(27 July 71)

# FM 5-1

DEPARTMENT OF THE ARMY FIELD MANUAL

# ENGINEER TROOP ORGANIZATIONS AND OPERATIONS



HEADQUARTERS, DEPARTMENT OF THE ARMY

SEPTEMBER 1965

TAGO 5701A

CHANGE
NO. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *31 October 1969*

# ENGINEER TROOP ORGANIZATIONS AND OPERATIONS

FM 5–1, 30 September 1965, is changed as follows:

1. Remove old pages and insert new pages as indicated below:

| Old pages— | New pages— |
|---|---|
| 7–5, 7–6 | 7–5 through 7–7 |
| None | A–B–32.1 through A–B–32.3 |
| A–B–143 through A–B–152 | A–B–143 through A–B–175 |

2. A star indicates new or changed material.
3. File this change sheet in front of the manual for reference purposes.

*This change supersedes FM 5–33, October 1968.

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
*General, United States Army,*
*Chief of Staff.*

Official:

KENNETH G. WICKHAM,
*Major General, United States Army,*
*The Adjutant General.*

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To be distributed in accordance with DA Form 12–11 requirements for Engineer Troop Organization and Operations.

CHANGE
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *23 February 1968*

# ENGINEER TROOP ORGANIZATIONS AND OPERATIONS

FM 5–1, 30 September 1965, is changed as follows:

1. Remove old appendix B (pages A–B–1 through A–B–137) and insert new appendix B (pages A–B–1 through A–B–152).

2. Recipients should retain old appendix B until the information contained therein is no longer valid for their unit; i.e., until the unit discussed is reorganized under the G-series TOE.

3. This transmittal sheet should be filed in front of the manual for reference purposes.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
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*The Adjutant General.*

Distribution:
To be distributed in accordance with DA Form 12–11 requirements for Engineer Troop Organizations and Operations.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1968—305–508/8397A

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *25 July 1966*

# ENGINEER TROOP ORGANIZATIONS AND OPERATIONS

FM 5–1, 30 September 1965, is changed as follows:

1. Make the following pen and ink changes.

| Page | Paragraph | Line | Action |
|---|---|---|---|
| 3–5 | 3–10 | 8 | Between the words and and tank insert to |
| 3–6 | 3–12 | 9 | Change G2 to G3 |
| 3–6 | 3–12 | 11 | Change G3 to G2 |
| 6–11 & 6–12 | Section VII | ------ | Wherever the word counterinsurgency appears change to read internal defense |
| 6–11 | 6–35 | 5 | Delete listed in TOE 5–500 and substitute of the Engineer Service Organization: |
| 6–11 | 6–35 | 5&6 | Delete K series and substitute TOE 5–560 |
| 7–4 | 7–3*b*(11) | 6 | Delete a metallic planking and substitute membrane or metal mat |
| 9–3 | 9–7*a*(1) | 7 | Delete of |
| 13–6 | 13–11 | 2 | Change four to five |
| 13–6 | 13–11 | 3 | After the word armored add airmobile |
| 15–3 | 15–7*a* | 4 | Between the words Army and Reserve insert and |
| A–B–80 | Fig B–33 | ------ | Change strength figures to read OFF 31 WO 4 EM 660 AGG 695 |
| A–B–85 | Fig B–35 | ------ | Change strength figures to read OFF 5 WO 1 EM 233 AGG 239 |
| A–B–87 | Fig B–36 | ------ | Change strength figures to read OFF 5 WO 0 EM 146 AGG 151 |
| A–B–101 | ---------- | ------ | Line out entire page |
| A–B–113 | Fig B–48 | ------ | Change strength figures to read OFF 25 WO 0 EM 81 AGG 106 |
| A–B–115 | Fig B–49 | ------ | Change strength figures to read OFF 17 WO 0 EM 71 AGG 88 |
| A–B–117 | Fig B–50 | ------ | Change strength figures to read OFF 38 WO 6 EM 610 AGG 654 |
| A–B–122 | Fig B–52 | ------ | Change strength figures to read OFF 5 WO 1 EM 129 AGG 135 |
| A–B–124 | Fib B–53 | ------ | Change strength figures to read OFF 6 WO 1 EM 166 AGG 173 |
| A–B–126 | ---------- | ------ | Line out entire page |

2. Remove old pages and insert new pages as indicated below:

| Remove pages | Insert pages |
|---|---|
| 1–1 to 1–4 | 1–1 to 1–4 |
| 2–1 to 2–9 | 2–1 to 2–10 |
| 6–1, 6–2 | 6–1 to 6–2.1 |
| A–A–1 to A–A–3 | A–A–1 to A–A–4 |
| A–B–1, A–B–2 | A–B–1 to A–B–2.1 |
| A–B–3 to A–B–16 | A–B–3 to A–B–16 |
| A–B–19 to A–B–24 | A–B–19 to A–B–24.1 |

| Remove pages | Insert pages |
|---|---|
| A–B–25 to A–B–28 | A–B–25 to A–B–28.1 |
| A–B–31 to A–B–48 | A–B–31 to A–B–48 |
| A–B–51 to A–B–54 | A–B–51 to A–B–54 |
| A–B–57 to A–B–60 | A–B–57 to A–B–60 |
| A–B–83, A–B–84 | A–B–83, A–B–84 |
| ---------- | A–B–88.1 to A–B–88.8 |
| A–B–105, A–B–106 | A–B–105, A–B–106 |
| A–B–119, A–B–120 | A–B–119, A–B–120 |
| A–B–127 to A–B–134 | A–B–127 to A–B–138 |
| A–C–3, A–C–4 | A–C–3, A–C–4 |

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By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
*General, United States Army,*
*Chief of Staff.*

Official:

J. C. LAMBERT,
*Major General, United States Army,*
*The Adjutant General.*

Distribution:

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  USACDCCARMSA (3)
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Corps (15)
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Div Arty (10)
Engr Bde (5)
Engr Gp (5)
Engr Bn (8)
Engr Co (2)
Br Svc Sch (10) except
  USAOC&S (25)
  USAIS (40)
  USAARMS (50)
Joint Sch (5)
USAWC (10)

*NG:* State AG (3); units same as active Army except allowance is one copy to each unit.
*USAR:* Same as active Army except allowance is one copy to each unit.
For explanation of abbreviations used see AR 320–50.

☆U.S. Government Printing Office: 1966— 250-501/5001A

FIELD MANUAL
No. 5-1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *30 September 1965*

# ENGINEER TROOP ORGANIZATIONS AND OPERATIONS



*This manual supersedes FM 5-1, 18 May 1961, including C 1, 17 July 1962.

# CHAPTER 1

# INTRODUCTION

## Section I. PURPOSE AND SCOPE

### 1-1. Purpose

This manual presents the basic doctrine governing the activities of engineer troop units in a theater of operations. Its purpose is to assist engineer commanders and their staffs and to familiarize other than engineer commanders and their staffs in the employment and supervision of such units. These guidelines, when combined with experience, judgment, initiative, and imagination, will enable the commander to utilize fully the capabilities of the engineer forces.

### 1-2. Scope

This manual covers both engineer troop organizations and operations. Engineer commanders and their staffs, and staff engineers and their sections are discussed. The manual covers the units, their assignments, and their employment in both the combat and communications zones of a theater of operations. Throughout the manual, doctrine rather than technique is stressed. Flexibility in the employment of engineer units, rather than adherence to rigid rules, is likewise emphasized as the best means of accomplishing the missions. Unless otherwise specified, the material presented herein is applicable to both limited and general war, nuclear and nonnuclear; cold war operations; and internal defense operations.

### 1-3. References

The text should be used in conjunction with the publications listed in appendix A. These cover a broad area of subjects including combat, combat support, and combat service support activities.

### 1-4. Recommended Changes

Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text to which they refer. Reasons should be provided for each comment to insure understanding and thorough evaluation. Comments should be forwarded direct to the Commanding Officer, U.S. Army Combat Developments Command Engineer Agency, Fort Belvoir, Va. 22060.

## Section II. MISSION AND CAPABILITIES

### 1-5. Mission

The mission of the Corps of Engineers and of engineer troop units in a theater of operations is to—

*a.* Facilitate the movement of friendly forces.

*b.* Impede the movement of enemy forces.

*c.* Provide engineer staff planning for, and advice to all commanders in the theater of operations.

*d.* Provide other engineer services required in a theater of operations.

### 1-6. Capabilities of Engineer Units

In order to accomplish their respective missions, engineer units in a theater of operations have the capabilities of—

*a.* Participating as a part of the combined arms team in all forms of combat operations. This includes the offense, the defense, and the retrograde in all types of operations, including airborne, internal defense, and amphibious operations. In these operations they perform specialized tasks, alone or in cooperation with other units—such as the construction, destruction, breaching, or passage of obstacles and barriers; river crossings; and employment of atomic demolitions munitions (ADM). Engineer combat units may be committed as units to engage in infantry type combat.

*b.* Constructing or rehabilitating all types of structures for military purposes, such as cantonments, depots, warehouses, hospitals, administrative buildings, and their necessary utilities,

*c.* Constructing, reconstructing, and maintaining roads and bridges; construction, reconstructing, and performing major maintenance of military railroads, ports, inland waterways, POL pipelines, POL marine terminal facilities, POL tank farms, and assault POL hoseline systems; constructing, rehabilitating, and improving airbases and related facilities for Air Force cargo, fighter, and bomber aircraft, and airstrips and related facilities for Army aviation.

*d.* Providing potable water for field forces.

*e.* Providing mapping, terrain intelligence, military hydrology, and geodetic services.

*f.* Providing advice on demolitions, and providing demolition services when required.

*g.* Providing camouflage, technical advice, and service.

*h.* Producing certain construction materials.

## Section III. THE ROLE OF ENGINEER UNITS

### 1–7. Employment

*a.* Engineer troops should be employed primarily on work requiring technical skills and special equipment. They should be assigned tasks in accordance with approved priorities based on their importance to the command as a whole and its mission.

*b.* Engineer units normally are committed as infantry only in emergencies. The advantage of employment of engineers as infantry is weighed against the current and future requirements for engineer work.

### 1–8. Organization of Engineer Units

Many types of engineer organizations have been developed to perform the various engineer missions in a theater of operations. Engineer units range in size from the construction brigade to specialized teams consisting of only one individual. Their missions include combat, combat support, and combat service support. A summarized discussion of these organizations and units is contained in the following paragraphs. For their organization, specific mission, and capabilities, see appendix B. For a more detailed discussion of their employment, see the separate manuals in the FM 5-series covering the specific unit.

### 1–9. Brigades

The engineer brigade is a flexible organization. Organized under a TOE, the brigade has an organic headquarters and headquarters company to which from two to four engineer groups are assigned or attached. There are three types of engineer brigades as follows:

*a. The Engineer Construction Brigade.* The engineer construction brigade is organized to command and coordinate the activities of several engineer construction groups. Operating in the communications zone, the construction brigade is assigned to the theater army logistical command.

*b. The Engineer Combat Brigade, Army or Corps or Airborne Corps.* The engineer combat brigade, army or corps, is organized to command and coordinate the activities of the nondivisional engineer units attached to it. It operates in the combat zone. When assigned to the field army it operates in the army service area and is known as an engineer combat brigade, army. When assigned to the corps it operates

in the corps area and is known as an engineer combat brigade, corps. When assigned to an airborne corps it is known as an engineer combat brigade, airborne corps.

*c. The Engineer Amphibious Brigade (EAB).* The engineer amphibious brigade is designed to provide a shore party headquarters at corps level and to provide assistance in planning and executing amphibious and shore-to-shore operations including landings on a hostile shore and crossing of major rivers and other water barriers. It provides command and control, and administers from one to three engineer amphibious groups. Each group in turn is composed of engineer amphibious battalions. The battalions include engineer amphibious companies which provide the shore party element to command and control the landing areas in support of the landing forces and engineer amphibian assault companies which provide tactical amphibian mobility for dismounted combat units in the passage of water barriers.

## 1–10. Groups

*a.* Groups resemble the brigade in concept of organization and operations. They have an organic headquarters and headquarters company and become operational through the attachment of other units. Groups may contain several battalions, separate companies, and teams. There are three types of engineer groups.

(1) Combat.

(2) Amphibious.

(3) Construction.

*b.* Engineer group headquarters are employed to command and coordinate the activities of battalions, separate companies, and teams. Assignment of subordinate units is dependent on the type of group and its mission.

## 1–11. Battalions

*a.* Engineer battalions may have a fixed organization, such as the engineer combat battalion, or a flexible organization, such as the engineer base topographic battalion. Generally, they consist of an organic headquarters and headquarters company, several operating or line companies, and support companies. The battalion headquarters and headquarters company consists of the battalion commander and his staff and the personnel and equipment necessary to man the battalion staff sections and the headquarters company. Company headquarters of the battalion headquarters company provides administrative and housekeeping services; in addition, headquarters company may contain one or more platoons or sections which support or supplement the operating or line companies of the battalion by performing specialized services. An operating or line company normally consists of a company headquarters or headquarters platoon, and two or more operating platoons. A support company may be organic to supplement the operating or line companies by providing specialized equipment and personnel. As an example, the engineer construction battalion has a headquarters and headquarters company to provide command and staff; three organic engineer construction companies which are the basic work units of the battalion; and an organic engineer equipment and maintenance company which provides direct support maintenance and specialized engineer personnel and equipment in support of the three construction companies.

*b.* Battalions are employed when it is desirable to assign complete control of a task or an area to a unit. There are four types of engineer battalions.

(1) Combat.

(2) Construction.

(3) Topographic.

(4) Amphibious.

## 1–12. Separate Companies

Separate companies are units with their own mess, supply, and administrative capabilities; they may operate independently when required. Normally, however, they are assigned or attached to an engineer group or a battalion to supplement the capabilities of the group or battalion. A separate company normally consists of a company headquarters or headquarters platoon, and two or more operating pla-

toons. The operating platoons may be identical, as in the engineer panel bridge company or different, as in the engineer topographic company, corps. A platoon may be divided into two or more sections or squads. The headquarters platoon contains supervising and support personnel, and may have one or more sections which support the operating elements of the company. The separate companies may be categorized as—

*a.* Bridge (Example: Engineer Panel Bridge Company).

*b.* Combat (Example: Engineer Company, Separate Infantry Brigade).

*c.* Camouflage (Example: Engineer Camouflage Company).

*d.* Equipment (Example: Engineer Light Equipment Company).

*e.* Topographic (Example: Engineer Topographic Company, (Corps)).

*f.* Construction-Support Companies (Example: Engineer Dump Truck Company).

## 1–13. Teams

*a. General.* The Engineer Service Organization (TOEs 5–500, 510, 520, 530, 540, 550, 560, 570, and 580) provides cellular units of specialized teams of varying sizes, functions, and capabilities for use when standard organizations are too large or cannot meet the particular engineer needs of the theater of operations. The team organization permits variety and flexibility for the best use of manpower and equipment. Teams may be combined to form a composite platoon, or a company, depending upon the nature and/or scope of the mission. Individual teams may be attached to an engineer unit to increase the unit's capabilities, or occasionally, to units of other arms or services. Teams fall into the following nine classes:

(1) Administrative and headquarters.
(2) Firefighting.
(3) Equipment operating.
(4) Construction, utilities, electrical, and nuclear power.
(5) Topographic and intelligence.
(6) Dredge.
(7) Engineer control and advisory.
(8) Engineer combat support (ADM).
(9) Supply, maintenance, and parts.

*b. Characteristics.* Teams have the following characteristics:

(1) They comprise a group of individuals trained to work together as specialists in some particular field.
(2) They may perform certain operations as a unit; comprise a specialized cadre around which a larger organization is built; or act as individual inspectors, instructors, or supervisors.
(3) Their equipment is generally restricted to the transportation and tools and supplies related to their specialty.
(4) They are not self-sufficient in such matters as administration, shelter, messing, supply, storage facilities, signal communications, and medical service. For such support they must rely on the organization to which they are attached.
(5) Some teams consist of only a handful of specialists, while others, such as certain topographic and equipment operating teams, are small-scale replicas of corresponding larger units.

# CHAPTER 2

# ENGINEERS SUPPORT IN A TYPICAL THEATER OF OPERATIONS

## Section I. GENERAL

### 2–1. Engineer Support

Collectively, the units listed in appendix B constitute the types of engineer support provided in the theater. Individually, each unit represents an organization tailored to handle a specific specialized task. There are certain recognized groupings of engineer units needed to support the major components of a theater. Precise lists are not given because each theater, as well as areas within a theater, have different engineer problems and needs. The data given in this chapter are representative for average conditions in a theater of operations on a large land mass. It is assumed that the theater army command consists of one or more type field armies and a fully developed communications zone. See figure 2–1.

### 2–2. Support Areas

*a.* Engineer troop units provide support in three general geographic and command areas in a theater of operations. These are—

(1) The divisional area of the combat zone.

(2) The field army service area and corps rear areas of the combat zone.

(3) The communications zone.

*b.* In addition, engineer support is provided for the Air Force and for the Intersectional Services (para 2–24). This support transcends geographic and command boundaries and is provided only for the duration of a specific mission.

### 2–3. Types of Support

*a. Direct Support.* Direct support is support provided directly to a specific unit. The direct support engineer unit is responsive to the requests of the supported unit, although not under the command or operational control of the supported unit. Direct support is characterized by close liaison and coordination between the supporting and supported units, and provides effective and rapid utilization of the engineer potential. Except in special situations where control of engineer effort normally is infeasible, direct support is the normal method of providing engineer support to units which have no organic engineer capability, or whose engineer capability requires augmentation. As an example, a corps commander may augment the engineer capability of a division by placing a corps engineer group, or a corps engineer battalion, in direct support of the division.

*b. General Support.* General support is that support which is given to the supported force as a whole and not to any particular subdivision thereof. General support normally is employed where centralized control is practical and essential, and the engineer tasks involve coordinated support of two or more subordinate commands. General support may include provisions for priority of effort to be furnished a subordinate command or instructions for the reinforcement of the efforts of the engineers of subordinate commands. For example, army engineer combat units in general support may be required to give priority to rehabilitation and maintenance of roads, bridging, and area preparations needed to facilitate displacement of army artillery or elements of the field army support command (FASCOM). Similarly, corps and army engineer combat units may reinforce the efforts of lower echelon engineers by pro-

viding equipment support and production and delivery of construction materials.

## 2–4. Assignment, Attachment, and Control of Units

*a. Assignment.* The command under which a unit normally functions is said to be its assigned command. Units in a theater of operations may be assigned to theater army headquarters, to the theater army logistical command (TALOG), a field army, an independent corps, or a division. In addition to such initial assignment there may be further assignment. A unit assigned to TALOG may be further assigned to a subordinate command thereof; a unit assigned to field army may be further assigned to an engineer brigade under army. An engineer unit may be assigned or attached to other than a higher engineer troop organization. In such an instance the unit reports to the commander to which it is assigned. Normally, this commander will place it under the operational control of his staff engineer.

*b. Attachment.* When a unit is temporarily under a command other than its assigned command, it is said to be attached. The unit may be attached for some explicit purpose, such as to receive rations, supply, or administration; but unless this is specified, attachment implies that the command to which the unit is attached has full responsibility for the unit's supply, administration, training, and operations. Responsibility in matters relating to the transfer and promotion of personnel is retained by the parent unit. While attachment has certain disadvantages, it may be necessary in cases where it is impractical for the parent unit commander or senior engineer command to exercise effective control, support, and supervision. During periods of attachment it is mandatory that appropriate liaison, exchange of information, and organizational, technical, and logistical support be maintained between the engineer unit and the command to which it is attached.

*c. Organic Units.* Organic units are those units assigned by TOE to and forming an essential part of a military organization. The organic elements of a unit are those listed in its table of organization. As an example, TOE 5–115 is the TOE for the Engineer Construction Battalion and lists the TOE of the units organic to it, namely, TOE 5–116, Headquarters and Headquarters Company; TOE 5–117, Engineer Equipment and Maintenance Company; and TOE 5–118, Engineer Construction Company.

*d. Operational Control.* Units under operational control are placed under a commander or staff officer for assignment of tasks and authoritative direction necessary to accomplish the mission. Operational control does not include responsibility or authority for combat service support, administration, internal organization, or unit training.

## 2–5. Work Assignments

Within the framework of their roles as assigned, attached, or supporting units, engineer combat, construction, and equipment forces may have work assigned on an area or task basis, or a combination of the two methods. For example, a group in general support may be assigned responsibility for all engineer operations in a given geographical area, or it may be directed to limit its operations to specific tasks, such as improvement of a segment of the roadnet. Work assignments are made in such a manner as to integrate the overall engineer effort toward the accomplishment of a common objective but permitting the exercise of initiative for rapid response to contingent requirements.

# Section II. ENGINEER SUPPORT IN THE DIVISIONAL AREA

## 2–6. Army Divisions (Except Airborne and Airmobile)

*a.* Organic to each of the infantry, infantry (mechanized), or armored divisions is an engineer battalion (app. B). This divisional engineer battalion is a self-contained unit designed to operate as part of the combined arms team in the forward portion of the battle area. It has the ability to overcome a great variety of

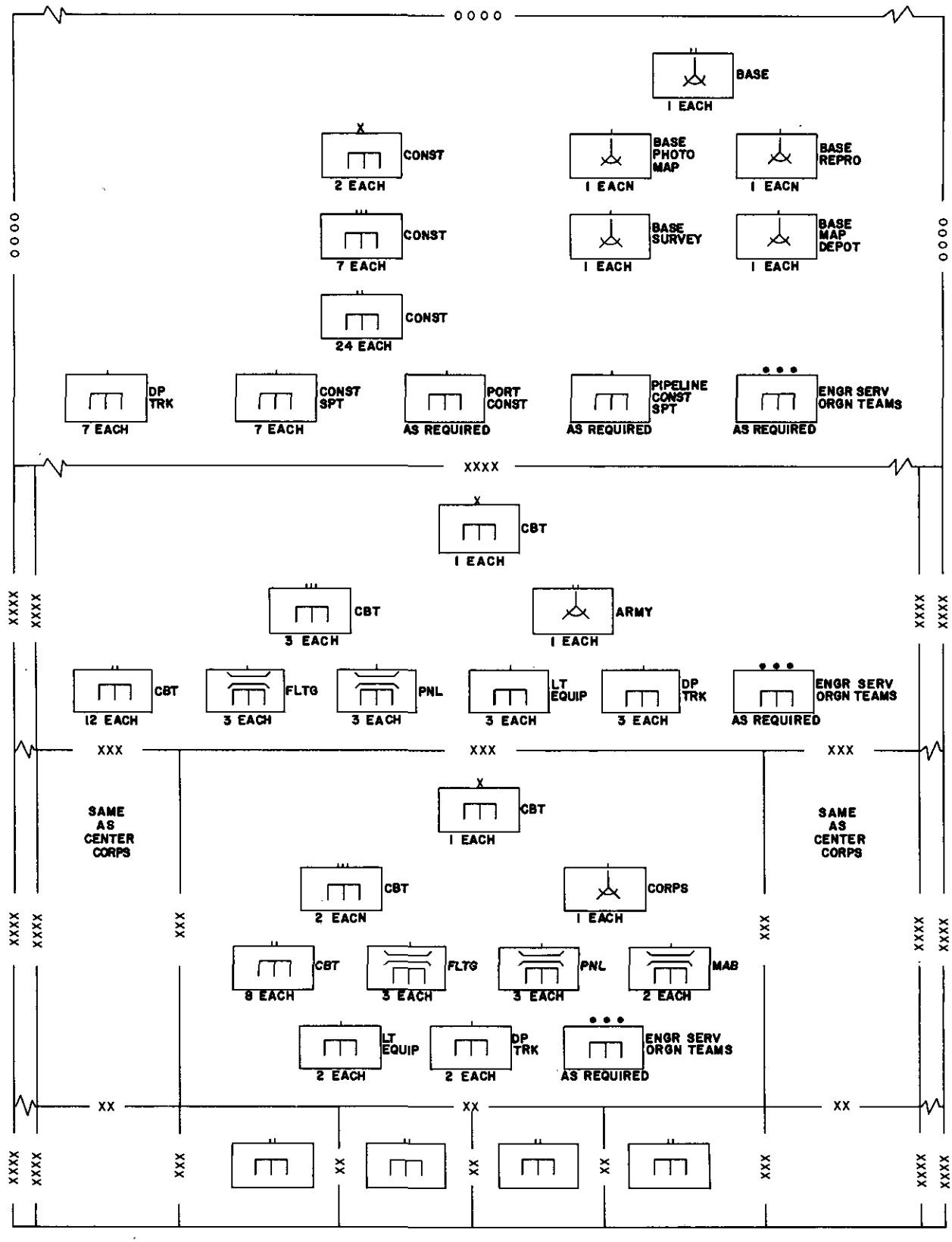



*Figure 2–1. Type engineer support for a large landmass field army and communications zone.*

obstacles to the movement of the division, and, hence, contributes greatly to the mobility of the division and its capability to maneuver in offensive action. In defense, retrograde, or denial operations the divisional engineer battalion has the capability of impeding the progress of enemy operations by blocking critical avenues of approach.

