affect operations.
- Critical and decisive terrain in a brigade's area that relates to operations.
- Expected weather conditions and their impact on operations.
- Light data and its impact on engineer missions.

Figure D-4. Engineer battalion OPORD

(2) **Enemy Situation.** Include—

- A macro picture of enemy forces facing a brigade.
- The current disposition of enemy forces, including the location of major enemy units (known and plotted), and the enemy's strength, designation (if known), composition, and current activities.
- Enemy engineer activities and capabilities.
- The most probable enemy COA.
- Enemy activities, capabilities, and COAs that affect brigade-level engineer operations.

b. Friendly Forces.

(1) **Higher.** Include the—

- Brigade mission and a commander's intent.
- Description of a brigade's plan. Highlight those aspects of the plan that give purpose to the missions.
- Brigade SOEO (the same as in a brigade OPORD and a brigade engineer annex).

(2) **Adjacent.** Highlight missions of adjacent divisions and engineer units that impact brigade missions.

c. Attachments and Detachments.

- List attachments and detachments of organic and supporting engineers to a brigade, as necessary, to clarify the task organization.
- Highlight any attachments and detachments that occur during an operation, including the time or event that triggers the change.

2. MISSION. Include—

- Who (the engineer battalion organization).
- What, when, where, and why (the brigade mission). ("What" also includes any essential brigade-level engineer missions.)

Figure D-4. Engineer battalion OPORD (continued)

3. EXECUTION.

Intent

- Include a clear, concise statement of what the force must do to succeed with respect to the enemy and the terrain and to the desired end state.
- Provide the link between the mission and the concept of operation by stating the key tasks that, along with the mission, are the basis for subordinates to exercise initiative when unanticipated opportunities arise or when the original concept of operation no longer applies.
- Express intent in four or five sentences. This is mandatory for all orders.

a. Concept of Operation. Ensure that a concept of operation—

- Is a single paragraph. It may be divided into two or more subparagraphs.
- Is concise and understandable.
- Describes—
  - — The employment of subordinate elements.
  - — The integration of other elements or systems within the operation.
  - — Any other aspects of the operation the commander considers appropriate to clarify the concept and to ensure unity of effort.

NOTE: Depending on the operation, the following subparagraphs may be required within the concept of operation.

(1) Maneuver.

(2) Fires.

(3) Engineer. Focus on how the forces under battalion control will accomplish their assigned tasks.

(4) Air defense.

NOTE: A sketch or sand table should be used to explain a concept of operation when briefing an OPORD, or a map with an overlay should be used for very small groups.

b. Tasks to Subordinate Units.

Figure D-4. Engineer battalion OPORD (continued)

- Include a clear, concise listing of all tasks assigned to engineer units remaining under a battalion commander's control.
- List tasks assigned by unit; tasks are generally listed in the order they will be executed during the operation.
- Distinguish "be-prepared" and "on-order" tasks from normal tasks.
- Ensure that tasks/instructions common to two or more units are not included.
- Ensure that all brigade-level missions are identified during the estimate process, if necessary.

c. Coordinating Instructions.

- List tasks and instructions that are common to two or more units subordinate to a battalion organization.
- Include all pertinent coordinating instructions listed in a brigade order.
- List SOP orders only if they are required for emphasis or have changed due to the mission.
- Include reporting requirements common to two or more units if not covered in the "Signal" paragraph.
- Authorize direct coordination between subordinate or adjacent engineer-specific tasks.
- Give the time that the task organization is effective.
- Include relevant environmental considerations or protection measures, or place them in an environmental annex.

4. SERVICE SUPPORT.

a. Support Concept.

- Provide subordinates with the general concept of logistics support for units under a battalion commander's control throughout an operation.
- Identify, in general, primary and backup (emergency) means of subunit sustainment for each type of engineer unit under a battalion commander's control. Address who (companies); how (area support, unit support, supply-point distribution, and unit distribution); where (BSAs and FSBs); and what (classes of supply and critical services).

Figure D-4. Engineer battalion OPORD (continued)

- Ensure that the concept is consistent with the task organization and command or support relationships.
- Make maximum reference to brigade CS graphics.
- List the locations of key CSS nodes as they apply to the concept for logistics support.

b. Materiel and Services.

(1) **Supply.** For each class of supply—

- List the allocation and CSRs for each unit, based on missions.
- List basic loads to be maintained by a unit.
- List the method of obtaining supplies, if different from the support concept. **NOTE: Mission logistics may be different than unit (scheduled) logistics.**
- Address any special arrangements or plans to sustain specific mission needs (Class IV/V or Class III push to sustain engineer preparation of defenses).
- List the details of the MICLIC/Volcano/MOPMS reload plan, as applicable.