*b.* The divisional engineer battalion is an integral element of the division. Its engineer companies are normally placed in direct support of the brigades or other combat elements of the division. The companies are attached to brigades only when special circumstances make control by the engineer battalion commander infeasible. Its headquarters and headquarters company and its bridge company contain engineer construction equipment and stream-crossing equipment with operators and specialists to appropriately supplement the engineer operating or line companies for specific tasks.

*c.* Engineer companies of the divisional engineer battalion are associated, normally, with particular brigades of the division so as to increase operational efficiency. When in direct support of, or attached to the brigade, the company commander performs the brigade engineer function of tactical engineer staff planning and execution of the engineer missions. The company, when in this role, maintains continuous liaison with the brigade.

*d.* When an engineer company is employed in direct support of a brigade it is administratively supported by the parent engineer battalion, but its movements, plans, and operations are keyed to the requirements of the supported brigade. The direct support unit remains under the engineer battalion control and, concurrently, may execute engineer battalion tasks which do not interfere with support of the brigade. The engineer company normally is attached to the brigade when administrative support and control by the parent engineer battalion is impracticable or unwarranted. Similarly, platoons may be placed in direct support or attached to elements of the brigade for specific short-term tasks when direction and control by the engineer company is not feasible.

*e.* When specific tasks require engineer teams of less than platoon size, these teams normally are attached to the combat elements to permit close command control. In the offense, such tasks may consist of erecting the AVLB, assault breaching of fortified positions, or executing demolitions. In defense or retrograde action, the execution of demolitions and the employment of ADM also may require attachment of engineer teams.

*f.* When exigencies of the situation require deliberate engagement of the engineer battalion to fight as an infantry unit, it is desirable to preserve unit integrity. When committed as infantry, the engineer battalions should be reinforced with infantry heavy weapons and tank teams, artillery liaison teams, and communications support commensurate with the situation, mission, and enemy capabilities. Concurrently, command engineers will determine critical engineer tasks which should be continued and advise commanders and staffs accordingly, including measures which should be adopted to control such operations.

*g.* When armored cavalry units or task forces are committed on independent missions, an appropriate engineer element normally is attached to the force. Attached engineers should be provided means of mobility commensurate with that of the force supported, to insure equal tactical mobility.

*h.* In airmobile operations, the amount of engineer effort required should be considered and planned. Engineer support may be required at loading areas and access routes thereto. The extent of engineer effort that is, or will be, required at landing and drop zones must be considered also when organizing airmobile task forces so that sufficient engineers and engineer equipment are available. Typical tasks include construction or clearing of short airstrips, helicopter landing areas, areas for ground-proximity cargo extraction systems and other low altitude aerial delivery systems, and recovery areas for supplies delivered by freedrop.

## 2–7. Airborne and Airmobile Divisions

The engineer battalions organic to the airborne and airmobile divisions have a lesser capability than the other divisional engineer battalions. They are weaker numerically; their construction equipment is lighter; and they have no organic bridging capability. Within their capability their functions are similar to those of the other divisional battalions. Generally, however, a larger portion of their effort is devoted to construction of airlanding and related facilities. Attachment of engineer companies to committed brigades is more frequent in the airborne and airmobile divisions. This is particularly true in the airborne assault.

## 2–8. Additional Support

When the requirement for engineer support within the division exceeds the capability of the divisional engineer battalion, additional engineer support is requested from and provided by the next higher echelon of command. Normally, the corps commander augments the engineer capability of each committed division.

*a.* The additional engineer support to the division may range from reinforcement of the combat engineer strength to the provision of such support as bridging, road construction, debris removal, construction of barriers, and mapping, military hydrology, and other engineer intelligence.

*b.* Corps engineer units normally are placed in direct support of a division. They are attached, however, when they cannot be supported or controlled effectively by the parent engineer headquarters. Attachment usually is desirable in the pursuit or exploitation phases of offensive operations, and with covering forces and other security elements during defensive operations. All engineer combat support provided to the division is coordinated by the division engineer.

## 2–9. Engineer Support for the Separate Brigade

In similar fashion to the divisional engineer battalion, the separate engineer company operates as part of the combined arms team of the separate armored, infantry (mechanized), infantry, light infantry, and airborne brigades. These separate engineer companies have capabilities similar to, but lesser than the divisional engineer battalions. The separate engineer companies are organized under TOEs 5–107, 5–127, and 5–137. The separate brigades, to which the separate engineer companies are organic, are organized under TOEs 7–100, 17–100, 37–100, 57–100, and 77–100.

# Section III. ENGINEER SUPPORT IN THE CORPS AND FIELD ARMY AREAS

## 2–10. Corps

The actual number and types of engineer units to be employed in a corps area depend upon the mission; the character, disposition, and capabilities of the enemy; terrain, weather, and the availability of engineer troops. The majority of corps engineer troops perform tasks within the corps boundaries to the rear of division areas. Elements of, or one of the combat groups support each division in the forward areas depending upon the amount of engineer effort required. Engineer units in a type corps of a field army may consist of—

*a.* One engineer brigade headquarters.

*b.* Two engineer combat group headquarters.

*c.* Eight engineer combat battalions, army.

*d.* One engineer topographic company, corps.

*e.* Three engineer float bridge companies.

*f.* Two engineer assault bridge companies, mobile.

*g.* Three engineer panel bridge companies.

*h.* Two engineer light equipment companies.

*i.* Two engineer dump truck companies.

*j.* Various engineer service organization teams as required.

## 2–11. Field Army

The actual number and types of engineer

units employed in a field army depend upon the same factors as in corps. The majority of these units perform their tasks within the army service area; however, army engineer units normally support corps operations by assuming responsibilities for engineer tasks forward into the corps area. The nature and extent of this support normally is determined by informal agreement between the corps and army engineers. Necessary support for the field army support command (FASCOM) is provided on an army-wide basis. The army engineer brigade is authorized nondivisional engineer combat units and a topographic battalion. Thus, in addition to those engineer units allocated to each of the corps, engineer units in a type field army may include—

*a.* One engineer brigade headquarters.

*b.* Three engineer combat group headquarters.

*c.* Twelve engineer combat battalions, army.

*d.* Three engineer float bridge companies.

*e.* Three engineer panel bridge companies.

*f.* Three engineer light equipment companies.

*g.* Three engineer dump truck companies.

*h.* One engineer topographic battalion (army).

*i.* Various engineer service organization teams as required.

## Section IV. ENGINEER SUPPORT IN THE COMMUNICATIONS ZONE

### 2–12. General

Engineer troop unit support required in the COMMZ cannot be as readily typified as it is for a type corps or field army. In the combat zone, type engineer force structures allow balanced support to tactical formations to meet contingent and changing requirements. However, in the communications zone the number and types of engineer units needed depends largely on the character, magnitude, and phasing of base development requirements, and the operational environment involved, rather than the type tactical force being supported. In a new theater there will be greater initial demand for construction which will diminish as the area is developed. The maintenance and utility load will increase as construction is completed. Representative engineer support in a typical communications zone is described generally in the succeeding paragraphs.

### 2–13. Construction

The great volume of engineer construction and rehabilitation work in the communications zone of an active theater of operations demands numerous construction and construction-support units of varying types. These construction and construction-support units support the combat forces by construction and allied activities in the rear areas. Coordination and supervision of these units is accomplished by the employment of an engineer brigade or group headquarters. The brigade, composed essentially of construction groups—although it may have other types of engineer units—is employed, as required, to command, to perform operational planning and supervision, and to coordinate the activities of the construction groups. Construction groups provide command of two to four engineer construction battalions and assigned or attached construction-support units. Groups plan for and supervise construction or rehabilitation of roads, railways, buildings, bridges, utilities, installations, air facilities, pipeline systems, and major port facilities. Typical engineer construction units comprising construction groups are—

*a.* Engineer construction battalions which have a large number and variety of construction equipment with which to perform construction commonly required by both the Army and Air Force in a theater of operations.

*b.* Engineer construction support companies which maintain and operate additional and specialized heavy construction equipment in support of the construction battalions and other units.

*c.* Engineer dump truck companies which maintain and operate dump trucks in support of construction battalions and other units.

*d.* Engineer pipeline construction support companies which provide technical personnel and specialized petroleum pipeline construction equipment in support of combat engineer or construction units engaged in pipeline and related facilities construction.

*e.* Engineer port construction companies which operate in conjunction with other engineer units and perform specialized tasks in the construction and rehabilitation of port facilities, inland waterways, POL marine terminals. and facilities pertaining thereto.

*f.* Teams of the Engineer Service Organization which are attached to engineer construction units.

### 2–14. Mapping, Geodesy, ond Terrain Intelligence

The base topographic battalion is designed to permit augmentation with military and civilian units and personnel. It will usually have subordinate company-size units assigned to perform each of the following activities: geodetic and topographic surveying; photomapping; reproduction; and distribution. Specialized teams from TOE 5–540 may also be attached as required.

### 2–15. Utilities and Firefighting Detachments

Utilities and firefighting teams are provided for in TOEs 5–510 and 5–530. Utilities detachments are desirable at major headquarters, hospitals, ports, general depots, staging areas, and recreation areas. Firefighting detachments are desirable at every city, port, depot, hospital, and large cantonment. Firefighting teams and utilities detachments are often detached from the engineer command and placed under the command of nonengineer echelons, such as areas, districts, hospital centers, large ports, and general depots. Composite firefighting companies may also be organized from several TOE 5–510 teams.

## Section V. ENGINEER SUPPORT FOR THE AIR FORCE

### 2–16. General Requirements

Engineers support the Air Force in two areas —mapping and geodetic services, and construction required by Air Force operations. Mapping and geodetic services include the provision of ground control, maps, and related data for weapon systems; as required by the unified command for theater Air Force tactical and strategic planning, training, and operations. Air Force construction requirements vary from new construction to rehabilitation and repair beyond immediate emergency damage recovery requirements.

### 2–17. Responsibilities

*a.* The Department of the Army is responsible for providing the required engineer support for the Air Force and for organizing and training the units necessary to provide this support. This includes the supply of construction materials and equipment except that required for immediate emergency damage recovery.

*b.* The Department of the Air Force is responsible for providing its current and anticipated construction, mapping, and geodetic requirements to the Department of the Army in broad terms which can be translated, by the Army, into support required. It is also responsible for developing and maintaining a capability to provide base maintenance support to include immediate emergency damage recovery within the organic capability of Air Force Civil Engineering resources.

*c.* The theater army commander is responsible, within his theater, for providing the theater Air Force with construction, mapping, and geodetic support, in consonance with the limitations described above.

## 2–18. Engineer Units Supporting the Air Force

*a. Engineer Construction and Nondivisional Combat Units.* The engineer construction group, with its engineer construction battalions (augmented by engineer construction-support units), is capable of accomplishing the construction and major rehabilitation and repair requirements of the Air Force in a theater of operations. When construction for the Air Force is required in the combat zone it may be assigned to nondivisional combat engineer units (a combat battalion, army, and a light equipment company, for example) or construction units from the COMMZ may be sent forward on a mission basis.

*b. Engineer Combat Battalion (Airborne).* The mission of the engineer combat battalion (airborne) (TOE 5–195T) is to increase the combat effectiveness of joint task force or tactical air force operations by constructing airbase facilities; by accomplishing expedient major repairs or modifications of existing facilities; and by performing general combat engineer construction tasks to support air operations.

*c. Engineer Topographic Units.* Engineer topographic units provide mapping and geodetic services to the Air Force.

## 2–19. Construction Support

Construction support is furnished in response to specific project requirements. If construction support is required in areas containing no army command, engineer construction units may be attached to other than an army command. When attached in this manner these units remain under the control of the senior engineer unit commander unless otherwise determined by the army commander releasing them, or by higher army authority. The army commander releasing the unit for the mission determines whether there is a need to augment the unit to insure adequate command and control.

## 2–20. New Construction

*a. General.* Engineer construction support of Air Force operations involves construction and improvement of rear area heavy and medium cargo airfields, rear area and forward area tactical (fighter-bomber) airfields, support area medium-cargo airfields, missile sites, and protective construction.

*b. Procedures.* The theater Air Force commander advises the theater Army commander of the Air Force requirements for construction of airfields and any other facilities and their general location. To facilitate project planning, the appropriate Air Force commander also provides a general siting plan supported by a development plan which includes any special requirements. He furnishes aircraft characteristics, allowance factors, and formulas; broad design, layout, and construction criteria; and policy guidance in the form of definitive drawings, specifications, regulations, manuals, or any other references applicable to theater of operations construction requirements unique to the Air Force. With the receipt of this information the theater army commander establishes support policy and, through the theater engineer, assigns or allocates design and planning projects to TALOG where they are forwarded to an engineer construction command, brigade or group for implementation. Normally an engineer construction group commander reconnoiters the various proposed sites. Upon approval of the location, the group normally prepares plans and specifications by site adaptation of standard designs. After approval of plans and specifications, determination of construction priorities, and receipt of the construction directives, the group commander directs one or more of his attached construction units to do the work. The group tests and inspects the construction for compliance with plans, specifications, and sound construction practices. Appropriate arrangements should be made for coordination and liaison betwen the constructing organization and the planned Air Force occupant during all phases of planning and execution. This is required in order that construction criteria and staging are in consonance with current requirements and that adjustments in criteria and siting may be effected in a timely manner, and are in conformance with

the best interests of the constructing and using units.

### 2–21. Rehabilitation and Repair

*a. General.* Routine maintenance and repair of air force installations are the responsibilities of the air force installation unit; however, when an existing airfield or other air facility is deteriorated or damaged to a point requiring major rehabilitation, the work then is assigned to engineer construction units. The engineer construction battalion is the logical unit to be assigned airfield rehabilitation projects. It is capable of performing rehabilitation in a concentrated area or in numerous dispersed sites.

*b. Procedures.* Requirements for airbase rehabilitation support in oversea areas are determined by the theater air force commander and transmitted to the theater army commander, where they are processed in the same manner as for new construction.

### 2–22. Emergency Damage Recovery

Emergency damage recovery of airfields generally is considered to be the minimum work required to permit aircraft to land and take off. Responsibility for this is assigned to the Air Force. Work beyond this point is considered rehabilitation and repair and is an Army responsibility.

## Section VI. ENGINEER SUPPORT FOR THE INTERSECTIONAL SERVICES

### 2–23. Intersectional Services

Intersectional services are highly centralized activities, such as the transportation intersectional service and the petroleum intersectional service, which cross section boundaries. The TALOG commander normally retains control and supervision over intersectional service activities. Engineers provide construction and maintenance support for intersectional services. They also provide support in the areas of mapping, geodesy, terrain analysis, and related intelligence matters to these services. These intersectional services include—

*a.* The Military Railway Intersectional Service.

*b.* The Inland Waterway Intersectional Service.

*c.* The Petroleum Intersectional Service.

### 2–24. Military Railway Intersectional Service

Construction and maintenance of railways in a theater of operations are functions of engineer and transportation units, respectively, except that major maintenance and repair is an engineer responsibility. Responsibility for railway construction rests with the TALOG commander in coordination with the field armies for projects within their areas. Normally, engineer construction and construction-support units of TALOG provide construction support for the military railway intersectional service. This support would include, in some instances, construction of railways in the combat zone by TALOG engineer construction and construction-support units, sent forward on a mission basis.

### 2–25. Inland Waterway Intersectional Service

The inland waterway intersectional service is responsible for the operation of military waterway systems throughout the theater, with the exception of waterways which originate and terminate in one section of the communications zone, or in the combat zone. In these cases, the waterway section is under the supervision and control of the appropriate section's logistical command, or under the field army commander. The engineer units provide construction support to the inland waterway intersectional service. This support is provided by TALOG engineer construction and construction-support units and includes dredging, removal of obstacles, and general construction and rehabilitation work necessary to make and maintain the waterway navigable and to establish waterway ports.

## 2-26. Petroleum Intersectional Service

The construction, rehabilitation, major assembly and replacement, and damage recovery of petroleum pipelines and related bulk POL handling facilities are an engineer responsibility in the theater of operations, based upon coordinated planning of the TALOG engineer and quartermaster. TALOG determines the engineer support requirements. These requirements are provided by engineer construction battalions augmented by engineer pipeline construction support units. Quartermaster units perform organizational maintenance on the pipeline operating equipment. The petroleum intersectional service may request engineer support from TALOG for repair work which exceeds the capability of the pipeline operating units.

# CHAPTER 3
# ENGINEERS IN OFFENSIVE OPERATIONS

## 3–1. General

*a.* The purpose of the offense is to destroy the enemy's armed forces, to impose the commander's will on the enemy, or to seize territory to further operations against the enemy. In offensive operations, the maneuver executed may take the form of an envelopment, a turning movement, a penetration, or a frontal attack. Regardless of the form of maneuver, an offensive operation may have several phases—the advance to contact, execution of the attack, exploitation, and pursuit.

*b.* Offensive operations are characterized by swift maneuver, violent assault, and rapid exploitation. Upon seizing the objective, a minimum force consolidates gains while the bulk of the attacking forces disperses rapidly. Offensive operations in a nonnuclear conflict differ from those in nuclear war only in regard to the combat power. A principal consideration in nonnuclear warfare is the fact that it can suddenly become nuclear. Hence, regardless of whether the situation is nuclear or nonnuclear, any concentration of troops and material which offers an attractive target in undertaken only as a calculated risk.

*c.* Priority of engineer support is given to those tasks which contribute to mobility of fire and maneuver units and movement of essential supplies and equipment. Engineer reconnaissance, obstacle reduction, combat roads, and trails, tactical bridging, forward airfields, ADM support, and assault POL pipeline systems are typical priority missions. Engineer missions are assigned to tactical and logistical commands in consonance with the overall mission; engineer resources are allocated accordingly. Engineer support in offensive operations is characterized by forward echelonment of engineer troops and material to facilitate tactical and logistical mobility. Resources are shifted as dictated by changes in mission, situation, and support priorities. In general, engineer support is tailored to the needs of the supported command after consideration of the factors comprising the operational environment. These are: the mission; strength and composition of friendly forces; enemy capabilities; weather and terrain. The impetus of engineer effort is toward support of forces in contact, and in the direction of planned or actual movement. Initial efforts of forward engineer units emphasize provision of minimum essential facilities for supported commands. Follow-on engineers relieve forward units as rapidly as possible; expanding or improving initial work and accomplishing the more complex and durable work required in the rear.

## 3–2. Engineers in the Advance

*a. Covering Forces.* A division moving to contact may be preceded by a self-furnished covering force operating directly under divisional control. If the division is operating as part of a larger element, the covering force is frequently furnished and controlled by higher headquarters. Missions assigned to a covering force are broad in nature and may include developing the enemy situation, attacking to destroy enemy resistance, seizing and holding critical terrain, or containing large enemy units. Engineer support in a covering force (including engineer reconnaissance teams) should be located well forward to aid the movement of the combat elements. Obstacles which cannot be bypassed are breached or surmounted. Breaching usually involves removal or destruction by demolition. Surmounting calls for bridging or ramps. The type of obstacle, the allowable time, and the equipment available determine the method employed. The width and number of passages through an obstacle are determined by the passage-preparing capability of the supporting engineer element, the nature of the obstacle, and the requirements

of the covering force. The location of the passage(s) is determined by terrain, enemy position, and the extent of the obstacle. Road gaps which cannot be bypassed are hastily repaired or bridged. The engineers are so armed as to resist enemy interference while conducting these tasks. Because of the distance involved in covering force operations, engineer troops are usually attached to the supported force.

*b. Advance Guard.* The main force advances behind the covering force. Each column is preceded by its own advance guard which protects it from ground observation and surprise from the front, and furnishes the time and space necessary to enable the main body to deploy for combat. Each advance guard is supported by engineer troops and reconnaissance elements, whose commander functions as the unit engineer of the advance guard commander. During the advance of a brigade, a platoon from the supporting engineer company normally forms a part of the advance guard. When these engineers are on foot, they may be supported by mounted engineer troops with tools and equipment, who follow by bounds. In other cases they are equipped with standard mechanical clearing equipment compatible with advancement of foot troops. The point engineers normally have mine detectors and probes. They search for and mark or open a lane through an enemy minefield. Within their capabilities, they remove all obstacles which have been left, or partially breached by the covering force. Removal or breaching of complex obstacles may require additional engineer troops and equipment which are moved forward from the support or reserve. The leading engineers in the advance guard maintain contact with and relay information concerning the required forward engineer tasks to the remainder of the engineers of the main body. As the advance guard progresses, engineer work parties are left at vital points where the need for engineer assistance exists. These parties rejoin the advance guard upon completing their tasks, or upon being relieved by engineers of the main body. The advance guard engineers may thus be depleted at the end of the march, and it may be necessary to replenish their strength by units from the engineers with the main body. When the main force is not preceded by a covering force, the advance guard normally is stronger, with a corresponding increase in the strength of the engineer support.

*c. Flank and Rear Security Forces.* Flank and rear security forces protect the main body from ground observation and surprise attack. These forces must be sufficiently strong to defeat minor resistance or to delay strong enemy attacks on the flanks or rear long enough to permit deployment of the main body. Engineers support the flank and rear security forces by assisting in the blocking of avenues of approach. This is done by creating obstacles such as craters, contaminated areas, minefields, demolished bridges, abatis, and floods.

*d. Main Body.* The main body is the bulk of the advancing force's combat power. It is used at the decisive time and place to attack and destroy key enemy forces and to seize and secure primary objectives. The remainder of the supporting engineer troops are positioned in the advancing columns of the main body to permit maximum flexibility and communication with security elements. This permits employment during the advance when they are needed to reinforce or replace the advance guard engineers or the flank and rear guard engineers.

## 3-3. Engineers in the Attack and Exploitation

In part, the duties of the engineers in the attack proper, and in the exploitation resemble those in the advance to contact. They assist the movement of combat maneuver elements and supporting units by clearing obstacles and fortifications; assist the troops protecting the flanks by creating obstacles on avenues of approach to the flanks; and perform routine engineer tasks, to include supply of potable water, and technical assistance in camouflage and combat deception measures. As the attack develops, however, new demands for engineer support arise. Reconnaissance is required both before and during the attack. Reconnaissance of the main supply route and other routes of advance, and of enemy obstacles and barriers is especially important at this time. Specialized assistance from engineers may be needed to bypass, breach, or surmount obstacles; assault fortified positions; establish flank protection; cross water barriers; or organize captured

ground against counterattacks. When control of an area is gained, advance landing strips for light aircraft will be required. (Site selection for these landing facilities is of vital importance to the engineer commander, as he must evaluate each potential site in the light of anticipated engineer effort, materials, and construction-time requirements.) Water points must be established over a wide area because of the dispersion of the attacking units. Water point teams retain mobility in accordance with the units they support, and when possible are located in the vicinity of the supported units' field trains area. Routes of advance for combat troops and essential supplies are established and maintained. As the attack gains momentum all advances are exploited to the maximum. As the exploitation develops, corps and army engineer combat units with follow-on forces are advanced by bounds to relieve divisional engineers as required, or to independently accomplish tasks required to facilitate movement of the follow-on forces. In this process, corps and army combat engineer groups, battalions and separate companies may be interchanged by leap-frogging where this procedure is judged to be an efficient one and where fresh units are needed in forward areas as soon as possible.

## 3-4. Engineers in the Pursuit

The pursuit, which is essentially an extension of the exploitation, is composed of highly mobile infantry, armor, artillery, engineer, aviation, and sometimes airmobile or airbone troops. It is characterized by boldness, speed, mobility, firepower, and shock effect. The size of the supporting engineer force depends upon the size of the pursuing force and the anticipated engineer work during the operation. Engineer units and materiel are located well forward in the columns to facilitate rapid stream crossing and surmounting or breaching of obstacles. Engineer elements of combined arms teams should be afforded commensurate protection and mobility as the rest of the combat troops, e.g., armored personnel carriers when participating with tanks or mechanized infantry. Engineer units are usually attached to the pursuing force because of the distances involved.

## 3-5. Control

*a. Disposition.* To enhance the mobility of the attacking force, it is essential that the engineers be an integral part of the committed units. Proximity enables them to anticipate the needs of the attacking troops and to have the maximum engineer support available for meeting those needs promptly. The staff engineer recommends the disposition of engineer troops and equipment for all phases of the offensive operation and recommends appropriate changes in disposition as changes are necessary. This disposition is normally made by assigning engineers specific tasks, placing engineer units in direct support of other elements, and under certain conditions, such as during a separate type operation, attaching engineer units.

*b. Liaison.* It is the responsibility of the supporting unit to establish and maintain liaison with the supported organization. The assistant division engineer is the chief liaison agent between the engineer battalion and division headquarters. Liaison functions between a supporting engineer company and a brigade are performed by personnel designated by the company commander. The liaison officer, usually the company executive officer, is familiar with the capabilities and operations of both units and keeps informed of all plans and operations to give reliable and up-to-date information and advice to both commanders. If engineer units are segmented in platoons or squads, each element establishes liaison with its supported organization. Where practicable, command posts of supporting units are located near those of the supported units.

*c. Corps Engineer Units.* Corps engineer units, attached to or in direct support of divisions, are responsible for establishing liaison with appropriate elements of the division. The supporting unit is responsible for assuring that its liaison team is provided with rapid means of communication; vehicle, radio, and/or wire link.

## 3-6. Assistance to Division Engineers

When the divisional engineer battalion is unable to perform all the engineer tasks required in an offensive operation, the division commander, upon recommendation from the divi-

sion engineer, requests and usually receives assistance from corps or army. At the beginning of the attack a corps engineer combat group normally assumes some of the divisional engineer battalion's responsibilities in the division service area, progressively extending its forward boundary to relieve the divisional engineer battalion. An engineer combat battalion from a corps engineer combat group or the entire group may be attached to a division for a particular operation, returning to the control of its parent unit at the conclusion of the operation. In a major attack the corps usually designates one or more of its engineer battalions as direct support battalions, operating with the division and often in the same areas as elements of the divisional engineer battalion. Such units remain under group control. Except for special operations it is normally desirable for corps engineer units, under parent unit control, to support the division on a direct support basis. In addition, corps provides engineer support to divisions on an area basis by assuming responsibility for engineer tasks in a portion of the division rear area, possibly as far forward as brigade rear. Boundaries between the divisional and corps engineer units are established informally to denote the forward working limit of the supporting engineer unit. Such working limits eliminate unnecessary concentration of nondivisional troops in forward areas. Specific missions forward of a work limit, such as bridge or road construction and maintenance, are made on a task assignment basis. The size of the engineer elements attached or supporting is governed by the anticipated strength necessary to reduce obstacles and to support the advance of the assaulting forces. When necessary, nondivisional engineers may be further attached to the brigades of the division. Regardless of the seniority of supporting engineer unit commanders, the commander of the divisional engineer battalion remains the division engineer and coordinates the engineer work in the division area through liaison with the supporting units and through recommendations to the division commander.

## 3-7. Economy of Engineer Effort

There are seldom enough engineer troops available to accomplish all the pioneer work necessary to assist the advance of the combat maneuver elements. To insure that the maximum engineer effort is available for significant tasks which require engineer skills and equipment, troops of combat arms and services participate as required in such pioneer tasks as:

*a.* Expedients for stream crossing.

*b.* Fighting of fires in forested or built-up areas.

*c.* Preparation of protective obstacles.

*d.* Minefield laying and breaching.

*e.* Expedient road and culvert repair.

*f.* Execution of camouflage projects.

*g.* Reduction of obstacles.

*h.* Construction of field fortifications.

*i.* Clearing of air landing areas.

## 3-8. Engineer Reconnaissance

*a.* Collection of engineer information is a mandatory requirement on all engineer elements in an offensive operation. It is continuous and detailed, and is performed prior to the advance, during the advance, and during the attack proper. Initially, reconnaissance teams from the engineer battalion provide the division engineer with early and reliable information of the area over which the division will advance. Particular emphasis is given to the condition of the proposed routes of advance, alternate routes, air landing facilities, enemy obstacles, local engineer resources, potential river crossing sites and hydrology, and possible water points. This on-the-ground reconnaissance is supplemented by information gained from air reconnaissance, maps, photographs, published terrain studies, and other intelligence collection agencies. The combined information aids the division engineer in estimating the required engineer materials; preparing plans and work estimates; and assisting other agencies in the development of traffic circulation plans. In addition, information pertaining to corps and army elements is passed to supporting corps engineers and becomes part of the basis for corps and army engineer planning.

*b.* Engineer reconnaissance elements accompany the advance party of each leading brigade

to provide the unit engineer with timely notification of forward engineer requirements. Likely avenues of approach are closely examined, especially for possible enemy use of mines, obstacles, and defending weapons.

*c.* During the attack engineer reconnaissance continues. Special attention is paid to the routes of advance. Engineer companies attached to, or in support of brigades make continuous reconnaissance of routes of advance, the main supply route, obstacles, potential water points, and sources of engineer materials in their assigned areas. Special reconnaissance missions are assigned by the battalion S2. On the basis of this reconnaissance information, engineer operational plans are made and means are provided to assist in maintaining the momentum of the attack.

*d.* Reconnaissance team of corps and army engineer units are deployed to assure complete coverage of respective corps and army areas. Particular attention is given to areas which may have been bypassed by leading units and to routes and areas which will be required for corps and army reserves, fire support units, and combat service support units.

## 3–9. Combat Roads and Tactical Bridging

*a.* Sufficient routes must be provided and maintained in the combat zone to support movement toward tactical objectives, occupation of fire support positions, dispersion and lateral movement of fire support elements and reserves, dispersion of logistical support elements and movement of logistic support. Operations in the combat zone seldom permit extensive road building to be undertaken. Thus, the operational road net will usually consist of routes selected from the existing road system. New construction is ordinarily limited to construction of bypasses around obstacles and short pioneer roads for access to tactical positions, assembly areas, etc. However, new construction will usually be necessary in the less-developed segments of a theater of operations to provide a minimum essential road net.

*b.* Divisions ordinarily require at least one route as a main supply route (MSR) and access roads to principal fire, maneuver, and service support elements. Corps ordinarily requires two axial roads as primary and alternate MSR's extending from the army rear boundry to the divisional rear boundry, and roads for lateral or oblique movement every 15–30 kilometers in the area behind divisions.

*c.* Development and maintenance of the road net is closely coordinated by unit engineers to avoid needless waste of effort and material. Divisional engineers give priority to supporting forward movement of fire and maneuver units. Corps engineers reinforce and support division engineers as required with priority on those routes which will become part of the corps and army road net. Tactical bridging (AVLB, M4T6 and class 60 dry-span equipage, and panel bridging) is employed as discussed below to facilitate rapid short-gap crossing. Army and corps engineers coordinate recovery of tactical bridging in consonance with plans for the combat zone road net and development of the LOC highway system by COMMZ engineer units.

## 3–10. Short-Gap Crossing

Short gaps frequently found in the combat zone which impede the movement of friendly vehicles may consist of antitank ditches, road craters, streams, canals, washouts, ravines, marshy ground, railroad cuts, and other similar obstacles. The armored vehicle launched bridges (AVLB), organic to the bridge companies of the divisional engineer battalions and tank battalions, are used to cross short gaps in a minimum of time and with a minimum of exposure of bridging personnel to enemy fire. Each AVLB is used to span gaps up to 18 meters (60 feet) in width and can carry a class 60 load. Rapid placement of bridging assists in maintaining the momentum of attack. To save time and labor in emergencies, the AVLB may be used on main supply routes. Components of the light tactical raft, the M4T6, and the class 60 bridge sets can be used also to span short gaps with fixed bridging. When the AVLB, or components of the float bridge sets are used as expedient bridging, they should be replaced at the earliest opportunity in order to free the tactical bridging for use in the combat areas.

## 3–11. Intelligence, Mapping, and Geodetic Support

Intelligence, mapping, geodetic, hydrologic,

and related data are particularly essential during an offensive operation, and result in an acceleration of associated intelligence and topographic activities. Often the advance will be into relatively unfamiliar territory, necessitating rapid up-dating of existing maps, utilization of captured enemy maps; substitution of up-to-date aerial photomaps until topographic maps are available; rapid distribution of maps; and rapid establishment or re-establishment of survey ground control. Where time permits, the preparation and distribution of engineer terrain studies will facilitate planning and operations. Mapping and geodetic support, including ground survey control and hydrologic data, are furnished by the engineer topographic units of the engineer brigades of corps and army.

## 3-12. Camouflage and Deception

The basic principles of camouflage are followed in an offensive operation as well as in a static or defensive situation (FM 5-20). The responsibility for camouflage rests on the commander and all troops must be aware of the principles and techniques of camouflage. Technical advice and assistance is provided by the engineers. The division engineer, under the general staff supervision of the division G2, is responsible for camouflage planning, in coordination with the division G3 and G4. In a fast moving offensive situation it is doubtful if time will allow extensive artificial camouflage measures. However, engineers advise and assist other troops in the utilization of natural terrain features which will aid in camouflage and concealment. During preparation for offensive operations special attention is given to camouflage, concealment, and disguise of units and activities which may reveal friendly plans. Division, corps, and army engineer units, in coordination with signal and intelligence units, may install and move decoys, fabricate disguises, and construct covered routes and positions as required to counter enemy intelligence systems in consonance with command plans for counterintelligence and deception. Smoke may also be used in deception and decoy operations.

## 3-13. Security

*a. General.* Security encompasses all the measures, active and passive, taken by a command to protect itself from surprise attack, observation, and harassment by the enemy. All engineer commanders are responsible for the security of their own commands. The engineer commander adopts sound and reasonable measures for security and he determines the size of the security detachment in accordance with the assigned mission and the situation.

*b. Security During Movement.* The engineer commander of a unit on the move has various methods of providing the necessary security; the choice is dictated by the situation. There is usually a frontal security force, the advance guard, and security forces to the rear and on the flank. Aircraft may play an important role in the security of a unit in movement by checking advance and flank areas, and warning of enemy activities and possible ambush. Communications are vital to control the movement.

*c. Security in a Stationary Position.* An engineer unit in a stationary position, such as a temporary halt during a march, in bivouac, or employed at a worksite, must also have perimeter protection. This protection can be achieved by using its own troops or by arranging for the provision of security forces from another combat unit. A frequently employed form of security is the outpost system, composed of sentinels, outguards, and visiting patrols, with its strength, location, and composition depending again upon the enemy situation and local conditions.

*d. Protective Action.* While the outpost system provides warning, it cannot be expected to repel a serious enemy attack. As soon as it is apparent that some action must be taken to repel the enemy, the engineer unit commander takes positive aggressive action, following the principles outlined in the basic infantry manuals of the 7-series. When the enemy has been repulsed or destroyed, the engineer unit returns to its original mission.

## 3-14. Support Organizations

*a. Division.* Combat service support for the division is provided by the division support command (DISCOM). The DISCOM is organized on a functional basis and is an operational command directly under the division commander. It provides the following logistical support to all elements of the division— supply,

transportation of supplies (less class V), direct support maintenance and backup organizational maintenance support of all division units (except for medical, ADPS/EAM, cryptographic, and air-drop equipment). The division supply and transport battalion obtains maps for the division from the supporting map depot and distributes them to using units. Quantities are based on requirements determined by the ACofS, G2, on the advice of the division engineer. The principal logistical functions of the divisional engineer battalion are those of procurement and evacuation within its own organization. However, the divisional engineer battalion is charged with the provision of potable water for the division. To accomplish this mission it has five organic water purification sets. Normally, four of these sets are continually operated at one time with the fifth used for displacement or held as a reserve. Water points are established in the most convenient locations available, preferably in the brigade trains area. Units using unit transportation draw water from the nearest water point.

*b. Army and Corps.*

(1) *Field army support command (FASCOM).* The FASCOM headquarters is established as a major subordinate element of the field army. It provides combat service support (less replacements, and chemical, signal, and engineer services other than supply and maintenance) to the field army. In the accomplishment of this mission it commands, controls and supervises all assigned or attached units, and coordinates combat service support operational matters with the supporting headquarters in the communications zone or base area. It also exercises territorial control over the field army service area to include responsibility for rear area security operations and area damage control activities.

(2) *Other support organizations.* Engineer brigades and a chemical unit are assigned to the field army commander and provide support (less supply and maintenance services which are organic to the FASCOM) on an army-wide basis or by attachment of specific elements to the FASCOM as required. A signal brigade is assigned to the field army commander to provide communication services on an army-wide basis. Technical intelligence is a responsibility of the military intelligence group of field army (branch material specialists are organic to the group). Replacements are handled by replacement battalions under the operational control of the field army headquarters as an army-wide service. (FASCOM is responsible for the administrative and logistical support of the replacement battalions; control of the flow of replacements remains with the Field Army Commander.)

# CHAPTER 4
# ENGINEERS IN DEFENSIVE OPERATIONS

## 4–1. General

*a.* Defensive operations are employed to deny a vital area to the enemy, to protect a flank, to contain an enemy force, to gain time, to economize on forces, or to effect the maximum destruction and disorganization of the enemy. There are two types of defensive operations—area and mobile. The primary differences between the two are the manner in which the forces are disposed and the size and intended use of the reserve or striking force.

(1) The area defense is a relatively compact defense in which the battle area is organized into a series of mutually supporting defensive areas. Forward portions of the battle area are strongly held. Terrain may be controlled temporarily with nuclear fires. Units may be in dispersed assembly areas adjacent to critical terrain, prepared to occupy the terrain, or call for nuclear fires on it, if its seizure is threatened. The depth of the defense is relatively shallow and is organized with the aim of stopping the enemy forward of the battle area. If the enemy penetrates the area he is destroyed or ejected.

(2) The mobile defense is a fluid defense. In this type defense the minimum forces employed in the forward area serve to warn of impending enemy approach, to disorganize and delay the enemy to the maximum extent possible, and to canalize the attacking forces into areas suitable for counterattack by the striking force. The bulk of the forces is in reserve and used as a counterattack force. In a mobile defense it is anticipated that the decisive combat will occur within, or forward of, the battle area, and principal reliance is placed on bold and vigorous offensive action by the reserve to destroy the enemy. Frontages and depths are usually greater than those for the area defense.

*b.* The division commander specifies the type of defensive position to be used and the priorities of construction. The division engineer advises the commander on such matters as mine laying, camouflage measures, the quantity of class IV camouflage and fortification materials which are needed, employment of ADM, obstacle erection, the influence of the terrain and the employment of the engineer troops. The division engineer assists in the formulation of the overall barrier plan and its implementation.

## 4–2. Defensive Areas

Defensive areas include the security area, the forward defense area, and the reverse area. Each of these areas is allocated forces and fires as part of the overall defensive plan.

*a. Security Area.* The division security area begins at the forward edge of the battle area and extends as far to the front, flanks, and rear as division security elements are employed. Forces in the security area furnish information of the enemy; delay, deceive, and disrupt him as much as possible; and provide a counter-reconnaissance screen. The security echelon also may have the mission of locating and developing nuclear targets. Forces operating in the security area may include elements from higher echelons such as covering forces and units to provide aerial surveillance and flank and rear security. Division forces in the security area will consist of the covering force or general outpost (GOP), combat outposts, flank and rear security forces, division aerial surveillance elements and patrols from units located in the division forward defense area.

*b. Forward Defense Area.* The forward de-

fense area extends rearward from the forward edge of the battle area to include that area organized by the forward committed units. The composition of the forward defense echelon depends on the form of defense employed.

(1) The forces located in the forward defense areas in the mobile defense are the minimum necessary to carry out the mission of disrupting, delaying, and canalizing the enemy into areas suitable for counterattack by the reserve (including nuclear weapons). These forward elements must be provided with long-range fire support and a degree of mobility equal or superior to that of the enemy. Depending on the enemy threat, an adequate antimechanized defensive capability should be provided to the forward defense echelon.

(2) When the defense is based on the retention of key terrain, as is the area defense, the bulk of the combat forces is normally used to organize the forward defense area.

*c. Reserve Area.* The reserve area is that area which contains the reserve forces or echelon. The reserve echelon consists of those uncommitted forces held under division control and is the principal means by which the commander influences the defensive battle and regains the initiative. The combat power of the reserve may consist of nuclear weapons or manuever elements, or both.

(1) In the mobile defense, the reserve is the decisive element of the defense. It is organized as strong as possible and has the primary mission of counterattacking at the opportune time and place to destroy the enemy.

(2) In the area defense, the reserve is normally not as large as in the mobile defense; however, it is given as much strength as possible consistent with the requirement for strong forces in the forward defense area. The reserve may be used to eliminate or block penetrations or to reinforce threatened areas.

## 4–3. Engineer Support

*a. Status of Engineers.* Divisional engineers may be attached to, or placed in direct support of the brigades to, or placed in direct support of the brigades and operate as a part of the combined arms team. Normally support is one engineer company for each brigade of the division in the forward defense area although this is varied to meet specific requirements. Engineers with the security force are normally attached. The engineer battalion, less the elements attached to subordinate units of the division, is kept under division control.

*b. Primary Missions of the Engineers.* The primary missions of the divisional engineers in the defense are to increase the defensive capabilities of combat troops by assisting in the organization of the ground and in the preparation of defensive positions, and to assist the movement of reserves in the counterattack. Engineers prepare obstacles, important demolitions, lay minefields, and prepare and maintain routes. ADM may be used, when authorized, to deny specific areas and strengthen the position (see FM 5–26). The division engineer assists in the formulation of the overall barrier plan and its implementation.

## 4–4. Assistance From Nondivisional Engineers

When a division organizes its own defensive position, it requires and normally receives engineer assistance from corps. Corps engineer combat units may accomplish certain road work and establish water points in the rear areas. Corps also may assume emergency installation of standard equipment bridges to replace damaged or destroyed bridges in the division area; earthmoving operations; specialized camouflage tasks; and the preparation of obstacles and positions for the rear flanks or blocking positions. Technical specialists not available to the division engineer may be provided by higher engineer commands. If a need is anticipated, and the situation permits, a defensive position may be completed by corps or army before the arrival of the occupying troops, in which instance maximum available civilian labor is often used.

## 4-5. Reconnaissance

As in the offense, engineer reconnaissance in the defense is continuous and detailed and is intensified immediately upon the decision to occupy a position. Emphasis is placed on the preparation of terrain studies; on selection of routes of communication for counterattack forces; on location of obstacles and demolition sites; and on utilization of natural cover. In an area defense the engineer battalion reconnaissance teams search the area in detail and report all items of engineer interest which become the basis for barrier and obstacle plans; routes of supply, evacuation, and withdrawal; available resources such as timber, sand, and gravel; and denial operations plans. In a mobile defense, engineer reconnaissance is carried out in conjunction with the counterattack plans under the direction of the unit engineer. Often a divisional defensive position is in an area with which the engineer is familiar and information on the area may be found at corps or army headquarters. The division engineer is responsible for the collection and utilization of this available intelligence.

## 4-6. Organization of the Ground

In the organization of the ground, divisional engineers and nondivisional engineers play a key role in advising and assisting other units in using and improving the natural defensive qualities of the terrain to the best defensive advantage. This includes the laying of mines, erection of artificial obstacles, camouflage, protective construction, and improvement of fields of observation and fire. Barriers are integrated into the defensive scheme to hold the enemy under fire, to divert him into areas where he can be destroyed by fires and offensive maneuver, or to separate attacking enemy echelons such as tanks from dismounted infantry. The barrier plan is designed to take maximum advantage of natural obstacles. When their use is authorized, chemical agents and ADM may be used effectively to create and contaminate barriers, obstacles, and defiles to further impede enemy movement and canalize his advance.

## 4-7. Field Fortifications

*a.* The defense is built around a series of organized and occupied tactical positions which are selected for their natural defensive strength, their contribution to the mission, and the degree of observation they will afford. These natural positions are strengthened by field fortifications to support the fire plan and the scheme of maneuver. Well planned and constructed fortifications provide the desired degree of protection and also bring the enemy under a maximum volume of effective fire as early as possible. Plans normally consider construction by phases. Protective construction proceeds from the minimum to the maximum practicable considering the time and materials available.

*b.* Because of the magnitude of the task of constructing field fortifications, all units participate in the accomplishment of this task within their capabilities. The siting and construction of field fortifications for the protection of troops is the responsibility of the individual unit commander involved. The staff engineer is responsible for the production of terrain intelligence studies from which the fortifications are planned and developed. The engineer's primary responsibilities in the construction for field fortifications are to—

(1) Recommend the amounts and types of field fortification materials and equipment such as hand tools needed by the division.

(2) Furnish technical advice and assistance.

(3) Accomplish large-scale excavation and backfilling.

(4) Increase the effectiveness of extensive emplacements through the creation of protective obstacles.

(5) Furnish special engineer tools and equipment with operators.

(6) Prefabricate emplacement and shelter components or modules for using units and protective construction for unit command and communication facilities.

## 4-8. Barriers and Obstacles

*a.* Barriers are used in the defense to—

(1) Delay the enemy advance toward the front or flanks.

(2) Delay or limit the movement of a penetrating or enveloping force.

(3) Canalize enemy movement into areas where he can be defeated or destroyed.

(4) Separate attacking enemy echelons such as enemy armor from infantry.

*b.* Barrier and obstacle planning is developed concurrently with other plans, and can be executed by all echelons of command. Extensive strategic or major tactical barrier systems, however, are directed by corps, or higher. G3 has general staff responsibility for the tactical employment of barriers and obstacles, but the staff engineer has the special staff responsibility for their planning. The staff engineer prepares terrain and barrier studies for G2, and advises G3 as to means and extent of augmenting natural obstacles. He plans and supervises the technical aspects of barrier employment and aids G3 by preparing the barrier annex to the operation plan or order, under the direction of G3. Coordination is effected with the chemical officer for use of chemicals in barrier plan. Division barrier and obstacle planning is usually supplemented by detailed planning of tactical obstacles at the brigade level.

*c.* The construction of obstacles for close defense is the responsibility of the unit commander involved, and may be integrated with a barrier plan of division or higher echelon. Normally each tactical unit is responsible for the construction of the obstacles of that part of a barrier system which lie within its area. Engineers furnish assistance in the form of effort, advice, and technical supervision. They may have the responsibility for the siting and construction of obstacles when special skills and equipment are required; flanks and rear are exposed; the command as a whole will benefit from the effort; the obstacles must be prepared before the position-occupying troops arrive; or when the construction lies beyond the responsibility of a particular subordinate unit.