(2) **Transportation.**

- List primary, alternate, and contaminated MSRs during an operation.
- State allocations of division or corps haul assets.

(3) **Maintenance.** List the—

- Concept of maintenance and recovery support.
- Maintenance priorities by vehicle, unit, or a combination of both.
- Authority for controlled substitution.

c. Medical Evacuation and Hospitalization. For each type of engineer unit, indicate the primary and backup means of medical evacuation and hospitalization, including locations of health-service facilities providing support on an area or unit basis.

Figure D-4. Engineer battalion OPORD (continued)

d. Personnel Support.

- Identify the method of handling EPWs and locations of EPW collection points.
- Identify the method of receiving mail, religious services, and graves registration for each type of unit under a battalion commander's control.

e. Civil-Military. Identify engineer supplies, services, or equipment provided by the HN.

5. COMMAND AND SIGNAL.

a. Command.

- List the location of key leaders and C^2 nodes throughout an operation.
- Identify the locations and planned movements of key brigade C^2 nodes.
- Designate the logical chain of command.

b. Signal.

- Identify any communication/signal peculiarities for the operation not covered in the SOP.
- Identify critical reporting requirements of subordinates if it is not covered in the coordinating instructions or SOP.
- Designate nets for mission and routine reports.

ACKNOWLEDGE

Battalion commander's signature
Rank

OFFICIAL:
(Authentication)

Figure D-4. Engineer battalion OPORD (continued)

ANNEXES: Possible annexes may include but are not limited to—

- Execution matrix
- Intelligence annex
- CSS annex
- Movement annex
- Environmental annex

Overlays:

- Situation template
- Brigade maneuver graphics
- Engineer graphics, as necessary
- Brigade CSS overlay
- Brigade obstacle plan
- Environmental considerations

Distribution:

CLASSIFICATION

Figure D-4. Engineer battalion OPORD (continued)