*d.* In the area defense, obstacles are used extensively. Time permitting, the natural defensive characteristics of the terrain are improved and augmented by artificial obstacles until a barrier zone has resulted which the enemy cannot penetrate without a costly loss. In a mobile defense, obstacles and barriers are employed to delay or canalize the enemy. They must be carefully coordinated, however, because of the necessity for freedom of movement of the friendly maneuvering forces in a counterattack. Gaps and lanes must be available for friendly tanks and armored infantry to move forward or backward or to adjacent areas for battle positions. In a static situation extensive use is made of mines, and fabricated and excavated obstacles. When time and resources are limited, obstacle and barrier planning reflect this limitation. Atomic demolition munitions are one solution because of their capability for rapidly producing contaminated obstacles of magnitude, such as craters, tree blow down, landslides, and flooding. When available, mechanical mine planters and earth-digging devices reduce the labor and time requirement. Mines are used as an obstacle, or as a supporting obstacle in a system. The integration of chemical mines in the system produces contamination which makes breaching operations more difficult and time consuming. Extensive use of mines, however, poses a logistical burden which must be considered when planning for the use of mines on a large scale.

## 4–9. Combat Roads and Tactical Bridging

It should be anticipated that the enemy will attempt to interdict movement of reserve echelons and supplies by air, artillery, and missile attacks directed against roads, defiles, and bridging. Consideration should also be given in counterattack planning to the need for reopening routes closed by friendly barrier operations. Defensive plans should provide for construction, repair, and maintenance of routes required to permit movement of reserves to counterattack or blocking positions, for access to alternate positions, and for bypasses around defiles. Materials for repair or replacement of bridging should be placed with supporting engineer units and stockpiled in advantageous locations.

## 4–10. Engineers in an Infantry Mission

*a.* One of the missions of combat engineer units is to undertake and carry out infantry combat missions when required. There may be times in a desperate defensive situation when engineer units will be given an infantry mission to aid or supplement the major combat

force. At such times, the engineer units must be prepared to deploy with a minimum of delay. The major force commander is responsible for the decision to commit engineer units for sustained ground combat, which he does only after serious consideration of the following:

(1) *The situation.* Will the enemy force be able to seriously affect the command if the engineer unit is not committed?

(2) *Loss of engineer support.* Can the command afford the temporary loss of engineer support? What engineer support activities must be continued?

(3) *The strength of the engineer unit.* Is it large enough to be effectively employed?

(4) *Weapons support.* Can adequate heavy weapons be provided to make the unit effective?

(5) *Support after commitment.* What fire and logistical support will the engineer unit need from supporting units in carrying out the mission?

*b.* Commitment of an engineer unit to an infantry combat role is not instantaneous. The unit requires time to prepare for such a mission; items of equipment must be moved to relative safety; personnel needed for essential noncombat activities must be relocated; and support for the committed unit must be established. When used in this manner, the unit should be provided with artillery liaison personnel, additional weapons, and additional communications.

*c.* Divisional engineer units may be required to reorganize and fight as infantry, infantry (mechanized), armored infantry, or airborne infantry. It is therefore not possible to have one definite infantry type combat plan for all engineer units. As a consequence, each divisional engineer unit has its own plan, incorporated into an SOP, reflecting the unit's individual characteristics and infantry mission (app. D). To guarantee the plan's success the unit must be highly trained to insure a smoothly functioning unit when the plan is implemented.

# CHAPTER 5
# ENGINEERS IN RETROGRADE OPERATIONS

## 5–1. Types

A retrograde movement is any movement of a command to the rear or away from the enemy. Retrograde movements are further classified into withdrawal, delaying action, and retirement. They may be forced by enemy action or may be made voluntarily. A force executes a retrograde operation voluntarily only when a distinct advantage is to be gained. To be successful it must be executed according to well organized plans. A disorganized retrograde operation in the face of enemy strength invites disaster. Retrograde movements are classified as follows:

*a. Withdrawal.* A withdrawal is an operation by which all or part of a deployed force disengages from the enemy.

*b. Delaying Action.* A delaying action is an action in which a unit trades space for time and inflicts maximum punishment on the enemy without becoming decisively involved in combat.

*c. Retirement.* A retirement is an operation in which a force not in contact moves away from the enemy.

*d. Combination of Types.* Within a large command which is in contact with the enemy a combination of these types usually is necessary, either simultaneously by adjacent units, or by one developing into the other. For instance, a retirement is frequently preceded by a withdrawal. A retirement may be covered by a force executing a delaying action.

## 5–2. Purpose

Retrograde movements are conducted to—

*a.* Harass, exhaust, and inflict punishment on the enemy.

*b.* Draw the enemy into an unfavorable situation.

*c.* Permit employment of the command or a portion thereof elsewhere.

*d.* Avoid combat under undesirable conditions.

*e.* Gain time without fighting a decisive engagement.

*f.* Disengage from battle.

*g.* Conform to movement of friendly troops.

## 5–3. Disposition of Engineer Support

It is normally necessary to echelon the withdrawing units, leaving a security or covering force to protect the withdrawing elements of the main force, by stopping, restricting, or diverting the enemy advance. This permits the main force to disengage, assemble, and move to the rear.

*a. Divisional Engineer Units.* In a divisional retrograde movement the typical disposition of the engineer support consists of an engineer company attached to the security or covering force, an engineer company in direct support of each major element of the withdrawing force, and the remainder of the engineer battalion in general support of the division. The exact composition and disposition of the supporting engineer elements depend upon the enemy situation, the terrain, the composition of the withdrawing forces, and the tactical situation.

(1) The divisional engineers may be placed in direct support of, or attached to, combat units as the situation demands. Execution of the division barrier plan, construction of obstacles and rearward positions, and road maintenance may dictate a centralized engineer effort. Additional engineer support from corps normally is provided especially if numerous small attachments of engineer elements to combat units decreases the overall effectiveness of the divisional engineer battalion.

(2) One of the most important functions of the engineers will be to provide advice and assistance in the overall formulation and implementation of the barrier plan. Barriers are used by the retrograde force commander to delay the enemy or canalize him into areas where he can be destroyed with nuclear and nonnuclear fires or by a limited objective counterattack. Well planned and widespread use of barriers, to include chemical munitions, assists in gaining time and in avoiding close pursuit.

(3) When required and authorized, surface or subsurface nuclear detonations of atomic demolition munitions (ADM), are employed to create obstacles and contaminated areas, to slow or impede the enemy's advance.

(4) Detailed plans are prepared for conventional and atomic demolitions along enemy avenues of approach and those routes which lead into the division zone. Particular attention is given to the destruction of bridges and tunnels. Demolitions are placed in defiles and on routes traversing natural and artificial obstacles. Demolition plans include:

(*a*) Provisions for placing and firing the necessary demolitions.

(*b*) Provisions for adequate guards to prevent premature firing of charges or seizure by enemy infiltrators.

(*c*) Fixed responsibility for the destruction of bridges.

(*d*) Schedule for destroying bridges no longer needed by friendly forces.

(*e*) Covering by fire, including nuclear fire, those obstacles created by demolition.

(*f*) Provisions for destruction of supplies and equipment that cannot be evacuated.

(5) The destruction of bridges is of major importance to the retrograde force commander. Care is exercised to insure that bridges are not blown prematurely or that they are not seized intact by the enemy. To accomplish this, responsibility for blowing bridges within his zone is delegated to the tactical commander. A demolition firing party and a demolition guard are designated for each bridge to be blown. The guard commander has the authority to destroy the bridge, subject to conditions established by the higher commander. A list of all units that are to use the bridge is furnished the guard commander. Each unit commander notifies the guard commander when his unit has cleared. After the main body has crossed, the majority of the bridges in the zone are destroyed. Certain predesignated bridges are left for use by security elements. The demolition guard commander is responsible for destroying the bridge to prevent its capture by the enemy, but will do so only in accordance with the provisions of the demolition plan.

*b. Corps Engineer Units.* Corps engineer units have two basic missions in retrograde operations. First, they enhance the movement of the friendly force by keeping open the routes of withdrawal; and second, they impede the advance of the enemy through planned destruction of installations, supplies, and structures. The preparation and execution of demolitions and the creation of minefields are carried out on order in accordance with the corps plans. Corps engineer units may be directed to prepare defensive positions and barriers in the rear area of divisions to assist in achieving their delay mission. Priorities for engineer work are established by the corps.

*c. Army Engineer Units.* Engineer units under field army control are employed to improve the main routes of withdrawal, to construct bridges at critical points, or to begin preparation of the new defensive position. In planning the support of the retrograde operation, close coordination with corps is required to insure adequate logistical support for the corps tactical plans with minimum loss, destruction, or unnecessary movement of supplies.

## 5-4. Reconnaissance

Engineer reconnaissance in a retrograde

movement emphasizes the collection of advance information on roads, bridges, terrain, installations, and natural resources in the territory through which the move will occur. Normally this is familiar territory, having been in friendly hands, and detailed reconnaissance reports are obtainable through intelligence and engineer channels.

# CHAPTER 6

# OTHER OPERATIONS

## Section I. RIVER CROSSING OPERATIONS

### 6–1. Planning

Selection of crossing sites and areas for river crossings must be made with due regard to tactical objectives as well as technical considerations applicable to such sites, and the crossing means available. Unit engineers (task force, division, corps, and army) participate in all phases of planning. The primary engineer objective is to provide and maintain sufficient crossing means to displace combat power to the far bank rapidly; in time to counter any enemy reaction; and in sufficient strength to defeat enemy forces. Toward this end, plans should provide for use of multiple dispersed crossing means to increase probability of success and to reduce the vulnerability of the operation, particularly against the threat of mass destruction weapons; and the use of smoke during the construction of bridges to establish decoys and large area smoke screens for the actual multiple crossings. Plans normally should include provisions for rafts or ferries to permit early crossing for armor, artillery, and other necessary elements. Unit engineers must assure that special attention is given to selection of assembly areas and routes for engineer units and materiel, and the plans for integration of assault units, combat engineers, and equipment support units. Plans should also provide for use of the combat engineer vehicle (CEV) (app. E).

### 6–2. Intelligence

Data produced by strategic intelligence agencies and higher engineer echelons are furnished to lower echelons before and during the advance to the river. Emphasis is placed on information needed by engineers to solve the technical problems of rafting and bridging operations. For the information required to produce the essential intelligence for a river crossing see FM 31–60.

### 6–3. Crossing Means

*a. Divisional Engineer Battalions.*

(1) *Infantry, infantry (mechanized), and armored divisions.* Each of the divisional engineer battalions of the infantry, infantry (mechanized), and armored divisions has an organic bridge company. This company is equipped with either the mobile assault bridge (143 meters of floating bridge or four self-propelled ferries), or the M4T6 bridge (170 meters of floating bridge or eight rafts), or the class 60 bridge (164 meters of floating bridge or four rafts). In addition, each company has assault and reconnaissance boats, and light bridge equipage which may be used for class 12 ferries or floating bridge, and six armored vehicle launched bridges (AVLB) for spanning short gaps up to 18.3 meters wide.

(2) *Airborne and airmobile divisions.* The engineer battalions of the airborne and airmobile divisions have no organic bridging equipment. However, their personnel are trained in bridge erection and they can support river crossings if furnished the necessary bridging.

*b. Engineer Companies, Separate Brigades.* The engineer companies of the separate armored, infantry (mechanized), and infantry brigades have about one-half the bridging capability of their corresponding divisional battalions.

*c. Engineer Float Bridge Company.* The engineer float bridge company is equipped with either the M4T6 bridge (216 meters of floating bridge or ten rafts) or the class 60 bridge (204 meters of floating bridge or five rafts). The company also has light bridge equipage which may be used for class 12 floating bridges and rafts, 70 pneumatic assault boats, and a floating foot bridge.

*d. Engineer Assault Bridge Company, Mobile.* This company is equipped with the mobile floating assault bridge (up to 212 meters of floating bridge or six self-propelled ferries) and three AVLB's.

*e. Engineer Panel Bridge Company.* The panel bridge company is equipped with the fixed panel bridge, normally used in the latter stages of a river crossing.

*f. Other Crossing Means.* Other crossing means which may be employed are helicopters; deepwater fording vehicles; armored personnel carriers, amphibious vehicles (LVTP), and other swimming vehicles; cableways; and expedient bridges, rafts, and ferries.

## 6–4. Crossing of Opportunity

When the retreating enemy leaves a means of river crossing intact or quickly repairable, a crossing of opportunity is exploited to the maximum. Bridges, fords, underwater bridges, ferries and rafts, found available upon arrival at the river are quickly inspected by engineer personnel for demolitions and evaluated for capacity. Bridges and other means of crossing prepared by the enemy for demolition are quickly neutralized. The river and its approaches, bottom, and exits are checked for mines which are quickly neutralized. Vehicular bridges are hastily repaired or reinforced to carry division loads. Railroad bridges, left intact, are temporarily converted to vehicular bridges, when possible, by the addition of necessary flooring to accommodate wheeled or tracked vehicles. Temporary replacements of demolished spans may be accomplished by the use of the AVLB, sections of the M4T6 or class 60 bridges, or by sections of the panel bridge.

## 6–5. Hasty Crossing

Compared with a crossing of opportunity, which is a product of routine offensive operations, a hasty crossing is a nonroutine offensive operation required when crossing of opportunity fails to materialize. A hasty crossing is characterized by speed; surprise; decentralization of control of specific crossing times for subordinate assault forces; minimum loss of time and momentum by the assault forces; and by the absence of detailed preparation. In a hasty crossing the organic bridge company of the divisional engineer battalion provides the river crossing means (assault boats, light and heavy rafts, and bridges) for the initial assault forces of the division. It is relieved as soon as possible by corps engineer bridge units when the bridgehead has been developed and expanded. When relieved it retrieves its boats and bridge equipage or obtains replacements and moves forward with the division.

## 6–6. Deliberate Crossing

A deliberate crossing, like the hasty crossing, is a nonroutine offensive operation. It is characterized by detailed planning and preparation, and by a buildup of the required assault forces and crossing means to overcome the enemy defense of the far shore. It is expected when a hasty crossing is impractical or has failed. All available crossing means are employed. By sequence of operation, movement across the river may be by amphibious or fording vehicles, helicopter, assault boats, floating footbridge, raft, light tactical bridge and finally, by heavy float bridge. In a deliberate crossing the organic bridge company of the divisional engineer battalion may be engaged in the initial assault. However, the bulk of the engineer support in a deliberate crossing comes from corps engineer combat groups. This allows the bridge company and the other units of the divisional

engineer battalion to move forward with the advancing division to provide close support. A corps engineer combat group normally supports each division making a crossing. Its float bridge company provides the boats, bridges, and rafts and its engineer combat battalions provide the personnel possessing the specialized techniques and knowledge of "task organization," such as rear area fabrication, serial transport of rafts and bridge sections, and quick loading

and unloading procedures which insure rapid construction. Heavy float bridging is readied and brought forward for use as the attacker reaches the river line. This decreases the loss in attack momentum and obviates the necessity for separating light and heavy combat equipment. Other units from the group which may be used in a deliberate river crossing are the light equipment companies which provide erection aids, and dump truck companies which provide additional transportation. In addition to the support from corps, attachment of additional engineer troops from army may be required. In such instances, the additional troops are attached to the corps engineer groups and employed as needed. The engineer amphibious brigade may also be used to support combat units in large-scale river-crossing operations by supplementing the corps engineer river-crossing capabilities. It is held at theater level for employment as required in any or all phases of a deliberate crossing and is normally made available on a task basis.

## 6–7. Employment

The preservation of the integrity of the engineer units and normal unit association are particularly desirable for river-crossing operations. There may not be enough divisional engineers, however, for these direct support tasks, and assistance from the corps engineer unit will be required. Ideally, the divisional engineer units support the brigades they normally support, both in crossing and in the assault on the far shore. The nondivisional engineers are allocated such tasks as the installation or erection of fixed and floating bridges, and road work. They relieve the divisional engineers of rear area tasks, initially on the near bank and progressively on the far bank as the attack advances. In a small-scale operation, if the situation requires the use of assault boats and foot bridges, the divisional engineer might be given the attendant duties, in addition to their forward support tasks. The engineer capability is severely taxed during a river-crossing operation. Therefore, specially trained teams of other arms and services may have to undertake the breaching of minor obstacles, particularly those encountered unexpectedly on the far bank.

## 6–8. Control

The division engineer is the responsible engineer in a division river-crossing operation as in any other special operation where additional engineer support is required. His knowledge of the procedures and the capabilities of the divisional units and the division's method of operation makes him the engineer who can best recommend the location, employment, and strength of the engineer support. He is responsible for the technical plans for the crossing the division. He determines the engineer assistance required and works closely with supporting engineer unit commanders in the coordination of the engineer support for the crossing. Divisional engineer troops accompanying the assaulting force may be in direct support, or under certain conditions attached—the attachment ending as soon as possible. Corps engineer troops, aiding in the crossing of the assaulting forces may be attached to or in direct support of the division. When in a direct support role these units remain under the command of the engineer group commander.

## 6–9. Duties and Responsibilities

The general mission of the engineers in a river-crossing operation is to furnish engineer support to the assaulting troops before, during, and immediately after the crossing. This may include:

*a.* Construction, maintenance, and repair of road nets and routes of communication.

*b.* Removal of mines and other obstacles.

*c* Construction of ferry and bridge approaches.

*d.* Operation of assault boats.

*e.* Construction of foot bridges.

*f* Construction and operation of ferries.

*g.* Installation of vehicular bridges, floating and fixed.

*h.* Construction of near-bank entrances and far-bank exits for swimming and fording vehicles.

*i.* Construction of bridge protective devices.

*j.* Construction of dummy bridges for deception purposes.

*k.* General engineer work, including construction of assault POL pipelines and hoseline

systems, production of potable water, camouflage supervision, and demolitions.

*l.* Providing terrain and military hydrologic data and flood forecasting services.

## 6–10. Special Considerations

*a. Mobile Assault Bridge (MAB).* When available in divisional or corps engineer units, the mobile assault bridge should be employed to the maximum practicable extent in all forms of assault river crossings. It provides the division engineers with a rapid means of assembling rafts and assault bridges eliminating the necessity for large construction sites along the river banks. Because the MAB is intended for use as a rapid means of assault crossing of a river barrier, it is not intended that it remain in place over a prolonged period of time. The MAB ferries and bridges should be replaced with the M4T6 or class 60 floating bridge or fixed bridges as rapidly as possible to permit the MAB units to rejoin the division for further use at assault crossing sites.

*b. Supply.* A reserve of engineer equipment is necessary to insure that the river-crossing means are kept in operation. Engineer combat groups supporting the divisions may require more than organic bridging material for the construction of the planned bridges. In addition, adequate additional material should be placed near the bridge sites to maintain the bridges after they have been built to replace damaged or destroyed bridges or material. This prevents the organic equipment of the engineer groups from being dissipated in maintenance operations. Based on the recommendation of the corps engineer, corps G4 arranges with army G4 for the establishment of such engineer bridge parks or dumps.

*c. Traffic Regulation and Control.*

(1) Traffic regulation and control is of great importance during a river crossing. During the initial stages of the crossing, traffic regulation and control is an operational matter and is a responsibility of the G3. All changes to the crossing plans are coordinated in the tactical operations center (TOC) and instructions are given to the traffic headquarters where the technical details are resolved. Engineer regulating points are established by the responsible engineer headquarters to insure proper use of the river crossing means. These regulating points are responsible for—

(*a*) Examination of vehicles to detect improper loading technique, weight, or dimensions.

(*b*) Recommendation for rerouting or halting of certain traffic when technical difficulties make one or more of the crossing means inoperable, or curtail its carrying capacity.

(*c*) Assistance to the traffic headquarters in maintaining maximum traffic density.

(*d*) Provision of the correct classification of each crossing means to the traffic headquarters.

(2) When sufficient forces are across the the river and the bridgehead has been secured and expanded, traffic regulation and control reverts to the joint staff supervision of the G3/G4.

# Section II. COMBAT IN FORTIFIED AREAS

## 6–11. General

A *fortified area* is one containing numerous defensive works. These may include fortified weapon emplacements or bunkers, protected shelters, reinforced natural or manmade caves, entrenchments, and obstacles. Depending on its location, extent, and depth, a fortified area and its parts may be classified as follows:

*a. Fortified Locality.* A grouping of defensive works about a single location, either without regard to any other defensive system, or as a part of a large defensive system.

*b. Fortified Position.* A series of strongly organized localities disposed in width and depth in such a manner as to be mutually supporting. Exceptionally, it may be a single, strongly organized locality.

*c. Fortified Belt.* A linear grouping of fortified positions.

*d. Fortified Zone.* A system of fortified positions extending laterally and in depth, normally consisting of two or more fortified belts.

## 6–12. Description

*a.* Fortified works of some nature are always constructed when military forces have a defensive mission. Depending on the time and resources available for construction, fortified works may range in complexity from simple positions hastily prepared with locally available material to large permanent-type works in organized and integrated belts or zones. Permanent-type works include concrete bunkers with thick walls, fixed embrasures or steel turrets, intricate underground passages, and elaborate troop quarters. These are unlikely to be constructed in normal operations due to their great expense in time, material, and manpower, and the fact that they may be bypassed by attacking forces. Consistent with the frequent movement of units on the modern battlefield, log or earth bunkers and field fortifications are more commonly used.

*b.* Log or earth bunkers, emplacements, and shelters may be constructed from locally available materials and provide good protection for personnel and weapons, depending on the depth of construction and the strength and thickness of the overhead cover. They afford protection to some degree from nuclear weapons effects and chemical and biological agents. For details of construction see FM 5–15.

## 6–13. Sequence of Attack

*a.* Infantry tactics in the attack of a fortified area, including employment of supporting troops and weapons, are discussed in FM 31–50 and FM 100–5. The basic attack unit for such an attack is the infantry platoon. Supporting units may include artillery, airborne, antiaircraft, armored, chemical, and engineer troops, as well as combat aviation. The duties of engineers in such attacks are fundamentally an application of the techniques of surmounting or breaching obstacles as an integral part of a combined arms team.

*b.* The attack of a fortified area can be divided into four phases. These phases often overlap and are:

(1) Reducing the hostile outpost system and developing the attack.

(2) Breaking through at the most favorable point.

(3) Extending the gap by isolating and reducing hostile emplacements on its flanks.

(4) Moving mobile reserves through the gap, to complete the encirclement and isolation of the remaining fortifications, while continuing to attack from the front.

*c.* Immediate exploitation of success is imperative in each phase. If the position is organized in depth, the attack must proceed to the second line of fortifications as soon as possible after breaking through the first. The same techniques are used in reducing a second line as in the case of the first line.

## 6–14. Engineer Missions

*a.* During the attack the principal mission of the engineers is breaching the outer and larger obstacles which protect the main fortified positions. Reduction of weapons emplacements, bunkers, and pillboxes, and the clearing of close-in and minor obstacles, are the mission of specially organized and equipped infantry squads which lead the attack. This means that the effective gapping of a strong enemy fortification system requires close coordination between the engineers, who gap the line of obstacles, and the infantry, who reduce the fortifications. The demolition guns of combat engineer vehicles (CEV) are effective for neutralization or reduction of enemy installations and fortifications. Combat engineer vehicles may be assigned to attack enemy targets which otherwise would require the use of infantry-engineer assault troops on foot. Tank dozers may also be used in lieu of combat engineer vehicles. For details on CEV see appendix E.

*b.* After the fortified line has been breached, the primary engineer task is creating and maintaining routes to and through the gap for personnel and combat vehicles. Engineers also render captured forts or pillboxes unsuitable for reoccupation.

*c.* Depleted engineer teams and units are replaced by fresh elements as operations progress. Corps engineer combat units may be employed to reinforce or replace divisional engineers, or to support follow-on forces in widening initial gaps or mopup operations.

## 6–15. Reconnaissance

*a. Preliminary Study.* Before the attack begins, a preliminary engineer study is made of the terrain, bridges, routes of communication, and artificial obstacles such as minefields, tank traps, and emplacements. The technique of attack and the requirements for engineer breaching personnel, supplies, and subsequent reconstruction, are planned from this study. Information for the study may come from various sources, of which ground reconnaissance is the most satisfactory. For areas beyond the reach of ground reconnaissance parties, information must come from aerial imagery and other sources. Additionally, engineer topographic units prepare large-scale maps of the fortified area.

*b. Ground Reconnaissance.* Ground reconnaissance before the attack should, if possible, cover obstacles in front and on the flanks of the enemy main battle position. Minefields are reconnoitered to determine their extent; the type of mines; the presence of gaps in the field, and whether and how they are marked; possible bypasses and approaches; and the location of defending weapons and contaminated areas. The reconnaissance parties seek to determine the portions of the obstacles which are best adapted for clearing operations, either because of their weakness or because they are not well covered by fire. When the reconnaissance is completed, the engineer makes recommendations as to the locations where enemy barriers will be breached.

*c. Organization of Reconnaissance Parties.* Reconnaissance of enemy obstacles requires careful organization and skilled execution. Normally it is done by the troops who are to breach the obstacles. Parties are given definite routes and areas, and are carefully instructed in their duties and, if necessary, rehearsed. Personnel are briefed on all information which has already been obtained. Parties are made as small as possible, since secrecy is of primary importance, both to conceal the intentions of our force and for the safety of the parties themselves.

## 6–16. Engineer Clearing Parties General

The strength, organization, equipment, and means of transportation for each clearing party are carefully planned, on the basis of its mission and the nature of the obstacles. Parties may be organized to clear obstacles in front of the enemy position at the beginning of the attack; to clear obstacles encountered within the enemy position as the attack progresses; or to dispose of obstacles already passed by the leading elements. Parties must have the same mobility as the units they accompany. Parties which accompany infantry are moved as far forward as practicable in their own transportation. Supplies carried are carefully planned to provide all essentials and eliminate nonessentials.

## 6–17. Duties of Engineer Clearing Parties

Clearing parties normally are organizing into task groups. When the obstacle to be breached is formidable and complete information about it is available, the task groups may be highly specialized, each one being instructed in detail and rehearsed in the performance of its precise duties. However, a flexible organization is needed to deal with obstacles encountered after the attack begins and on which there is little or no advance information. A typical party of this sort might contain small groups as follows:

*a.* A group to precede the breaching personnel and clear antipersonnel mines.

*b.* A group to breach or otherwise neutralize the obstacle.

*c.* A group to mark the boundaries of the gap and the routes between successive gaps.

*d.* A group to provide local security.

*e.* A group to lay smoke screens to obscure the operations of the party.

*f.* A contingent to furnish replacements or reinforcements to the other groups.

## 6–18. Training for the Attack

Training for the attack is concentrated in two parts: technical training and rehearsals for all troops to be used in the attack.

*a. Technical Training.* Technical training is training in the special techniques, weapons, and equipment to be used. Engineers construct mockups and help train the infantry assault units to use demolitions to pass obstacles.

*b. Rehearsals.* The technical training and coordination of all troops concerned are continued during rehearsals. Whenever possible, troops rehearse until perfection is obtained, on ground similar to that over which the attack is to be made to include simulated enemy works. Care must be taken that training areas, if observed by enemy or infiltrators, do not disclose tactical planning.

# Section III. COMBAT IN BUILT-UP AREAS

## 6–19. General

Built-up areas containing solid masonry or concrete and steel structures modified for defense purposes resemble fortified areas. They consist primarily of cities containing blocklike construction or those areas consisting of large complexes of industrial structures. Such areas are conspicuous typographical features for which details are usually available. They offer cover and concealment for troops and weapons. Built-up areas may be untenable because of their susceptibility to neutralization or destruction by conventional or nuclear munitions. These areas are also vulnerable to neutralization by chemical or biological munitions. Extensive subterranean systems may provide the defender with additional protection. Built-up areas reduced to rubble retain their defensive characteristics and restrict the use of motorized or mechanized forces. Fighting in built-up areas is characterized by close combat, limited fields of fire and observation, canalization of vehicular movement and difficulty in control of troops. In employing nuclear weapons, the effect on the civilian population must be considered and plans made for their control and evacuation. See FM 31–50 and FM 41–10. Previously published and specially prepared town and city intelligence studies will provide advance information on built-up areas.

## 6–20. Sequence of Attack

*a.* Tactics in the attack of a defended built-up area, including the employement of supporting troops and weapons, are discussed in FM 31–50 and FM 100–5. The control of attacking units is usually decentralized because of restrictions on communication and observation caused by building interference. This results in semi-independent small unit actions of platoon and company size.

*b.* The attack of a built-up areas is divided into three phases:

(1) Phase I is designed to isolate the area by seizing terrain features dominating the approaches to it.

(2) Phase II consists of the advance to the edge of the built-up area and the seizure of a foothold in buildings on its near edge to eliminate the defender's ground observation and direct fires on the approaches to the town.

(3) Phase III consists of the advance through the built-up area to clear it of the enemy.

## 6–21. Engineer Missions

*a.* Attached or supporting engineers are employed well forward and will frequently be with the lead units.

*b.* Missions accomplished by the engineers may include:

(1) Preparation and execution of demolition for use in breaching walls or other obstacles. This includes employment of the combat engineer vehicle with its demolition gun.

(2) Location and assistance in mine and boobytrap removal.

(3) Clearance of barricades, rubble, and debris to assist forward movement and resupply.

## Section IV. AIRBORNE OPERATIONS

### 6–22. General

The construction, improvement, rehabilitation and maintenance of airfields and landing facilities are primary concerns of the supporting engineer elements in an airborne operation. The growth in weight and size of assault aircraft in recent years greatly compounds the problems of site selection, planning and design, surfacing requirements, and construction operations. The published operational capabilities of air force medium cargo aircraft for short takeoff and landing (STOL) operations may lead to false interpretations in establishing minimum size and grading requirements for new airfields, or in evaluating the capacity of existing airfields. At certain operational weights these aircraft can operate a limited number of times on relatively short rough airstrips having weak subgrade soils. However, the required mission generally dictates several hundred sorties within a short period of a few days. This high operational frequency requirement in turn imposes much more rigorous requirements for safety considerations (glide angles, clearances, grades, and smoothness) and for airfield size and strength considerations (runway length, parking areas, and surfacing materials). Under anything but the most favorable terrain and environmental conditions the airborne divisional engineer battalion should be reinforced by equipment and personnel from such units as an engineer airborne light equipment company to produce acceptable facilities within the timing usually imposed by typical tactical situations. If the tactical plan calls for air delivery of supplies beyond the airhead by a combination of aircraft systems, the qualitative requirements for individual airstrips and landing areas become much less elaborate, but site selection often becomes critical. This results from the fact that to be effective the location of delivery areas must be in immediate proximity to relatively small ground units wherever those units may be. If appropriate to the airhead development plan, air landed nondivisional engineer troops from corps or army may be given responsibility for development of the airfield and air landing facilities or for continuing development after initial work by the airborne division engineer battalion. Such employment would be highly desirable where the scope of other combat engineering tasks is so great as to be beyond the capabilities of divisional engineer battalions. For a discussion of airfield reconnaissance and construction, see FM 5–36 and TM 5–330.

### 6–23. Planning

The key factor in successfully developing an airhead and an air delivery plan is related to the ability to perform site selection remotely; i.e., from terrain intelligence data without ground reconnaissance. Within the tactical plan, and in consideration of the proposed location of drop zones, maximum advantage must be taken of existing airfield facilities. Further, the best sites in a given area from the standpoint of soil, topography, vegetation, and weather conditions may not permit development within the time limitations imposed by a tactical plan. Here the engineer planner must work closely with the operational planner to either increase the engineer force or lengthen the permissible construction time. The planning cycle will normally involve the following considerations:

*a.* Establishment of minimum facility requirements to satisfy logistic and tactical requirements.

*b.* Study of terrain data to evaluate the capability of existing airfields, and selection of sites that will permit the additional construction or improvement within the tactical time and general location limitations. (This involves remote interpretation of requirements for clearing, grubbing, grading, soil stabilization, drainage, and surfacing material.)

*c.* The tailoring of an engineer troop and equipment force capable of performing the required construction.

*d.* The planning of aircraft loading and scheduling for air drop and air landing delivery to the airhead.

### 6–24. Employment

One engineer company of the divisional engineer battalion (airborne) normally is at-

tached to each brigade for the airborne assault, reverting to battalion control as early as possible after the assault. The remaining companies are kept under battalion control. Construction equipment and operators that are organic to headquarters and headquarters company are attached to the engineer lettered companies of the battalion as required.

### 6–25. Organization for the Assault

*a.* The engineer battalion is normally organized into three echelons—

(1) The assault echelon includes the bulk of the engineer battalion and contains the personnel, equipment and material from the headquarters and headquarters company, and the airborne engineer lettered companies required to support the initial assault. This echelon enters the objective area by parachute or air landing, or a combination of both.

(2) The followup echelon includes personnel and equipment (less the rear echelon) not initially brought into the objective area. The followup echelon normally joins the assault echelon as soon as practicable by air or surface means, or by a combination thereof.

(3) The rear echelon consists of the administrative personnel who are normally incorporated into a divisional pool and left in the departure area. In an operation of long duration, the rear echelon may be brought into the airhead to support subsequent operations.

*b.* The battalion is brought under centralized control as soon as practicable in order to more efficiently perform its supporting tasks.

### 6–26. Operations

*a.* Airborne operations involve assault from the air and require a high order of audacity, timing, and coordination. The combat forces normally enter combat by a combination of parachute assault and air landing. The mission and plan for tactical operations of the airborne force, terrain, weather, and the enemy situation and capabilities must be considered in assigning engineer troops supporting missions. The engineers may have to meet concurrent and pressing demands for engineer work of both an offensive and defensive character, often interrupted by the need to fight to defend themselves and their worksites.

*b.* The initial tasks of those elements of the engineer battalion in the assault echelon may include removing obstacles from or improving existing airfields or air landing facilities; initiating construction of air landing facilities on predesignated landing zones; executing limited demolitions and hasty obstacle construction; and, on a limited scale, neutralizing minefields and enemy prepared demolitions, stream-crossing tasks, expedient bridge construction, and minor bridge repair.

*c.* No two situations will be the same. The engineer battalion commander must prepare his unit to meet any possible emergency and his plans must be flexible. A typical sequence of engineer activities after the assault echelon lands in the objective area would be assembly of personnel and equipment into predetermined work parties followed by immediate execution of preplanned tasks. Water points should be established and initial routes of communication should be opened as soon as practicable. Necessary adjustments to initial plans must be made as the situation develops.

*d.* As the situation stabilizes, the duties of the airborne engineer battalion become similar to the duties of the other divisional engineer battalions in their support of normal ground operations. After the airhead has been firmly established, airborne units are either relieved to permit preparation for subsequent airborne assault or continue further ground operations.

## Section V. AIRMOBILE OPERATIONS

### 6–27. General

Airmobile operations are operations in which combat forces and their equipment move about the battlefield in aircraft under the control of a ground force commander to engage in ground combat.

### 6–28. Airmobile Force

An airmobile force is a force composed of ground combat elements combined with army aviation elements to conduct airmobile operations. Actual composition of the force is dictated by specific mission requirements. The force must contain a ground combat element; it may also contain one or more support elements from the other arms and services. Normally, engineers are as essential element of an airmobile operation.

### 6–29. Characteristics of Airmobile Operations

Airmobile operations are similar to other ground combat operations but differ in the following respects:

*a.* Airmobile operations usually are executed in lightly defended areas or after a preassault nuclear or nonnuclear preparation with the advantage of initial tactical surprise.

*b.* Airmobile forces can land directly on, or adjacent to, their objectives.

*c.* Airmobile forces are particularly vulnerable during landing and assembly.

*d.* The types and amounts of heavy equipment that can be taken into the objective area are limited.

*e.* Airmobile forces have the ability to conduct operations readily in otherwise inaccessible areas.

*f.* Airmobile forces are particularly vulnerable to enemy armor due to their limited ground mobility and firepower in the objective area.

*g.* Airmobile operations require air superiority in the objective area and suppression of enemy antiaircraft fire.

*h.* Adverse weather restricts airmobile operations more than it restricts ground mobile operations.

### 6–30. Engineer Support

*a. Offensive Operations.* In offensive operations, engineers are used for obstacle reduction, and for preparing and improving helicopter landing sites and airplane landing strips. They are also used for other tasks similar to those of the divisional engineer battalion in the offense.

*b. Defensive Operations.* In defensive operations, engineers are used for obstacle construction, demolitions, or special operations required during the defense.

## Section VI. AMPHIBIOUS OPERATIONS

### 6–31. General

Basic guidance for participation by army army forces in amphibious operations is contained in FM 31–12 and FM 5–144. Engineer units, as part of an army landing force, perform basic engineer tasks which do not differ appreciably from those performed in normal land operations, but include additional tasks requiring special organization and equipment because of the nature of amphibious operations. In an amphibious assault, a landing beach is itself an obstacle to be breached and crossed. Beach support area facilities must be constructed or improved to permit a continuous landing of forces and a progressive establishment of combat service support means ashore.

### 6–32. Organization for the Assault

*a. Divisional Engineer Units.* Elements of divisional engineer battalions are included in landing teams formed by assualt divisions. The composition of landing teams will vary with the situation; however, a brigade landing team normally will include an engineer company, elements of which will be further attached to infantry, armored, or infantry (mechanized) battalions. One of the first tasks of combat engineer teams landing in the initial assault waves is the clearance of gaps through minefields and other beach obstacles. Once ashore, the remainder of the divisional engineer battalion is employed on normal combat support tasks.

*b. Nondivisional Units.* Engineer combat battalions, army, are attached to assault divisions as required to supplement the divisional engineer effort. Elements of the engineer amphibious brigade (EAB) (see app. B for organization, mission, and capabilities) also are

attached to assault divisions and provide command and control of shore parties formed at division and subordinate landing team levels. The engineer amphibian assault companies provide amphibian mobility for the assault landing forces. Engineer units required to develop and operate beach support area facilities for support of the landing force normally will be included in shore parties at landing force or assault division level.

### 6–33. Base Development

A landing force commander may be responsible for initiating base development projects essential to the support of the operations in progress and for forces landing after termination of the amphibious operation. Engineer construction units involved in base development projects may not be included, however, in shore parties. If the landing force commander assigns responsibility for initiation of base development projects to a subordinate division commander, he normally will attach the required engineer construction units. Alternatively, construction units may be attached to a subordinate division for landing only and remain responsible to the landing force or appropriate engineer commander for accomplishment of their construction mission. For example, elements of an engineer construction group may be attached to a division for the landing only, with the mission of initiating port construction under the command of the engineer group commander.

## Section VII. ENGINEERS IN COUNTERINSURGENCY OPERATIONS

### 6–34. General

*a.* Counterinsurgency is defined as those military, paramilitary, political, economic, psychological, and civic actions taken by a government to defeat subversive insurgency. To combat insurgency which may arise in nations friendly to the U.S., the U.S. Army Counterinsurgency Forces have been developed. These forces are comprised of Special Action Forces, other U.S. Army units, and elements or personnel trained and designated for a counterinsurgency mission assignment.

*b.* In the initial phase of an insurgency, U.S. engineer personnel are provided to host countries (receiving state) as mobile training teams (MTT) and are normally under the operational control of the Military Assistance Advisory Group (MAAG) or of the Special Action Forces (SAF). These teams generally augment existing in-country U.S. Army Forces and are responsible for—

(1) Training host country engineer units.

(2) Providing advice to host country military engineer forces and civilian communities, to include advice on civic action programs of an engineer nature.

(3) Making surveys within the country to assist the host country in its struggle against insurgency; and to provide information required to support possible future U.S. assistance to the government in case the insurgency escalates.

*c.* In the event the insurgency escalates, U.S. Army engineer personnel and units are employed to—

(1) Support the military forces of the host country in an operational role.

(2) Support any of the U.S. military forces committed.

### 6–35. Engineer Units in Counterinsurgency

Any of the engineer units listed in appendix B may be employed when required to support counterinsurgency operations, including the teams listed in TOE 5–500 (see especially K series teams). These units are organized and possess a wide range of capabilities to provide training and operational assistance to a host country's indigenous forces and other agencies in support of a counterinsurgency effort.

### 6–36. Employment of U.S. Army Engineers

*a. General.* Engineer advisors, teams or units may be required to support counterinsurgency operations in a host country at all levels of intensity of subversive insurgency. Engineer support must be closely coordinated with other U.S. agencies to insure efficient pro-

graming. Coordination and free exchange of ideas with the local civil authorities is of equal importance. Whenever possible, projects should be set up as joint enterprises between indigenous military and civil forces. Engineer units may be deployed separately to a host country for the accomplishment of specific projects or with a counterinsurgency task force. In many situations, engineer functions will involve pioneer tasks accomplished with local materials and limited equipment. Improvisation and the use of field expedients will be the rule rather than the exception. To fulfill his combat role the engineer must be thoroughly familiar with the tactics and methods of the insurgent force and with the methods used by a counterinsurgency force.

*b. Engineer Combat Role.* In those areas of a country where the level of insurgency has escalated and the defeat of the insurgents requires major military action, engineer units or advisory teams may be employed to—

(1) Provide technical service support and/or combat support to indigenous forces engaged in combat.

(2) Provide advice and training to counterpart forces, in order that these forces may take over combat support missions.

(3) Provide operational assistance to indigenous paramilitary forces with emphasis on the development of field fortifications for secure villages and communications centers.

(4) Construct and repair major roads, bridges, landing strips and helipads in forward or remote areas: Construct railroads and waterways, and operate ferries when these projects contribute directly to the combat effort of indigenous forces.

(5) Advise, assist, and train indigenous military and paramilitary forces in neutralizing guerrilla mines and boobytraps, clear vegetation, and destroy facilities useful to guerrillas.

(6) Provide mapping, geodetic and hydrologic services.

*c. Engineer Contribution to Civic Action.* The following list is considered representative of engineer tasks:

(1) Construction of simple irrigation and drainage systems.

(2) Reclamation of land by clearing and draining swamps.

(3) Grading operations.

(4) Forestry activities such as planting, thinning, and reforestation.

(5) Setting up and operating saw mills.

(6) Devising and constructing flood controls.

(7) Assessment and development of acceptable sand and gravel resources for road work and general construction.

(8) Construction of housing and other buildings.

(9) Construction, repair, or improvement of roads, bridges, railway equipment, and airfields.

(10) Improvement of sanitary conditions.

(11) Devising acceptable methods of disposing of human waste when this waste is not used for fertilizer.

(12) Providing safe water supply systems.

(13) Providing technical training to indigenous military personnel which will be useful to them upon their return to a civilian status.

(14) Preparation of necessary maps and charts as required for planning road, railroad, and airfield projects; irrigation and land development; political subdivisions and geographical features; and land use.

(15) Construction, repair, and operation of utility systems.

*d. References.* For a more detailed discussion of counterinsurgency, see FM 31–22 and FM 100–20.

## Section VIII. DENIAL OPERATIONS

### 6–37. General

A denial operation is an operation designed to prevent or hinder the enemy occupation of, or benefit from, areas or objects having tactical or strategic value. A theater or theater army denial policy is normally the basis for detailed denial planning in the combat zone. It is command responsibility, with authority usually delegated to subordinate commanders to effect denials as a normal activity within their areas, subject to the limitations and directives published by higher headquarters. The general and special staff responsibilities for denial operations plans are the same as those for barrier plans. Denial operations involve the removal, damaging, or destruction of objects, or the denial of ground through the use of mines, flooding, chemical agents, or demolitions. In a retrograde movement the division commander, acting under orders and policies of higher authority is responsible for preparing and executing a plan for denial operations in his area. In the division, denial operations are normally incorporated in the barrier plan.

### 6–38. Engineer Role in Denial Operations

The divisional engineer battalion, the army engineer battalion, and the atomic demolition teams of the engineer service organization (TOE 5–500) are exceptionally well suited and equipped to participate in, supervise, and execute denial operations by reason of their training and organic equipment. All troops, however, participate in certain aspects of a denial operation, including the destruction of organic equipment and supplies, procedures for which are normally a part of their unit's SOP. Engineer units may be required to instruct nonengineer units engaged in denial operations in demolition operations and techniques. Because of their equipment, which includes a winch, a dozer blade, and a 165-mm demolition projector, the combat engineer vehicles (CEV) organic to the divisional engineer battalions and to the separate engineer combat companies are particularly valuable in a denial operation. For further information on denial operations, see FM 31–10.

# CHAPTER 7
# ENGINEER OPERATIONS UNDER SPECIAL ENVIRONMENTAL OPERATIONS

## 7-1. General

Abnormal environmental conditions can change or even eliminate some aspects of engineer operations. Although engineer units are equipped with materiel designed for use within a wide range of conditions, in environmental extremes specialized equipment, techniques, and procedures are sometimes necessary. When the organic equipment is inadequate, inoperable, or of insufficient quantity, the unit equipment may be augmented by conventional equipment or modified by specialized materiel. Engineer commanders and staff sections of all echelons study all environmental factors, real or anticipated, to determine how troops should be trained and equipped.

## 7-2. Operations in Areas of Extreme Cold

*a. General.* Deep snow and extreme cold are found in the arctic and subarctic zones, the fringes of the temperate zone contiguous to these areas, and at high altitudes in all zones. The areas in which these conditions exist vary extensively in population. The subarctic and arctic regions of the world constitute the largest areas of deep snow and extreme cold. An additional characteristic of these areas is the obstacle to movement created by thaws. The conduct of operations in such areas will require the application of special techniques and equipment and will be affected by the following factors:

(1) During the winter, cold, snow, frozen waterways, permafrost, frequent high winds, and continuous darkness or short periods of daylight prevail. These factors create problems, such as constant need for shelter and heat, increased dependence of tactical operations on combat service support, difficulties in the construction of field fortifications, and need for special winter equipment and clothing. Deep snow does not necessarily reduce the mobility of properly trained and equipped troops. In certain terrain it may enhance their mobility. Use of aircraft may be facilitated by using frozen lakes and rivers and compacted snow strips for landing areas.

(2) During the summer, the area may be characterized by numerous and extensive swamps, lakes, and rivers; abundant insects; and, at times, continuous daylight. Special equipment, such as boats and low-ground pressure tracked vehicles, are needed. The extensive daylight increases the likelihood of enemy observation of friendly movements.

(3) During the spring breakup, sudden thaws weaken the ice on waterways and swamps and make existing roads almost impassable. The ground thaws to a depth varying from a few inches to several feet depending on the geographical location of the area. These factors will hamper extensive overland movement.

(4) During the fall freezeup, ground and waterways frequently freeze before heavy snowfalls. Prior to such snowfall, troops and vehicles can move cross-country with ease; however, in some cases early snowfall will insulate the ground and prevent its freezing until late in winter. This condition impedes cross-country mobility.

(5) During all seasons the lack or scarcity of roads affects large-scale operations, particularly combat service support, which points up the requirement for

increased engineer support. Limited map coverage adds importance to effective navigation and control measures.

*b. Engineer Operational Considerations.*

(1) Many engineering operations are affected by the existence of permafrost. Permafrost is permanently frozen ground, varying in thickness. As long as it remains frozen it makes a good foundation, but when thawed, it loses its bearing capacity as a result of being disturbed.

(2) In arctic and subarctic areas there are many marshy areas with a resilient carpeted surface of bog moss and sedges, which are termed muskeg. They have a high moisture content and very low bearing power. The insulation qualities of the surface material may hinder freezing during winter.

(3) Loose snow exceeding 30 centimeters in depth is generally impassable for wheeled vehicles; however, wheeled vehicles equipped with tire chains can travel very well over packed snow. When prolonged cold can be anticipated, snow roads will suffice. They usually can be constructed with no difficulty by packing the snow with tracked vehicles. If they are subject to slight surface thawing and the surface turns to ice, they must be well sanded or have set-in-wood cleats. Roads over snow-cleared areas are slow and difficult to construct. If the site is subject to an appreciable amount of thawing, special attention must be given to drainage.

(4) Bridges are subject to foundation difficulties if they are used during the warmer seasons. Sills and cribs must be set on piles driven to a depth which is not subject to freezing and thawing. Bridges over streams of any size should be designed to resist extreme flows and heavy ice movement.