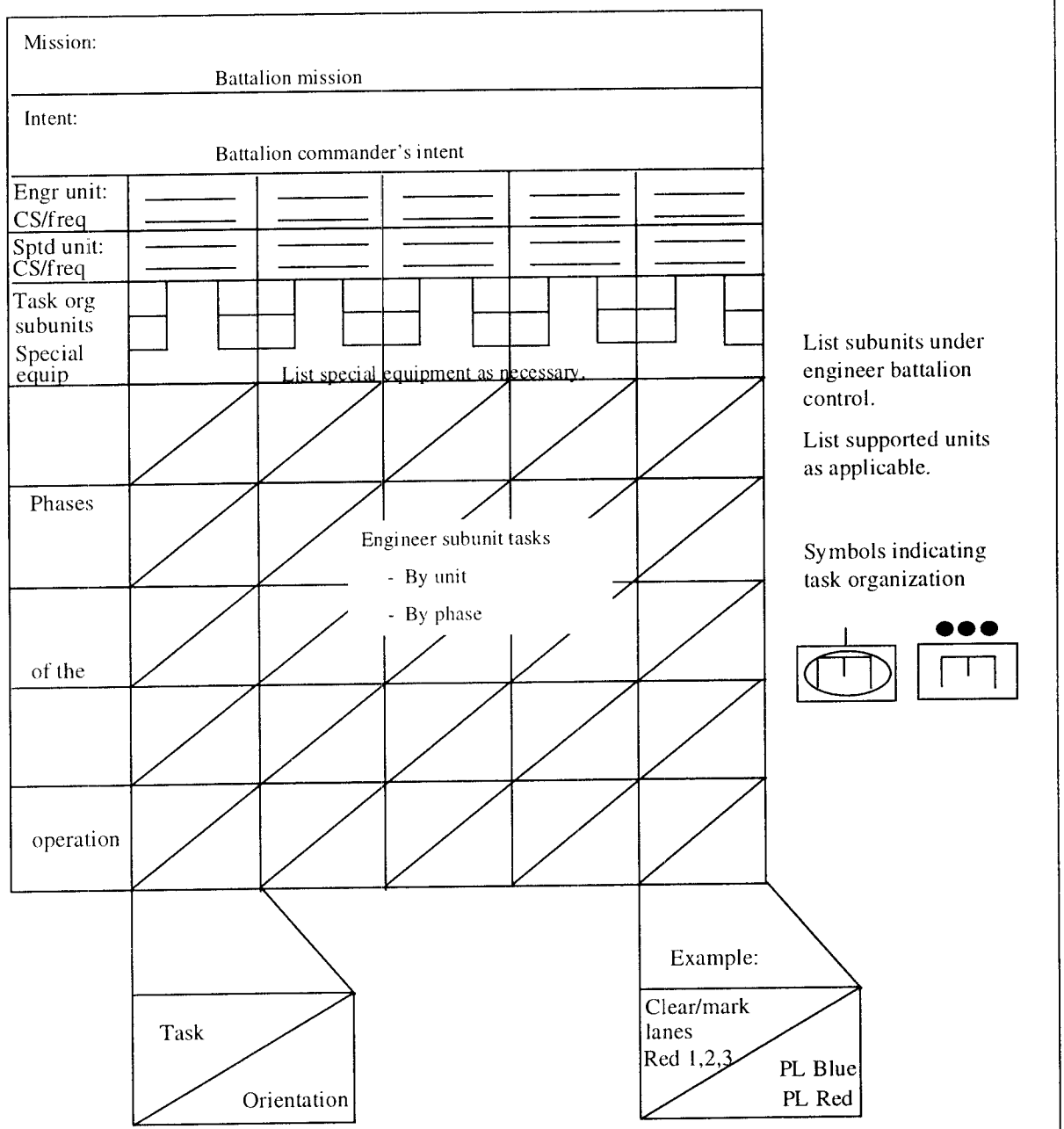


Figure D-5. Engineer execution matrix

Glossary

12Z50	E8
1SG	first sergeant
A&L	administrative and logistics
A/1	Alpha/1st platoon
A/2	Alpha/2d platoon
A/3	Alpha/3d platoon
AA	avenue of approach
ABE	assistant brigade engineer
ABF	attack by fire
ACE	M9 armored combat earthmover
AD	air defense
ADA	air-defense artillery
ADAM	area denial artillery munition
ADE	assistant division engineer
AG	Adjutant General
ALOC	administrative logistic center
AO	area of operation
APC	armored personnel carrier
approx	approximate

AT	antitank
ATP	ammunition transfer point
attn	attention
AVLB	armored vehicle launched bridge
B/1	Bravo/1st platoon
B/2	Bravo/2d platoon
B/3	Bravo/3d platoon
BAS	battalion aid station
BHL	battle handover line
BMO	battalion maintenance officer
BMT	battalion maintenance technician
BOS	battlefield operating system
BP	battle position
BSA	brigade support area
C/1	Charlie/1st platoon
C/2	Charlie/2d platoon
C/3	Charlie/3d platoon
C^2	command and control
CAS	close air support
CATK	counterattack

cbt	combat
CCIR	commander's critical information requirements
CCM	cross-country mobility
CDMP	combat decision-making process
CEB	clothing exchange and bath
CEV	combat engineer vehicle
CFA	call-forward area
CFL	coordinated fire line
cfm	cubic foot (feet) per minute
CFZ	critical friendly zone
CHEMO	chemical officer
CMT	company maintenance team
COA	course of action
COLT	combat observation lazing team
COMSEC	communications security
COO	combined obstacle overlay
CP	command post
CS	combat support
CSE	combat support equipment
CSM	command sergeant major
CSR	controlled supply rate

CSS	combat service support
ctr	center
DA	Department of the Army
DATK	deliberate attack
DIVE	dive detachment
DIVEN	division engineer
DLIC	detachment left in contact
DMA	Defense Mapping Agency
DNVT	digital nonsecure voice terminal
DS	direct support
DSA	division support area
DST	decision support template
DSVT	digital secure voice terminal
DTED	digital terrain elevation data
DZ	drop zone
E8	master sergeant
E9	command sergeant major
EA	engagement area
EAC	echelons above corps
EBA	engineer battlefield assessment

EEP	engineer equipment parks
EGA	enhanced graphics adapter
EM	enlisted men
engr	engineer
EOD	emergency ordnance disposal
EPW	enemy prisoner of war
equip	equipment
ERP	engineer regulating point
FASCAM	family of scatterable mines
FAX	facsimile
FEBA	forward edge of the battle area
FIST	fire-support team
FIST-V	fire-support-team vehicle
fld	field
FLOT	forward line of own troops
FM	field manual
FM	frequency modulated
FRAGO	fragmentary order
freq	frequency
FS	fire support
FSB	forward support battalion
FSCOORD	fire-support coordinator