(5) Special procedures are required for water supply. Water is found under the ice in any deep pond, lake, or stream, but pumps, filtering apparatus, water lines, and stored water must be heated and insulated. Troops draw water more frequently but in lesser quantities because it freezes so quickly. Often in forward areas the only source of water will be melted ice or snow. The supply will thus be limited because of the scarcity of fuel with which to melt snow. When water can be obtained only from ice and snow, it is the responsibility of each unit to supply its own water. When possible, units fabricate expedient snow melters for provision of water for their personnel.

(6) The supply of engineer materiel is affected by transportation difficulties. Local resources of sand and gravel are difficult to locate under snow and ice and to excavate when frozen. They must be thawed before use. In permanently cold regions, standing timber is rare or nonexistent.

(7) Proper maintenance of vehicles and power equipment in very low temperature is difficult. Maintenance work in the open at low temperature is extremely difficult and heated shelters must be provided.

(8) In areas of heavy snow and ice, geodetic control is sparse or nonexistent. Additional topographic troops are normally required to supply survey data for weapons systems.

(9) For additional information on northern regions, see FM's 31-70 and 31-71.

*c. Engineer Reconnaissance.* Engineer reconnaissance will need to utilize special techniques and equipment not normally utilized in other geographic areas. In the arctic and subarctic zone, the terrain will change dramatically and suddenly.

## 7-3. Desert Operations

*a. General.* Deserts are arid regions characterized by an almost total lack of rainfall, extensive treeless expanses, and extreme daily temperature fluctuations. The terrain consists

use of cobbles and boulders for parapets and breastworks. Protective works may also be made of logs if standing timber is available.

(4) Obstacles are particularly effective in mountainous terrain, since it is very difficult to bypass them. Properly placed and covered by fire, they can often make the approaches to a position or to other commanding ground almost impassable. Use of atomic demolition munitions, if authorized, can be highly effective in mountainous terrain.

*c. Engineer Reconnaissance.* Engineer reconnaissance should precede all operations but not delay them. Rugged mountain terrain makes field reconnaissance time-consuming and dangerous. Aerial reconnaissance is emphasized, although small dismounted patrols may be successful. Terrain analysis for routes, trafficability, and local materials is of special importance in mountain warfare. Specially trained engineer terrain analysts furnished with reconnaissance information and aerial imagery have the capability of furnishing information quickly and in great detail unavailable by other means. Relationships between vegetation and soil conditions resulting from terrain evaluation aid the engineer in his determination of trafficability and sources of materials, while special engineer intelligence overlays may be prepared to give information of trafficability, construction sites, and materials.

*d. Training.* In addition to normal engineer training, the training of engineer troops in mountain operations should include, but not be limited to, the following:

(1) Demolitions in rock formations.

(2) Tramway and cableway construction.

(3) Physical conditioning.

(4) Assault climbing.

(5) Mountain road construction.

(6) Use of helicopter aircraft in engineer operations.

(7) Field fortifications in mountainous areas.

## 7–5. Jungle Operations

*a. General.* Jungles impose special problems because of heat, heavy rainfall, and dense vegetation. Jungles are sparsely inhabited, and good roads and other necessities of civilization are rare or nonexistent. Movement of troops and supplies through jungle growth is most difficult, and visibility is often limited to a few feet. (See FM 31–30.)

*b. Engineer Operational Considerations.*

(1) The construction and maintenance of roads are of the greatest concern to engineers in jungle warfare. Generally every road to be used by our troops must be newly built. Ground water is frequently found within a few inches of the surface, requiring special attention to subgrade drainage. Time is often saved if the site is thoroughly drained before attempting to employ heavy equipment. Frequently the soil is composed of decayed vegetation which must be removed and replaced with some suitable material, such as coral found on the coasts of many tropical islands of the Pacific.

(2) Bridge design should consider the intense rainfall and consequent flooding. For small bridges it may sometimes be advisable to allow for normal flow only, and to be prepared to replace the bridges promptly.

(3) Native timber varies from very soft and pulpy to extremely hard wood. The former quickly deteriorates, while the hardest woods are almost impossible to work. In training for jungle operations, personnel should study engineer intelligence reports to be able to identify useful timber. As a general rule the softest woods have a bulbous shape just above the ground line. The coconut palm grows in tropical and semitropical areas near salt water throughout the world. It is readily accessible and of convenient shape, but like other palms it is soft and deteriorates rapidly. Often there is more suitable timber in the area that should be used when the structure is to last more than 3 months.

(4) Water supply is rarely a serious problem. In many areas a water source may be created at will by merely excavating a pit below the ground water table. Where the topsoil is underlined with coral, potable water is often found on the coast as close as 50 feet to the shoreline. However, all water used for drinking must be treated because of the many diseases which may be transmitted by impure water.

Personnel working in raw water must be given special protection because of the danger of contracting certain serious diseases caused by waterborne organisms and parasites peculiar to the tropics.

(5) Shelters are very quickly and easily constructed by native methods with local materials. They consist of a light frame with a thatch roof and half walls of woven palm leaves.

(6) Certain maintenance problems are accentuated by the effects of high temperatures and humidity. Bright metal surfaces must be continually protected by grease or paint. Rubber and plastic parts, such as those in ignition systems, will require replacement more frequently. Leather and fabrics are subject to mold, and must be kept clean and treated with preservatives. Engineer equipment is frequently employed in beach areas and exposed to immersion in salt water or to salt water spray. Under such conditions it should be thoroughly washed with fresh water as often as possible.

(7) Jungle areas usually are lacking in suitable geodetic control. Engineer topographic units normally are required to provide this control for weapons systems.

*c. Engineer Reconnaissance.* Jungle areas present special reconnaissance problems. Roads, tracks, and trails are extremely important since these most frequently present the only means of traversing the jungle. Aerial reconnaissance and imagery interpretation from normal aerial photography are hampered by inability to see under the tree canopy. Other means must be employed.

## 7–6. Operations in Forested Areas

*a. General.* Forests are considered a special environmental condition if they are dense and heavily covered with foliage. Dense forests present a formidable obstacle to tanks and vehicles. Considerable engineer effort is required for road construction through forested areas because of the initial clearing of the route of trees and underbrush. Tree blowdown or abatis on existing roads through forests caused by nuclear or planned detonation can also become a major obstacle. Dense foliage hampers aerial observation for engineer reconnaissance. Aerial photo interpretation is hampered by the inability to see under the tree canopy.

*b. Engineer Operational Considerations.*

(1) Heavy earthmoving equipment is required to create a passage through a tree blowdown area or heavily forested area.

(2) As an obstacle, tree blowdown can be used effectively in both offensive and defensive operations.

(3) Depending upon the tree species, tree condition, moisture content, and general forest condition, thermal-radiation-induced fires may ensue.

*c. Engineer Reconnaissance.* Terrain reconnaissance and studies may include adequate data to assess tree blowdown and fire susceptibility.

## ★7–7. Land Clearing Operations in Forested or Jungle Areas

*a.* A requirement exists to provide tactical forces with a specialized land clearing capability to level heavily forested or jungle areas which may serve as active or potential sanctuaries for enemy forces, or to clear passages through these areas for lines of communication. To meet this requirement, a tree dozer has been developed which is capable of felling trees up to 48 inches in diameter in a matter of minutes.

*b.* The tree dozer is a standard military crawler tractor modified by the addition of a cab cover for the protection of the tractor operator, a specially designed horizontal cutting blade, and a verticle wedge-shaped projection or "stinger" at one end that is used to split trees larger than one foot in diameter by repeated application of this stinger. The trees thus split, and smaller trees and brush, are then sheared off at ground level with the horizontal cutting blade. Clearing the brush, bamboo, and trees at ground level preserves the turf and avoids large root balls which result from the "pushover" method of clearing. This method of land clearing also alleviates dust problems, reduces the amount of debris and leaves no stumps which might provide cover for ambushers. All spoil is windrowed and may be burned when dry.

*c.* The tree dozers are organic to the specialized engineer land clearing company (TOE 5–87T). The mission of this company is:

(1) To destroy or clear dense vegetation in critical areas for the purpose of denying their use by the enemy as bases of operation, supply bases, marshaling areas, ambush sites, and cover and concealment.

(2) To clear dense vegetation from areas adjacent to friendly installations for the purpose of improving installation security by providing observation and fields of fire, and to reduce the probability of ambush along land lines of communication.

*d.* Details concerning the organization and equipment of the engineer land clearing company are contained in TOE 5–87T. An extract of the TOE is contained in appendix B of this manual. Details concerning the techniques employed in land clearing operations are contained in TM 5–330 and TM 5–331A.

# CHAPTER 8
# ENGINEER INTELLIGENCE, MAPPING, AND GEODETIC ACTIVITIES

## Section I. ENGINEER INTELLIGENCE

### 8–1. General

*a.* Engineer intelligence, including maps, ground control, and related materials is required in all theater echelons for tactical, technical, and strategic purposes and when properly used, assists the tactical and engineer commanders in the accomplishment of their missions.

*b.* The Chief of Engineers is charged by regulation with producing all intelligence maps, geodesy, and related materials needed to carry out his mission, plus meeting the needs of the U.S. Armed Forces, particularly the Army. Production is normally accomplished by engineer personnel.

*c.* Engineer intelligence, in its broadest meaning, includes area or geographical intelligence, technical intelligence, and hydrology as covered in FM 5–30, FM 30–10, TM 5–231, SR 115–15–5, and AR 117–50.

*d.* The nature and amount of specialized information needed in the conduct of engineer operations in a theater of operations is comprehensive. This information becomes engineer intelligence after it has been evaluated (to determine the pertinence, the reliability of the source and agency through which it was derived, and its accuracy) and interpreted (to determine its significance).

*e.* Special emphasis in the engineer intelligence effort is directed toward nuclear warfare and the effects of CBR agents. Engineers are vitally interested in the destructive effects of nuclear weapons on the natural terrain, aboveground and underground structures and installations, equipment, stored supplies, and personnel; and in the influence of terrain and weather on these effects. Chemical, biological, and radiological contamination of terrain, structures, installations, supplies, and equipment will have a serious effect on engineer operations. Of particular interest is the ability of hasty or deliberate protective structures to withstand a nuclear explosion and to protect personnel from chemical, biological, and radiological contamination; and the engineer role in recovery from the effects of a nuclear explosion. Engineer intelligence reports on such items as soils, atmospheric and hydrologic conditions, and the various manmade features should always give consideration to the nuclear and CBR aspects of the subject under consideration.

*f.* Engineer intelligence, an organic part of army intelligence, both strategic and combat, is of interest to other arms, services, and agencies. In the same way other agencies' intelligence activities may be of interest to the Corps of Engineers. Full use should be made of both command and technical channels to obtain information possessed by other headquarters, whether superior, subordinate, or laterally situated in the chain of command.

### 8–2. Responsibilities

The intelligence officer is the commander's principal staff assistant for intelligence activities. In a large command, the intelligence officer is the G2 (Director of Security in logistical commands). The engineer element of the staff at theater, theater army, field army, and corps has the intelligence element divided into separate elements for the mapping and the intelligence functions, which work closely with the command intelligence officer. At battalion, group, and brigade level the intelligence officer (S2) performs both intelligence and mapping functions. The responsibility for the collection

of information falls on every member of the military. The ability to recognize, collect, and transmit information while performing routine assignments is the mark of well-trained engineer personnel. For a complete and detailed discussion of engineer intelligence responsibilities in both the zone of interior and a theater of operations see FM 5-30.

## 8-3. Engineer Intelligence Elements

Engineer intelligence detachments are under the operational control of the engineer of the command. The engineer of the command is responsible for the collection, evaluation and interpretation of all engineer intelligence except engineer technical intelligence (engineer technical intelligence is a responsibility of the theater military intelligence units). Engineer intelligence detachments should normally be located with the engineer's staff at the command headquarters and, if possible, near the G2's staff (or tactical operations center). These detachments should not be assigued or attached to an echelon lower than corps, but should be habitually associated with topographic units to insure the availability of cartographic and reproduction support.

## 8-4. Types of Engineer Intelligence

*a. Terrain Intelligence.* Terrain intelligence is the product of the collection, interpretation, and evaluation of information concerning natural and manmade terrain features, weather, and climate of a particular area or region. This information is usually presented in the form of a terrain intelligence study, which is prepared by the engineer as required by the commander. In general, the presentation of a specific terrain intelligence study requires an interpretation and evaluation of several, or all of the following subjects:

(1) Geology, soils, surface configuration and shape, vegetation, ground condition, hydrology, water supply, hydrography, and weather conditions.

(2) Routes of communication including roads, railroads, inland waterways, ports and beaches, and airfields.

(3) Urban areas, hydraulic structures, excavations, electric power, pipelines, defenses, and other works of man.

(4) Cross-country movement, suitability for airfield, highway, and underground construction, airborne operations data, effects of special weapons, and works of man.

*b. Engineer Technical Intelligence.* Although engineer technical intelligence is a responsibility of the theater military intelligence units, all engineers should be aware of the importance of this type of intelligence. Engineer technical intelligence pertains to the design, operation, nomenclature, physical characteristics, performance, operational capabilities, and limitations of foreign materiel and facilities, used by or for the support of military forces. It may also include the manufacture, storage, distribution, installation, and maintenance of such materiel. Also included are operations, organizations, capabilities, and personalities of foreign civilian and military engineering activities. Engineer technical intelligence is necessary for the prompt development of countermeasures against new enemy equipment, prompt exploitation of new ideas derived from foreign sources, accurate deductions as to the enemy's military capabilities, and the effective use of captured engineer materiel.

## 8-5. Collection

*a. Direction of the Collection Effort.* Direction of the collection effort of engineer information at any level of command is a responsibility of the engineer of the command subject to the commander's policies. This direction consists of the recommendation for the commander's essential elements of information (EEI), a preparation of a collection plan, the issuance of orders and requests for information to the agencies concerned, and finally, the continuing check on those agencies.

*b. Sources.* In general terms, engineer information in a theater of operations is obtained in three ways: by reconnaissance agencies; by the study of documents, including the interpretation of imagery; and by the interrogation of individuals. Specifically, the sources are:

(1) Ground reconnaissance.

(2) Aerial reconnaissance.

(3) Maps.

(4) Captured enemy documents.

(5) Aerial and ground imagery.
(6) Other documents, including texts, periodicals, and technical papers.
(7) Captured enemy materiel.
(8) Captured enemy installations.
(9) Prisoners of war.
(10) Local civilians.
(11) Refugees and military returnees.
(12) Published intelligence and terrain studies.

*c. Collection Agencies.*

(1) In addition to the engineer intelligence teams and topographic units, certain engineer units such as the engineer combat battalion, army, and the engineer combat group have limited intelligence capabilities. For details of the intelligence activities of these and other engineer TOE units see the FM 5-series manuals dealing with those units.

(2) Troops, other than engineer troops, especially divisional combat troops, have access to a great deal of engineer information.

(3) The intelligence officer, in addition to coordinating the production of intelligence within the command, has intelligence specialists who are capable of exploiting particular sources of information. Of interest to the engineers are interrogators of prisoners of war sections, interpreter/translator sections, photointerpreter sections, document examination sections, order of battle sections, and military intelligence collection units.

*d. Reporting.* An agency which has been directed to obtain engineer information makes its report according to SOP or as otherwise directed. The originating officer, if he is not himself a processing agent, transmits it to the appropriate intelligence officer for processing. This procedure would not be followed in combat or in any fast-moving situation if the information must be acted on at the level received, or at a higher command level, before there is time for formal processing. Because of the diverse nature of engineer information and the use to be made of it, no single form can cover all situations. See FM 5–36 for typical reconnaissance reports.

## 8–6. Processing and Evaluating Information

*a.* Recording is the initial step in the processing of information. If the information comes directly to an engineer command or agency or the intelligence section of the staff engineer's office, records are kept as follows:

(1) The engineer intelligence pournal is the primary permanent record of the operations of the engineer intelligence section.

(2) The engineer intelligence worksheet is an aid in orderly collection and processing of information.

(3) The engineer intelligence situation map provides a graphic picture of the situation, supplements the worksheets, and serves as a base for the preparation of overlays.

(4) Separate files for originals and copies of documents entered in the journal, photograph negatives, and friendly or enemy minefields are maintained.

(5) The intelligence section of the staff engineer keeps up-to-date information on the location, type, and importance of existing and potential targets of interest to engineer agencies.

*b.* Evaluation is a vital step in the production of intelligence calling for close examination of the information to determine the reliability of its source and agency, accuracy, and pertinence (FM 30–5 and FM 5–30).

*c.* Interpretation is the final step in the conversion of information to intelligence and involves judgment. In the light of previously processed intelligence, the enemy situation, and the friendly situation, determination is made as to what interpretation should be given to the new item of information.

## 8–7. Dissemination of Engineer Intelligence

Engineer intelligence is transmitted from the agency which processed it to the users and to higher engineer mapping and intelligence agencies, including Army Map Service. These in-

clude other intelligence agencies which may further process it for use of their own commands. The object of dissemination is to insure the timely receipt by all interested agencies of all the available facts about the enemy and the situation, which are pertinent to their needs, and to insure that the factual information and the general intelligence picture at any given time are similar or consistent at all echelons.

## Section II. MILITARY MAPPING AND GEODESY

### 8-8. General

A wide variety and large quantity of maps and charts of the theater of operations are required in modern warfare. The establishment of, extension, and data reduction of basic geodetic control for mapping purposes and support of artillery and missile units are also a prime requisite. Available map coverage and geodetic control data of a theater of operations will be furnished the theater commander by the Department of Defense. They must always be supplemented by extensive mapping and geodetic operations after the campaign starts.

### 8-9. Types of Military Maps

Based on form and content, military maps are generally produced in the following forms:

*a. Planimetric Map.* A map which presents the horizontal positions only for features represented. It is distinguished from a topographic map by the omission of relief in measurable form.

*b. Topographic Map.* A map that presents relief or the vertical positions of features in measurable form, as well as their horizontal positions.

*c. Military City Map.* Large-scale map of a town or city and its environs.

*d. Special Maps.* Maps for a special purpose such as trafficability maps, transportation maps, boundary maps, etc.

*e. Photomosaic.* Assembly of aerial photographs to form a composite picture.

*f. Photomap.* A reproduction of a photograph or photomosaic upon which grid lines, marginal data, place names, boundaries, and other cultural data may be added.

*g. Terrain Model.* Any three-dimensional model of a portion of the earth's surface. Cultural and vegetative features may be shown either realistically or by map symbols, or they may be omitted entirely.

*h. Plastic Relief Map.* A terrain model made by forming a plastic topographic map into a three-dimensional form over a terrain model mold.

*i. Plastic Relief Photomap.* A terrain model made by forming a plastic photomap into a three-dimensional form over a terrain model mold.

### 8-10. Categories of Maps

*a. General.* The term "military map" includes all maps designed for use by the Department of Defense. Military maps are usually identified according to scale, which is a criterion as to the density of map detail shown upon the map and a determinant of the military use for which the map is best suited. Certain general categories are also commonly used to indicate the extent of geographic information given, as well as the manner in which it is portrayed.

*b. Military Scales.*

(1) *Small scale*—1:600,000 and smaller (standard 1:1,000,000). Needed for general planning and for strategical studies by commanders of larger units.

(2) *Medium scale*—larger than 1:600,000 but smaller than 1:75,000 (standard 1:250,000). Required for planning operations including movements and concentration of troops and supplies.

(3) *Large scale*—1:75,000 and larger (standard 1:50,000). Intended to meet the tactical, technical, and administrative needs of field units.

### 8-11. Basic Responsibilities

*a.* The Defense Intelligence Agency provides management of Department of Defense mapping, charting, and geodetic activities in accordance with the overall requirements and priority guidance established by the Joint Chiefs of Staff. The Department of the Army

has specific functions and responsiblities for the Department of Defense mapping, charting, and geodetic activities. Within the Department of the Army, the Assistant Chief of Staff for Intelligence is the mapping and geodesy program director, while the Chief of Research and Development has responsibility for Department of the Army research and development activities in these functions.

*b.* The Chief of Engineers is responsible for the performance of the Department of the Army functions pertaining to mapping, charting, geodesy, and military geographic intelligence in support of the Assistant Chief of Staff for Intelligence. For a list of the specific responsibilities see AR 10–5 and AR 117–5.

*c.* The Department of the Air Force is a cooperating agent in the mapping program and upon request accomplishes all aerial photography required for the execution of the Army's mapping function. It also undertakes the accomplishment of all airborne electronic control not adaptable for accomplishment by Army organic aircraft. When the Air Force is unable to undertake or complete the photography requested, the Navy, also a cooperating agent, is requested to undertake and complete the mission.

*d.* The Army Map Service is a Corps of Engineers activity, operating under the command of the Chief of Engineers, for the production, storage, and distribution of maps, geodetic data, and related materials and the operation of a central library of maps, geodetic and astronomic data, and related publications for the common use of the Department of Defense.

## 8–12. Theater Responsibilities

*a.* The theater commander is responsible for any mapping, charting, and geodetic functions directed by higher headquarters, and for the preparation and execution of a coordinated program for these functions for the theater.

*b.* The theater G2 is responsible to the theater commander for the preparation of plans and policies and the general staff direction and coordination of military mapping, charting, and geodetic activities, including acquisition, production, reproduction, and distribution of maps, and recommendation for the assignment of topographic troops. The theater engineer, under staff supervision of the G2, is responsible for the execution of the assigned engineer functions at theater level including the provision of military hydrology data.

*c.* Staff engineers at various levels down to corps engineers inclusive, have corresponding responsibilities, within their fields, with respect to the coordinated theater program and to work not included therein but needed by their own commands.

## 8–13. Engineer Topographic Troop Units, General

*a.* Topographic units include the corps topographic company, the army topographic battalion, the base topographic battalion, and certain teams of the engineer service organization. Among them they perform the various engineer mapping functions required for a theater of operations.

*b.* These units will—

(1) Provide direct mapping support to the appropriate commands to which assigned.

(2) Furnish ground control for artillery and missile fire.

(3) Perform evaluation of aerial photography as required.

(4) Assist in the accomplishment of the Department of the Army and theater mapping program in coordination with the Chief of Engineers.

*c.* The normal assignment of a topographic unit is to TALOG, field army, or corps. As the mapping situation changes, a unit may be shifted from its normal assignment to answer particular mapping requirements, but must usually be augmented. The topographic company, corps, for example, is neither organized nor equipped to perform extensive original map compilations and can therefore be employed in such a capacity only if augmented.

*d.* The engineer topographic support available for a typical theater of operations is normally adequate for supplying the theater with its topographic needs. Small TOE 5–500 topographic units with highly qualified technical personnel and equipment of platoon or team size are provided for special purpose mission

and/or augmentation of regular units. Additional capabilities to accomplish a peacetime mapping program may also be obtained from Allied government agencies as the result of cooperative mapping agreements.

*e.* Topographic units are not used to supplement field printing plants in the production of posters, programs, administrative publications, and other nonmapping projects which would interfere with the mapping mission of the command.

## 8–14. Base Topographic Battalion

The base topographic battalion has an elaborate and flexible organization reflecting its varied missions. It is composed of a headquarters and headquarters company and four other companies comprising a base survey company, a base reproduction company, a base photomapping company, and a base map depot company. The photomapping and reproduction elements require semipermanent or permanent air-conditioned facilities in a location undisturbed by airfield, railroad, streetcars, demolitions, and like vibratory disturbances and supported by reliable utilities. TOE 5–500 teams are attached to the battalion or its components for special situations to increase their capabilities. The battalion operates in the communications zone (normal assignment is one per communications zone) and is under the operational control of the theater engineer. It is normally attached to an engineer construction command or an engineer construction brigade. The battalion provides basic materials, such as trigonometrics tables and map reproducibles, to army and corps topographic units. It procures, compiles, reproduces, and distributes military maps, which, when combined with the efforts of all other topographic units, meet the requirements of a theater of operations. It conducts surveys of an accuracy suitable for ground mapping and artillery and missile fire control; it assists the theater army G2 and the theater army engineer in the preparation of terrain studies and reports.

## 8–15. Topographic Battalion, Army

The engineer topographic battalion, army, operates within the field army area, on a basis of one per field army, and consists of a headquarters and headquarters company, a map reproduction and distribution company, and a photomapping company. The battalion commander coordinates the planning and execution of mapping activities with the army engineer and his staff. The battalion provides maps and engineer mapping and artillery and missile fire control information as required for a field army; reproduces new and existing maps and other intelligence materials; stores and distributes maps and similar materials; performs topographic surveys and provides survey information required by a field army; and when directed, prepares engineer intelligence reports. The base topographic battalion supports the army topographic battalion by supplying basic materials, such as trigonometric tables and map reproducibles, and by carrying horizontal and vertical survey control forward. In turn, the army battalion supports the corps topographic company by furnishing basic mapping material and extending survey control forward for pickup by the corps companies. When not fully employed on its normal function of producing maps for use by army, the battalion assists the base topographic battalion in the execution of the theater mapping program.

## 8–16. Topographic Company, Corps

Each corps is supported by one engineer topographic company which is designed and organized for the purpose of compiling, revising, reproducing, and distributing maps, and for extending and establishing ground control for mapping and artillery in support of corps operations. Map compilation is limited to provisional maps. The company commander advises the corps staff and assists the corps engineer in determining the mapping needs of corps units. He also coordinates with the corps artillery officer the requirements of the artillery in connection with fire control. The company is most effective when it operates close to corps headquarters. When not fully employed on its primary function of producing maps for use by the corps, the company assists base and army topographic units in the prosecution of the theater mapping program.

## 8–17. Teams

The engineer service organization (TOE 5–500) has various types of teams for topo-

graphic work. Included in these are survey, photomapping, map reproduction, map distribution, photographic evaluation, geodetic survey, hydrologic and terrain teams. These teams are assigned, as required, to supplement the mapping, geodetic, and intelligence capabilities of the topographic companies and battalions.

## 8–18. Mapping Operations

*a. Planning.* The planning of a military mapping program is the staff responsibility of the G2 of any command, with the senior engineer of the command, under staff supervision of the G2, charged with the production, reproduction, and distribution of maps. The engineer and his staff, in coordination with G2, evaluate the map requirements of the command and establish a program within known engineer capabilities. The theater mapping program will be coordinated with the Chief of Engineers to insure maximum conformance with and support of the Department of Defense world mapping requirements and priorities as prepared by the Department of the Army Assistant Chief of Staff for Intelligence. In developing a mapping program, consideration is given to—

(1) Existing map coverage.
(2) Maps and mapping support available from the CONUS (AMS).
(3) Aerial photography and ground control required.
(4) Local mapping agencies and reproduction facilities.
(5) Number, type, and phasing of topographic units.
(6) Special and auxiliary equipment required.
(7) Map supply and distribution plan.
(8) Requirements and phasing of topographic supplies.
(9) Support of Allied governments.

*b. Mapping Sources.*

(1) *Aerial photography.* The key to adequate mapping is aerial photography. Aerial photography must conform to strict standards, for every relatively slight reduction in the quality of the photography may reduce not only the production capacity but also the degree of accuracy, possibly jeopardizing the success of the tactical operation. General procedures and instructions for procurement of aerial mapping are contained in AR 117–5. The production of aerial photography is a responsibility of the theater air commander. Air Force reconnaissance units are trained and equipped to procure and evaluate photographs, to process film, and to supply negatives and a limited number of prints, photomaps, and related data to air, ground, and naval forces. In the early phases, mapping photography is a function of the strategic air command, USAF, but as the theater develops, additional photography is undertaken by reconnaissance units assigned to the theater. Naval aviation performs certain collateral photographic missions primarily for naval purposes, which can be of great value to the engineer as additional source material. Requests for aerial photography are made through command channels and are accompanied by a list of minimum standards (see TM 5–231 and TM 5–240). The establishment and enforcement of these standards are engineer responsibilities and consist principally of introctrinating the photographic units, furnishing them with adequate technical assistance, and evaluating the photographs to determine their suitability as mapping sources. In emergencies, practically any photograph can be utilized to some extent by modern photogrammetric methods and equipment. In addition, the field army has an aerial photography capability, but because of the type aircraft and camera limitation the resulting photographs have limited mapping application.

(2) *Ground survey and control.* Ground survey is second in importance to aerial photography as a requirement for new mapping. The extent of additional ground control required varies from little in such thoroughly sur-

veyed areas as Western Europe to the establishment of complete control nets in areas never previously surveyed. Besides the ground survey requirements for interrelating the several national control nets, for support of the artillery and missile units, and for radar sitings, there are additional requirements for the support of guided missile operations. The engineer is responsible for assembling and maintaining complete files of ground control data and for disseminating this data in usable form to engineer topographic units, artillery, and other interested units. Principal sources of data are Army Map Service, captured materials, friendly or Allied agencies, and field work by engineer units. The extension of ground control is frequently prevented by natural or tactical obstacles or by lack of sufficient time. Sometimes existing control may be supplemented by airborne electronic control accomplished by army or air force aircraft. To the extent feasible, common survey control should be established and made available to all field army activities requiring accurate position location. Survey projects must be planned and executed in an expeditious manner commensurate with the most modern techniques and equipment in existence and available. Procedures and specifications for procurement of geodetic control for maps, artillery, and missile units are prescribed in AR 117-5.

(3) *Other sources.* All available material pertinent to the production of maps within the theater can be obtained by the theater army engineer from the Army Map Service. Indexes of all active map series for which reproduction material and map stocks are available are included in the general map catalog of AMS. The Army Map Service library indexes indicate both inactive series and series of which library copies are available. Similar indexes can be obtained from Allied and friendly sources. The engineer must establish a map library to which is added all new material from maps compiled from other sources. Copies of such additional material and new map sheets compiled therefrom are forwarded to AMS. Procurement of current and reliable source materials, such as bilingual geographic names and boundary information, becomes a major problem for inaccessible areas, and the proper resolution of discrepancies requires highly-experienced technicians.

*c. Map Compilation.* The principal agency for the compilation of new maps is the Army Map Service. It is supplemented from within the theater of operations by the base topographic battalion, Allied mapping agencies, and local contractors. Map revision, limited compilation, preparation of photomaps and mosaics, and special site studies may be performed by field topographic units. All mapping agencies are integrated with the theater mapping program to the maximum possible extent.

*d. Map Reproduction.* The essential problem in map reproduction from the engineer's view is the provision of sufficient press capability to meet estimated requirements. The map reproduction capability of the CONUS must be augmented in the theater by the base topographic battalion, by exploitation of local facilities, and by utilization of mobile reproduction facilities and field topographic units. Map compilation is an extremely intricate and technical process involving delicate equipment and highly specialized personnel. Assistance of qualified AMS personnel should be sought in planning the theater map reproduction establishment. The theater map reproduction program should be flexible and should provide for stocks of maps to meet normal requirements when reproduction facilities are required to produce maps not anticipated in long-range planning.

*e. Terrain Models.* AMS is the principal agency capable of producing terrain models of adequate quality and quantity. Terrain models are in great demand for many phases of operational and technical planning, but the production of terrain models is necessarily a time-

consuming process involving skilled hand labor. For most tactical purposes, embossed plastic maps prove to be an economical substitute.

*f. Distribution.*

(1) Maps, as items of intelligence, are handled separately from supplies. They have their own storage and distribution system for the following reasons:

(*a*) Bulk production, movement, and issue of maps are clues to the scope of forthcoming operations. Because of the security requirements, special and elaborate arrangements may be necessary to handle the map issues prior to a large-scale operation such as an amphibious or airborne invasion. In such cases, the entire map distribution operation may be directly controlled by the engineer of the command.

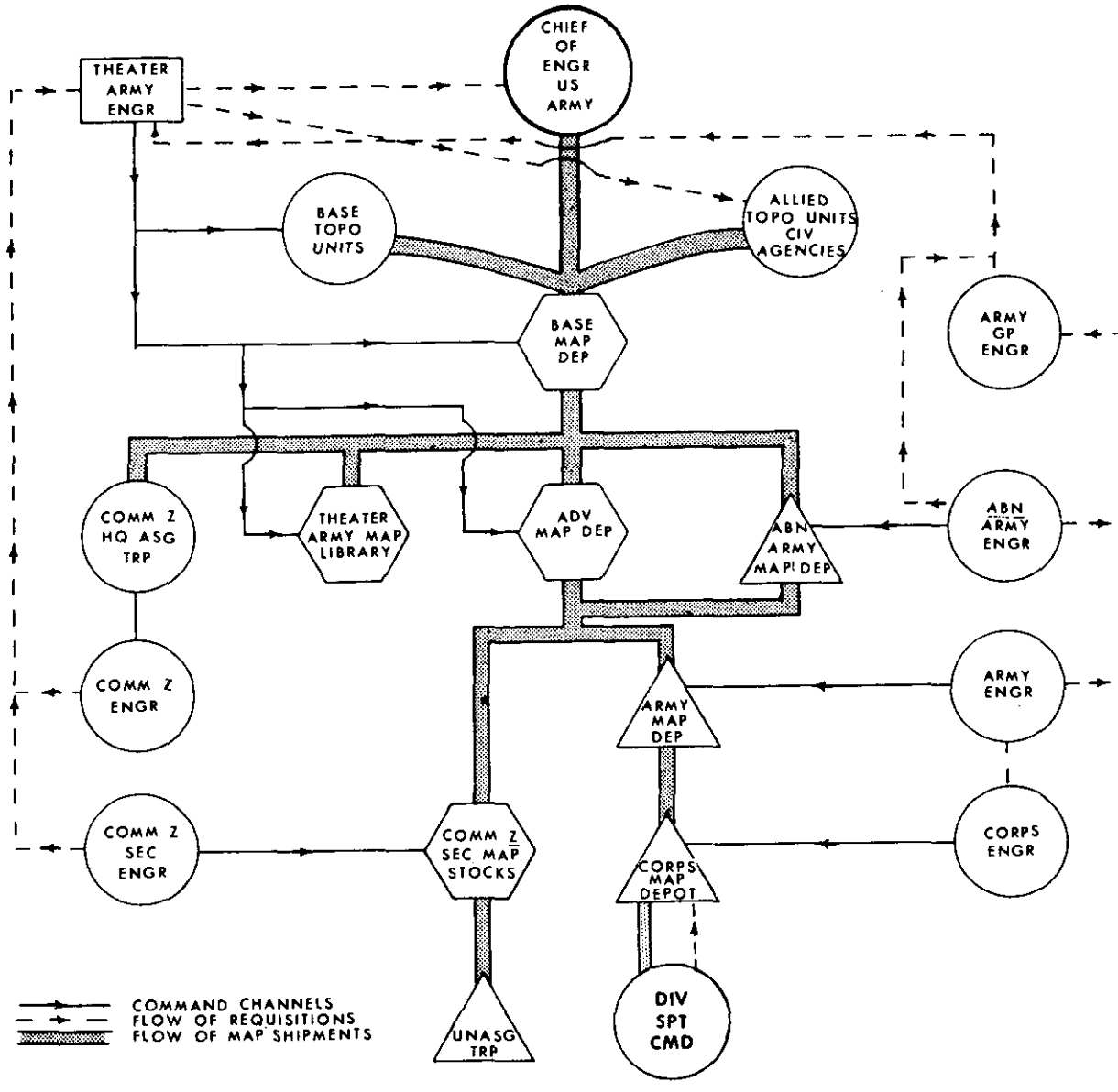
(*b*) Changes as revealed by the constantly expanding sources of information may quickly render maps obsolete and may require several improved editions in the course of a single operation.

(*c*) Maps have a direct relation to the exact place in which the operation is to occur.

(*d*) In general, the preparation and distribution of bulk stocks of maps cannot be planned far in advance. Collection of source material for map production must be constant and worldwide. Production must be phased to insure the inclusion of the most current piece of terrain information which can be used. Issue can be accomplished only after an exact assignment of mission has been made.

(2) Map reproduction and distribution is decentralized to the extent necessary to insure prompt and efficient service. Requirements are computed by the engineer under the staff supervision of G2. Requisitions are prepared and submitted through engineer channels in time to permit the reproduction and shipment of the maps required. Emergency requisition must be held to an absolute minimum, for a large volume of such requisitions will disrupt any reproduction program and map distribution system in a short time. Engineers of corps and larger units are responsible for the distribution of military maps in the field, except such confidential and secret maps as may require special distribution. They obtain maps not printed by their echelons from the engineer of the next higher echelon.

*g. Depots.* Map depots are organized and operated at each echelon of command, down to and including corps. Map depots normally procure and make available bulk stocks to the depot of the next lower echelon. Base and advance depots are located in COMMZ with the advance depot positioned near the forward limit of COMMZ. Base map depots receive and store bulk stocks from AMS and base reproduction plants, break down and distribute bulk stocks to advance depots, distribute to base depot units, and operate a retail map store. Advance map depots receive and store bulk stocks for field army map depots, and operate a retail map store for the headquarters of units located in the area. The army map depot is located in the army service area, usually near army headquarters. In a fast-moving operation it may be necessary to operate two map depots in the field army area which leapfrog over each other as the army headquarters moves on. The army map depot has functions parallel to those of the base map depot. It is operated by the map storage and distribution section of the army topographic battalion. The corps map depot is located in the corps rear area and has the same functions as the base map depot, but on a reduced scale. It is operated by a section of the corps topographic company. Operation of the division map stores is the responsibility of the division support command which receives bulk stocks, and distributes maps to divisional and attached units, and stores the division reserve map stocks. Detailed discussion of map supply and map depot operations are found in TM 5–231. Figure 8–1 is a general map distribution plan and may require modification to best fit a given situation or particular command.




NOTE: A list of maps authorized for issue is normally published by corps or army. Using this list as authority, requisition may be submitted by the division support command directly to the corps map depot. Requisition for maps not on the list must go to the corps engineer.

*Figure 8-1. Flow chart of map distribution in a theater of operations.*

## 8-19. Survey Support of Artillery

In addition to the survey requirements for mapping activities, the engineer topographic units have the responsibility of providing survey support for artillery, guided missile operations, surveillance devices, electronic installations, air defense artillery, and air installations. Even though artillery units normally have an organic survey capability, engineer topographic survey support is required to supplement the artillery capability. Since engineer survey support capability is limited, only the highest priority missions should be assigned to the topographic units. The accuracy required for these surveys varies and the engineer at all echelons of command must be able to evaluate the type and amount of survey effort required. The engineer should also maintain close liaison with artillery commanders to determine just what artillery survey support is required. Accurate missile fire is dependent upon reliable ground control which entails exact determination of launching sites, azimuths, and target sites. The photomapping elements of units have a limited capability for siting weapon systems and for locating terrain-type targets.

# CHAPTER 9
# CONSTRUCTION OPERATIONS

## Section I. GENERAL

### 9–1. Responsibility for Construction

Broad plans and policies for construction in the theater are established by the theater commander. They are based on coordinated planning by construction representatives of theater army, navy, and air force. The theater army commander establishes policies, standards, priorities, and scale of construction for his subordinate echelons, based upon recommendations of the theater army engineer. In turn, the theater army engineer furnishes staff supervision in the execution of theater army construction directives pertaining to all aspects of construction. The TALOG commander is responsible for army construction throughout the communications zone. He exercises this responsibility through the commander of the engineer construction brigade or the engineer construction command (when one is activated). The field army commander is responsible for all construction in the combat zone. He exercises this responsibility through the army engineer brigade and through the corps commanders. The field army engineer exercises staff and technical supervision of construction in the combat zone through the army engineer brigade and through the corps engineers. When required, construction units from the communications zone are sent forward into the combat zone to complete mission type tasks. In this event their activities are coordinated by the field army engineer in conjunction with the responsible engineer in the communications zone.

### 9–2. Planning and Supervision

Within the theater army headquarters, planning and staff supervision of engineer construction is the responsibility of the theater army engineer. Major staff coordination is effected with the G4 and liaison with the air force with respect to requirements, acquisition, priorities, and materiel. Plans for construction are based upon requirements generated at subordinate echelons. Only very broad planning guidance, theater army-wide in scope, is initiated by the theater army engineer. He exercises his staff responsibility through technical channels by the exchange of information and through command channels in the form of both orders and directives. Based upon current plans, the availability of both military and civilian construction supplies, the availability of civilian labor and construction capability, and the approved priorities for construction, the theater army commander allocates construction troops and materials to subordinate echelons.

### 9–3. Programing

The using services are responsible for outlining their general requirements for construction of installations and facilities. The commander establishes priorities and standards of construction based on the recommendations of G4, which are obtained by coordination with the general and special staff sections concerned. This is the base on which engineer construction command, brigade, or group commanders prepare detailed layouts and construction plans. Knowledge of the commander's construction policies and priorities should be of assistance to the engineer involved in planning and implementing a construction program. The demands for construction, however, usually greatly exceed the engineer's capabilities and are so urgent that the commander's approval of specific major features of the construction program is essential. This insures that the engineer's program is the commander's program and that the commander is able to apportion construction effort where it will best support his overall plan of operations.

## 9-4. Contracting

*a. General.* In certain situations it may be possible to contract for construction or services in a theater of operations. The use of contract construction depends upon the military situation, the availability of indigenous contractors and materials, and theater policy. Formal agreements between U.S. forces and local national authorities concerning all aspects of contractor relationships are usually needed when operations are being conducted in friendly or Allied countries.

*b. Types of Contracts.* The many types of construction contracts may be roughly classified as:

(1) Lump sum.

(2) Unit price.

(3) Cost-plus-fixed fee.

These types are suitable, generally, for operations in a theater but require an explicit statement of supplies and support to be provided by the contracting officer, and careful inspection to insure desired quality of performance.

*c. Competition Among Services.* The responsible engineer must insure that no competition arises among the army, navy, and air force, or Allies, for the services of contractors, as such competition reflects unfavorably on our own forces and reduces the effectiveness of contractors. If necessary, a joint contracting agency may be established.

*d. Overhead.* Contracting in a theater of operations normally requires a larger overhead for supervision and inspection to attain similar performance than does contracting in the CONUS.

*e. Local Practices.* Adoption of local contracting practices (method of reimbursement, wage scales, building standards, and techniques) may facilitate administration of the contract; however, they should be scrutinized to insure that they do not conflict with good performance, and with current regulations modified within the bounds of authority permitted. In particular, the following practices should be avoided:

(1) Use of peacetime safety factors not warranted for military construction.

(2) Direct dealing between the contracting officer and subcontractors.

(3) Open-end maintenance contracts unless specifically authorized.

(4) Rebates from contractors.

(5) Near total substitution of cheap labor for faster, more economical production equipment.

*f. Incentives.* In a wartorn area, currency alone is seldom sufficient incentive for good contract performance. The following incentives have proved successful in past operations: food, clothing, gasoline, surplus construction materials, housing, and an opportunity to keep a construction organization together.

*g. Decentralization.* During an occupation, decentralization of contracting authority, including authority for bartering, will greatly increase the volume of engineer work accomplished. Decentralization also discourages mass labor migration.

*h. Coordination with Civil Affairs Agencies.* Enforcement of contracts may require legal intervention and the responsible engineer must insure that the contracts comply with the technical requirements of the civil affairs agencies.

## 9-5. Indigenous Labor

Because engineer units are among the largest employers of local civilian labor in a theater of operations, it has been common practice to assign immediate responsibility for civilian labor to the engineers. This responsibility reverts to a civil affairs agency as soon as practicable. Both prisoners of war and civilian labor are important factors in the total production effort in a theater and must be adequately and rapidly organized with qualified U.S. personnel to plan and direct their activities. In an area of dense population the tremendous dislocation due to the war reacts strongly on the quality and capability of the labor supply. In areas of scattered population the necessity for the importation of labor creates its own special problem. These problems, as well as those incident to supply of food and clothing, wage scales, organization, and general facilities must all be solved initially by the engineer responsible for the labor. Notwithstanding these problems,

activation of the maximum number of type B construction and construction-support units is to be encouraged as they will prove invaluable in the theater construction effort.

## Section II. GENERAL CONSTRUCTION

### 9–6. General

The maximum scale of accommodations and facilities to be provided for forces in a given theater is specified by the commander, usually on recommendation of his staff engineer and G4. A guide for such construction standards is found in TM 5–301 and TM 5–302. During initial stages of development of any base, when supply of construction materials is most critical, and at locations where occupancy of only a few weeks' or months' duration is expected, it is the responsibility of the commander charged with the operations to reduce the scale of construction until it is commensurate with such conditions. Facilities and accommodations are intended to reach the maximum scale of development indicated in the above referenced manuals only where functional use of the base for more than six months is contemplated or where conditions necessitate certain semipermanent-type construction. In all cases, construction should be held to the minimum necessary to accomplish assigned missions.

### 9–7. Engineer Functional Components System (EFCS)

The engineer functional components system provides standards of construction, phases, standard plans, bills of materials, equipment and unit augmentations, and general guidelines for the construction effort required for given facilities. It thus relieves the constructing units of much of the task of preparing drawings, specifications, and bills of materials. In addition, the system is so designed as to be adaptable to automatic data processing in determining the overall requirements for the engineer support of military operations in any given theater of operations. This includes requisitioning, shipping, and maintaining balanced stocks of material, equipment, and units. The system is developed in three technical manuals, TM 5–301, TM 5–302, and TM 5–303.

*a. TM 5–301. Staff Tables of Engineer Functional Components System (EFCS).* This manual explains the concept and use of the system and contains tables of the installations, facilities, and equipage in the system. It is of primary interest to logistics planners but all engineer officers should become familiar with it. Separate coding systems for installations, facilities, and equipage are established and explained. This coding permits exploitation of electronic data processing machines and allows for logical expansion and changes in the sys tem. Note that "installation," "facility," and "equipage' have specific meanings when used in the EFCS—meanings different from their usual connotation.

(1) An installation is a balanced grouping of facilities to be located in the same vicinity, to serve a particular function, such as a 300-bed hospital, a 1,000-man troop camp, an army airfield and heliport to accommodate 25 aircraft, or a 600,000-barrel of POL tank farm.

(2) A facility is a grouping of items and/or sets consisting primarily of construction material in the necessary quantities to provide a specified service such as a 20- by 100-foot building, one mile of 2-lane road, or an airfield control tower.

(3) An equipage is a grouping of items and/or sets, consisting primarily of nonexpendable construction equipment, designed to provide or augment the equipment necessary for the execution of specific types of construction, by specific types of construction units, in a specific world area. For example, equipage is listed for an engineer construction battalion to do railroad construction work in Western Europe.

*b. TM 5–302, Construction in the Theater of Operations. Of* the three manuals that constitute the EFCS, TM 5–302 is the most useful to construction units. it contains site and utility layout drawings; drawings of buildings

and other structures; standard and special detail drawings; and simplified bills of materials for many of the structures. The first four digits of a facility code number identify the drawing of that facility as presented in TM 5–302.

*c. TM 5–303, Bills of Materials and Equipment of the EFCS.* This manual contains the complete bill of materials for each facility and the bill of equipment for each equipage in the EFCS. Construction units may use it as a guide for requisitioning. The facility code number identifies the bill of materials for each facility and the equipage code number identifies the bill of equipment for each equipage.

## 9–8. Principles Governing Military Construction

*a.* Construction should be accomplished within the allotted time, utilizing a minimum of materials, equipment, and skilled labor, with the objective of conserving our own natural resources and supplies.

*b.* Maximum use should be made of installations and facilities described in TM's 5–301, –302, and –303, the engineer functional components system, and the signal corps coded facility system when they are applicable. These systems provide necessary drawings, plans, and bills of materials for a number of the most common and repetitive-type construction tasks. They are appropriately coded for use with the automatic data processing system (ADPS) and modernized supply procedures. Use of the systems facilitates construction planning, programing, and review; and the procurement, distribution, and control of construction material.

*c.* If new design is necessary it should be simple and flexible to provide for multipurpose use and future expansion of completed work.

*d.* Using services must express their anticipated needs well in advance of the actual needs to permit procurement of the necessary construction materials and supplies.

*e.* The permanency of any structure erected should be only that consistent with military necessity at the time.

*f.* Existing facilities must be used before initiating new construction.