FSO	fire-support officer
FSP	forward supply point
G1	Assistant Chief of Staff, G1 (Personnel)
GS	general support
HATK	hasty attack
HEMTT	heavy expanded mobility tactical truck
HET	heavy-equipment transporter
HHC	headquarters and headquarters company
HLZ	helicopter landing zone
HMMWV	high mobility, multipurpose wheeled vehicle
HN	host nation
HQ	headquarters
HVT	high-value target
hvy	heavy
IBM	International Business Machine
IEW	intelligence electronic warfare
IPB	intelligence preparation of the battlefield
IR	intelligence requirements
JP-8	jet propulsion

KCLFF	kitchen, company-level field feeding
km	kilometer
LC	line of contact
LD	line of departure
LO	liaison officer
LOA	limit of advance
LOC	lines of communication
LOGPAC	logistical package
LOGSTAT	logistical status
LOS	line of sight
LP	listening post
LRP	logistics release point
m	meter(s)
M/CM/S	mobility, countermobility, and survivability
M/S	mobility and survivability
MBA	main battle area
MCOO	modified combined obstacle overlay
METT-T	mission, enemy, terrain, troops, and time available
MGB	medium girder bridge, M3
MHE	material-handling equipment
MICLIC	mine-clearing line charge

MKT	mobile kitchen trailer
MOGAS	motor gasoline
MOPMS	modular pack mine system
MOPP	mission-oriented protective posture
MOS	military occupational specialty
MP	military police
MRB	motorized rifle battalion
MRC	motorized rifle company
MRE	meals, ready-to-eat
MRP	motorized rifle platoon
MRR	motorized rifle regiment
MSB	main support battalion
MSE	mobile subscriber equipment
MSL	mean sea level
MSR	main supply route
MSRT	mobile subscriber radio telephone
MST	maintenance support team
MTC	movement to contact
NAI	named area of interest
NBC	nuclear, biological, and chemical
NCO	noncommissioned officer
NCOIC	noncommissioned officer in charge

NCS	net control station
NLT	no later than
O&I	observation and intelligence
OBSTINTEL	obstacle intelligence
OCOKA	observation and fields of fire, cover and concealment, obstacles, key terrain, and avenues of approach
OIC	officer in charge
OOTW	operations other than war
OP	observation post
OPCON	operational control
OPLAN	operation plan
OPORD	operation order
org	organize
PAC	personnel and administration center
PAL	point, area, and linear
PCI	precombat inspection
PIR	priority intelligence requirements
PL	phase line
PLL	prescribed load list
POL	petroleum, oils, and lubricants
POP	point of penetration

prof	profile
PSNCO	personnel staff noncommissioned officer
PX	post exchange
QSS	quick supply store
R&S	reconnaissance and surveillance
RAAMS	remote antiarmor mine system
RB-15	rubber boat
RFA	restrictive fire area
RGB	red, blue, and green
Ribbon	ribbon bridge
RP	release point
RRP	replacement receiving point
RSR	required supply rate
RX	repairable exchange
S&S	supply and service
S1	Adjutant (US Army)
S2	Intelligence Officer (US Army)
S3	Operations and Training Officer (US Army)
S4	Supply Officer (US Army)
SA	staging area
SALUTE	size, activity, location, unit, time, and equipment

SBF	support by fire
SCATMINE	scatterable mine
SEE	small emplacement excavator
SEN	small extension node
SICPS	standard integrated command post system
SIGO	signal officer
SINCGARS	single-channel, ground-to-air radio system
SOEO	scheme of engineer operations
SOP	standing operating procedure
spt	support
sptd	supported
STE-ICE	simplified test equipment internal combustion engine
synch	synchronization
TAI	target area of interest
TAMMS	The Army Maintenance Management System
TCP	traffic control point
TF	task force
TLP	troop-leading procedures
TOC	tactical operations center
TOE	table(s) of organization and equipment
TOW	tube-launched, optically tracked, wire-guided
TPL	time phase line

TTADB	tactical terrain analysis data base
TTP	tactics, techniques, and procedures
TVA	target-value analysis
ULLS	unit-level logistics system
UMCP	unit maintenance collection point
US	United States
UTM	universal transverse mercator
VAP	visible area plot
vert	vertical
WO	warning order
XO	executive officer

*U.S. Government Printing Office: 1997 - 527-027/80032

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DOCUMENTS NEEDED

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FM 5-71-3
3 OCTOBER 1995

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☆ U.S. GOVERNMENT PRINTING OFFICE: 1995 – 628 - 027 / 40059

PIN: 074014-001