*g.* Only the minimum facilities consistent with military necessity can be provided. In view of the extremely heavy demands on engineer effort and the tonnages involved in construction, economy of construction is most important.

*h.* Generally, a large project is completed in units to allow the completed parts to be used while construction continues. Cases will arise, however, particularly in the combat zone, in which time is the vital factor. In such cases, economy of manpower is secondary and the project should be completed in the fastest and most practical way. Production-line methods may be employed in some instances.

*i.* Underground or protected sites should be considered in the construction of essential facilities. Improvisation should be used whenever possible to reduce material requirements.

*j.* Facility planning should be of such a nature as to avoid creating lucrative nuclear targets.

*k.* Vague delineation of a project inevitably leads to confusion and friction. The engineer responsible should strive for an explicit understanding with the using agency, and, in particular, should point out borderline features not covered by the project plans.

*l.* Camouflage, where considered necessary, should be planned during initial site selection and construction, as early consideration prevents excessive costs, limits destruction of existing terrain, and insures better concealment.

## 9–9. Protective Construction

Protective construction must be integrated into existing strategic, tactical, and logistic concepts and must provide balanced protection against all weapons effects which may be expected. Semipermanent protective facilities must be designed for continuous day-to-day operations rather than solely for emergencies. Engineer and other troop effort available for the construction of semipermanent shelters is at a minimum; this necessitates the use of civilian contract construction firms or indigenous labor and equipment effort wherever possible. Maximum use should be made of existing facilities.

## Section III. UTILITIES

### 9–10. General

Operation and maintenance of utilities, including electric power, water, heat, sewerage, and fire protection at large installations, such as hospitals and major headquarters, are best performed by utilities detachments (TOE 5–500) which report to the installation commander. These utilities teams also accomplish repairs and minor construction within the installation, relieve the engineer of a mass of detailed problems, and give the installation commander quick action on small projects. Reconstruction and initial operations of municipal utilities in a large city of particular significance to our forces may be beyond the capabilities of utilities teams and therefore classed as major construction to be accomplished by the engineer construction units. When possible, military personnel of the utilities detachments should be replaced with indigenous employees to make the military personnel available for other assignments.

### 9–11. Special Considerations

*a.* The authority and responsibility of installation commanders to execute minor construction should be explicitly defined.

*b.* Control over the utilities activities of an installation commander may be exercised through project approvals, supply allocations, limitations on contracting authority, personnel ceilings, and budgeting of funds.

*c.* Procedures for supply of construction and repair materials, supply of solid fuels, and the loan of equipment to utilities teams must be explicit. Similarly, provision must be made for maintenance of engineer equipment in the hands of these teams.

*d.* Utilities personnel should be thoroughly indoctrinated through technical channels in the construction policy of the higher command. In addition, the engineer must provide technical assistance in appropriate cases.

*e.* Large portable or floating electric generator plants with capacities up to 10,000 kw or even larger may be required because of increased consumption of electric power by large port, depot, or hospital complexes. In an emergency, electrical power may be supplied by large naval vessels for consumption on land.

## Section IV. ROADS

### 9–12. General

Adequate roads are essential to large-scale military operations and their construction and maintenance constitute the heaviest and most time-consuming responsibility of the engineers in a theater of operations. There is no engineer unit designed solely for road construction and maintenance, and the responsibility, demanding much time and effort, falls to a large proportion of the engineer units in a theater. Unless the responsible engineer resorts to all practical means to reduce the workload, and undertakes new construction only when absolutely necessary, the bulk of his engineer effort can be expended on road construction and maintenance. New construction usually can be limited to those projects paying large dividends such as port egress highways, bypasses to relieve congestion, and depot roads; and maintenance can be limited to a carefully selected highway net. Much engineer time and effort can be saved if installation commanders are encouraged to accomplish as much of their own interior road work as possible.

### 9–13. Characteristics

*a.* Although the engineering principles involved are unchanged, construction and maintenance of military roads differ from civilian road work in that the time factor, supply problems, and enemy action impose a greater range of problems and require modification of construction methods. Little construction of the degree of permanency represented by usual civilian practice is expected of engineers in a theater of operations. While in the forward areas the urgencies of the military situation usually require rough, hasty work designed primarily

to meet immediate needs, and in the rear areas there is a limited requirement for construction of a more deliberate nature. Most of the engineer road construction and maintenance falls in the middle of these two extremes.

*b.* Based on the tactical or strategic situation, higher authority dictates certain requirements or specifications when assigning a road construction mission. These include—

(1) *Time alloted for completion.* In forward areas, construction speed is usually the dominating factor.

(2) *Type of construction.* For example, main supply route, fair-weather road for temporary traffic relief, etc.

(3) *Location.* Specific location should always be determined by a competent, trained engineer. Principal engineering factors for site selection are anticipated traffic, existing facilities, future expansion, obstacles, earthmoving requirements, topography, drainage, soils, availability of materials, and accessibility of the site.

## 9–14. Special Considerations

The following factors must be considered in all road construction work and are of particular importance in a theater of operations.

*a. Economy of Time.* The nearer the operation is to the front, the more vital the time element becomes. Time is saved by efficient use of manpower, power equipment, handtools, materials, and other available facilities.

*b. Simplicity.* Simple designs calling for available materials and requiring a minimum of skilled labor should be used.

*c. Economy of Materials.* Materials must be conserved, particularly those shipped from the zone of interior. Local materials should be used whenever practical.

*d. Location.* The location of new construction projects is normally dictated by military necessity. Existing facilities, however, should be used whenever possible to avoid unnecessary construction.

*e. Safety and Durability.* The factors of safety and durability of roads are not as important for military construction as for civilian construction. Safety factors often are materially reduced in keeping with the small degree of permanence of the facilities constructed; the inherent risks of war; and in saving time, materials, and manpower. Almost all military construction in a theater of operations should be considered temporary.

*f. Planning and Management.* Good planning, careful scheduling, and thorough supervision hasten job completion and effect economy of time, equipment, and materials. When the situation requires, stage construction should be used to permit early use of the facility while further construction and improvement continue.

*g. Terrain.* Slopes, drainage, vegetation, character of soil, likelihood of floods, and other unusual conditions that may affect construction and layout should be studied preferably by terrain and hydrologic teams. Dense brush, timberland, and rolling terrain that may require heavy clearing or grading are normally to be avoided in combat-area construction.

*h. Air Defense Measures and Camouflage.* Aerial attack on vital installations in proximity to the road site must be expected. The likelihood and effectiveness of such attacks, however, are often lessened by the selection of a site that gives protective concealment and by the use of antiaircraft weapons and camouflage.

*i. Protection of Existing Facilities.* In all construction, whether in forward or rear areas, care must be taken to prevent destruction of or damage existing facilities. Unnecessary damage to existing facilities, whether above or below the surface, will require repairs and an expenditure of time and manpower far exceeding that required to prevent such damage or destruction.

## 9–15. Reconnaissance

When roads are needed in a theater of operations, it is almost axiomatic that these facilities should be ready for use as early as possible, as the need is usually critical. Good reconnaissance is the best time saver. This does not imply that exhaustive field investigations or elaborate plans are necessary, but adequate investigations of the site and careful study of

the design details are essential for maximum economy in construction time and effort. In the preliminary reconnaissance it is possible that a few hours spent in soil investigations will save days in construction time. Finding a gravel pit easy to work and near at hand, or locating a rock ledge which might impede grading operations are examples of helpful reconnaissance. The comparison of soil conditions on two possible sites requires extra effort in surveying, but may mean the difference between simple and difficult work. After site information is collected and the type of construction is determined, such details as establishing grade lines, location of work areas for different equipment, sequence of operations, procedure for compaction and the thickness of base and surface courses must be considered in relation to all possible solutions in order to select the proper one.

### 9–16. Highway Preventive Maintenance Measures

*a.* A command-wide indoctrination program stressing preventive maintenance of highways will reduce unnecessary damage resulting from careless driving practices. The command concerned should publish a comprehensive snow and ice control plan that clearly specifies the responsibilities of engineer units and nonengineer units as well. It is important that the available snow and ice control equipment and supplies be allocated in a manner to support the ice control plan. As a general rule, engineer units are assigned responsibilities for snow and ice removal on the main road net, while using units are assigned responsibilities for the remaining roads and hardstands.

*b.* The importance of drainage to road construction and maintenance must be emphasized in engineer troop training.

*c.* Snow and ice problems in a temperate climate are best solved by summer and fall procurement and reconditioning of snowplows, distribution of cinders, sand, fine aggregate and salt, and similar preparations.

## Section V. RAILROADS

### 9–17. General

Strategic, tactical, and logistical plans are greatly influenced by the rail transportation system, even in regions of moderate industrial development. New construction may be confined to key projects such as depot yards, transfer points connecting two systems of different gage, short bypasses or sidings to eliminate traffic bottlenecks, port-egress lines, expansion of terminal facilities—particularly in regard to water supply and fuel storage—and short spurs to accommodate railway artillery and rail-transported launching facilities for guided missiles. Reconstruction is limited to the part of the system that is essential to military operations.

### 9–18. Responsibilities

Although AR 55–650 assigns responsibility for new construction and for reconstruction of railroad facilities to the engineer service, and responsibility for ordinary maintenance to the transportation service, the engineer must be prepared to act on many borderline cases. In situations where the transportation officer and engineer cannot mutually determine the responsibility, their recommendations are referred to the command G4 for decision.

### 9–19. Special Considerations

The following factors may assist the engineer in anticipating special problems:

*a.* As a general rule, a type field army require one double track line into its service area.

*b.* The enemy may be expected to concentrate his demolition efforts on turnouts (switch points and frogs).

*c.* Most railway bridging requirements can be satisfied by the simple steel-stringer type bridge supported on timber trestles or piles.

*d.* Native railway-operating personnel are a source of information on existing operation and supply facilities in a liberated area.

### 9-20. Reconnaissance

The surveys and studies and plans required for the construction of a railroad are more elaborate than those necessary for the construction of most roads.

*a.* Studies are made of the best available topographic maps to narrow the choice of routes to be reconnoitered.

*b.* Ground reconaissance is made of the possible routes. Items to be noted include odometer and barometer observations of distances and elevations, general character of the terrain, controlling curvatures, soil and drainage conditions, bridge and tunnel sites, the size and character of bridges needed, intersections with railways or important roads, availability of ballast and other construction material, and points at which construction parties would have access to the railway route.

*c.* A preliminary survey is then made which includes cross-sections along the feasible routes. Trial locations are plotted and adjusted to give the best balance of grades, compensated grades, cuts, and fills. This establishes or fixes the line of the railroad.

*d.* The precise line is then located by field survey parties and staked. This calls for much more precision than the location survey of most new roads, since the curves of a railway and superelevations must be accurately computed.

### 9-21. New Construction Principles

Except in the most primitive areas, the basis of the military transportation service in a theater of operations is the existing transportation network and its facilities, expanded as may be required to meet the total traffic load. All transportation in the theater must be organized into one system, each part supplementing the other, and all directed toward the theater requirements. The existing transportation facilities normally follow a nonmilitary pattern which may not correspond to the tactical plan. The logistical plan of support, however, is greatly influenced by the existing transportation system since maximum use must be made of the available system in order to expedite the operation. As in all other types of construction it is necessary that new construction be restricted to the minimum. Not only will such restriction reduce the material requirements, but the requirements for transporting the material will also be lessened.

## Section VI. AIRFIELDS

### 9-22. General

Road and airfield construction are similar. The equipment used, the sequence of operations followed, the methods used, and the types of construction employed are much the same. Both require the use of earthmoving and paving equipment, but airfields require a heavier concentration of this equipment. The principal difference between road and airfield construction in the theater of operations is related to the requirements for quality, grade, and smoothness of airfields dictated by modern high performance aircraft. In general, the present family of army aircraft is relatively light and was designed to operate under austere conditions. The family of air force cargo and tactical aircraft needed for support of ground operations, however, has generally been designed to operate on smooth paved surfaces. Specifically, these are the heavy and medium cargo aircraft and high performance fighter-bombers. These aircraft impose wheel loadings that are 3 to 5 times heavier than those of the heaviest ground vehicles and up to 10 times heavier than those of army aircraft. Additionally, tire-inflation pressures range upward to 270 pounds per square inch. In most cases these loadings cannot be supported for any length of time without high-quality structural surfacing, even on the most favorable subgrade soil conditions. Finally, requirements for maximum grades, changes of grade, and surface smoothness over short distances are far more limiting for even minor airfield construction in support of air force aircraft than for road or army airfield construction. Thus, for all rear and support area airfields that must support air force aircraft, from the division rear back through corps, army, and COMMZ, the requirements for plan-

ning, site selection, construction control, and time present as rigorous a task as will be faced by engineer units in a theater of operations.

### 9–23. Responsibilities

Refer to paragraph 2–17.

### 9–24. Special Considerations

The considerations given in paragraphs 9 through 14 for road construction are applicable to airfield construction.

### 9–25. Reconnaissance

Airfield reconnaissance differs from road location reconnaissance not so much in the type of information sought as in its comprehensiveness. Ordinarily, an airfield project involves more man-hours, more machine-hours, and more material than a road project. Consequently, an even greater degree of certainty that the site selected is the best site available becomes economically necessary. Also, certain additional requirements are imposed on an airfield site by the operational peculiarities of flight. Just as roads must be both feasible engineering-wise and adequate to accommodate the vehicular traffic to which they will be subjected, so must airfields be both feasible engineering-wise and suitable for the air traffic which will use them. Here, too, the difference is one of degree. Air traffic by its very nature imposes more severe limitations on its traffic facilities than does vehicular traffic. Also, a history or record of wind velocities and directions is of paramount importance to airfields, while unnecessary for roads. For further information on airfield reconnaissance, see FM 5–36 and TM 5–330.

## Section VII. BRIDGING

### 9–26. Responsibilities

Engineers are responsible for the construction, rehabilitation, repair, and maintenance—except for routine maintenance of railway bridges which is within the capability of the transportation railway operating battalion—of all highway and railway bridges in a theater of operations.

### 9–27. Special Considerations

*a. Economy of Time and Materials.* Of time and materials, time is normally the more critical in war and its economy is possibly the paramount consideration in the construction of military bridges. On the other hand, there is always an inherent shortage of construction materials in war and too free utilization of materials, to save time, in one locality or on one occasion, may result in failure of a military operation in another locality at a later date. A balance of these two economies must be achieved by weighing all factors.

*b. Mission.* The mission of a bridge is the most important factor in determining the type of bridge to be constructed.

*c. Permanency.* The length of time for which the bridge is intended to be used should be considered.

(1) Temporary bridges are usually constructed in forward areas for the purpose of opening routes of supply for the assault troops, or to provide access to certain areas for a limited period of time. They are hastily constructed and replaced as soon as possible, or abandoned altogether. These structures are designed for a short life, normally not over six months. If possible, provision should be made for easy replacement. Temporary bridges may be either prefabricated or field-designed. The prefabricated temporary bridges are designed to carry a given load and require a short time to construct. Their expense is justified by the decrease in erection time; however, they should be replaced as soon as possible to enable the reuse of the prefabricated materials in the more forward combat area. The field-designed temporary bridge most often used is the simple stringer span, timber trestle bridge. Logs or local ma-

terials are used in this type construction. Erection time is usually longer than for prefabricated bridges, but the logistical problems are greatly reduced. Simplicity and standardization of construction aid in rapid erection with a minimum amount of equipment and skilled labor.

(2) Semipermanent bridges normally are used to replace temporary structures and are intended to last for the duration of hostilities. The most common semipermanent structure is a timber or steel stringer span with either timber trestles or pile-type supports. Time is not as critical in the construction of a semipermanent bridge as it is with a temporary bridge and the material and construction effort normally have a greater influence. The location becomes important. Semipermanent bridges are tied in with existing road nets wherever possible, rather than detouring vehicles excessively to permit a shorter bridge crossing. These bridges are required to carry heavier loads and may be constructed by noncombat troops or civilian labor. With two exceptions—their less permanent nature, and the lack of consideration given to their appearance—these bridges are built in accordance with the recognized principles of civilian bridge construction.

(3) Permanent bridges are sometimes built in the rear areas along main routes. Very special circumstances may justify the decision to use this type of construction. In such construction, the equipment and materials available and the skill of the personnel, rather than the time element become the most important consideration.

*d. Materials.* Prefabricated fixed and floating bridge components as well as the standard family of beams and girders are used for tactical bridging. Depot stocks are conserved by the use of portions of existing bridges left in place or on site, and the utilization of materials developed by cannibalization of existing buildings for beams, timbers, and bracing. Strategically important material is stockpiled to be readily available as replacement.

*e. Design.* Designs for various types and sizes of military bridging are prepared and published by the Department of the Army. A theater headquarters may prepare and issue designs intended to utilize local materials and skills, simplify construction, or meet special load requirements. Officers responsible for the design and construction of bridges in a theater should adhere as closely as possible to standard designs unless there is good reason to depart from them, in which case the responsible engineer headquarters must do its own designing. This policy should not, however, act as a barrier to making any changes which would expedite work or economize labor or materials. For the techniques involved in designing a bridge, or computing accurately the military load classification of an existing bridge, see TM 5–312 and FM 5–36.

## 9–28. Site Selection

*a.* In many cases there is little choice in the selection of a bridge site. New bridges are frequently located at the site of a destroyed bridge in order to utilize existing routes, abutments, piers, or spans which may still be in good condition. Usually an existing site was originally planned to provide the most economical bridge at the best location. It may be necessary, however, to remove debris if the enemy has destroyed the old bridge, and if the destruction was complete the removal of the debris may be more time-consuming than the development of a new site. These considerations must be weighed in each individual situation.

*b.* Technical considerations such as soil conditions, height of banks, and stream characteristics also affect the time required for construction. The principal site conditions which must be considered in determining the most economical bridge are:

(1) *Soil conditions.* The choice of a foundation for an intermediate or end support depends on soil conditions. The major considerations are the soil capacity and the possibility of scouring action. Normally the easiest and

quickest type of foundation to construct is a spread footing; however, if there is a tendency to scour, piling is preferred. Spread footings may be used if adequately protected with rip rap, sheet piling, or cribs. On soils of low bearing capacity spread footings are often inadequate and piles will have to be employed.

(2) *Banks.* A low, flat, and marshy approach, or one subject to flooding demands either a very long bridge, or a causeway over the flood plain, with a bridge over the stream. As a general rule it is better to use a causeway in conjunction with a bridge when the fill is less than 15 feet. Over 15 feet it is usually easier to use a longer bridge. High banks necessitate either tall intermediate supports, or a cutting down of the approaches to a practical grade—an operation which can involve much time. High banks are not a great disadvantage for gaps that can be bridged with a single span.

(3) *Stream data.* The velocity, depth, and width of the stream and the effect on the proposed bridge must be considered. The best bridge sites are generally found on straight runs where there is less tendency to scour, and where the stream is usually narrower. Flood frequency and level must be considered in determining the height of the roadway. Piers that cause the least obstruction to the flow of water and debris should be used, and must be designed for stability against the forces of floods, debris, or ice. A thorough investigation of civilian bridges in the vicinity, and consultation with the natives provide a sound basis for accurate estimation of unusual stream conditions. Navigational clearance generally need not be considered. If a river or canal, however, is used to bring supplies by barge, provision should be made for the movement of river traffic.

### 9–29. Construction Principles

*a.* The construction of a bridge must be well planned, and personnel and equipment must be used efficiently. A construction schedule is helpful in insuring the latter, by showing the number of men and the amount of equipment required, as well as their disposition throughout the project. The extent to which the construction schedule is developed depends on the time available.

*b.* Standard designs, material sizes, methods of construction, and training are useful and economical in military practice. It is desirable to regulate the supply and stockpiling of materials and avoid too large a variety of sizes and shapes of timber, steel, and other materials. A limited variety of materials aids in standardizing designs, construction details, and methods of construction, and results in a repetition of tasks which promotes a high degree of skill in the construction personnel.

*c.* While it is almost always more economical in time to use completed prefabricated bridge structures, it is almost never more economical from a logistical standpoint. Therefore, prefabricated bridges are normally replaced by field-designed bridges when the tide of battle has waned and time and materials are available. Many details of field designed bridges may be standardized, resulting in advantages normally associated with prefabricated bridges.

## Section VIII. PORT CONSTRUCTION AND REHABILITATION

### 9–30. General

Obtaining adequate ports early in any oversea operation is so vitally important that one of the initial objectives of a campaign is to secure them. The construction of new ports is undesirable as it requires a large amount of manpower, materials, and time and probably would lack the desirable urban community at or near the site. Generally, temporary ports and landing facilities are used in the initial

phase of an invasion and are abandoned as soon as established ports are captured and rehabilitated. It is improbable that an existing port will have the precise facilities needed; if it has been under enemy control, it will probably be badly damaged. Therefore, construction at ports in a theater of operations consists of repairing, rebuilding, enlarging, or adding new facilities. This type of construction differs from other construction in that much of it is done in and over water. In the construction of port shore installations, such as warehouses, roads, and railroad track, standard military construction procedures are followed. Special consideration and priority of effort must be given to construction, rehabilitation, or improvement of marine POL terminal facilities to achieve an early capability for unloading POL tankers and lighters. As a passive protection measure, POL facilities should be dispersed and sited away from other port facilities.

## 9-31. Responsibilities

*a. General.* The operation of a port in a theater of operations is a large and vital undertaking, with many divisions of responsibilities between the Navy and the service forces within the Army. Basic decisions as to the location of ports, capacity, utilization, wharfage, and storage facilities are made at theater headquarters and TALOG headquarters levels. The numerous units involved are coordinated through the commander and staff of a transportation terminal command. The transportation officer is responsible for operating ports and furnishing liaison with the Navy, Coast Guard, and other interested military and authorized civilian agencies, both of Allied countries and the United States. Engineers construct and maintain new ports and rehabilitate captured ports. Engineer responsibility includes minor salvage operations, such as clearing obstructions and debris from harbor entrances and channel improvement, but does not include large-scale salvaging, which is a Navy responsibility. The transportation officer requests, advises, and makes recommendations concerning engineer troops employed and the work concerned.

*b. Engineer Responsibilities.* In the construction of ports the engineer is normally charged with the following duties:

(1) Construction and repair of breakwaters, docks, piers, wharves, quays, moles, and landing stages.

(2) Reconstruction of utilities and clearance of debris within the port area.

(3) Dredging.

(4) Repair of roads and railroads within the port area.

(5) Firefighting.

(6) Acquiistion of buildings, facilities and other property within the port area for military use.

(7) In a large port expansion or rehabilitation operation, engineers must provide warehouses, depots, quarters for transients and port personnel, tank farms, roads, railroads, and utilities. Such a project is usually under an engineer construction group which has, in addition to the specialized port construction units, construction battalions, dump truck companies, engineer pipeline companies, and other units as needed.

## 9-32. Special Considerations

*a.* Essential to successful port construction is careful planning based on extensive and detailed port reconnaissance. Reconnaissance should be conducted throughout the action up to actual occupation, for though initial planning may have been completed prior to occupation, last minute enemy action may render the plans obsolete. Other equally important factors to be considered in port reconstruction include the availability of necessary construction materials and special nonorganic equipment, such as dredges, lighters, barges, cranes, diving equipment, pile drivers, and floating shops. The order and shipping time on these items may be three months or more.

*b.* Because of mines and demolitions, unloading capacities are nearly always extremely limited immediately following the capture of a port area, while, at the same time, the demand for supplies for direct support of combat operations may be urgent. The engineer can do little to improve this situation until consid-

erable tonnage of his reconstruction materials and equipment is unloaded. Unloading priority is therefore a command decision based on the situation.

*c.* Planned structures should be based on the simplest type of construction such as timber piling, or timber trestles, in order that materials may be readily adapted to unexpected conditions.

*d.* Under favorable conditions timber piling and lumber may be rafted over short distances directly to the worksite to conserve shipping.

*e.* Waterline facilities are usually provided in the following order:

(1) Ramps for landing craft and amphibious vehicles.
(2) Beach roads.
(3) Marginal piers for shallow-draft vessels.
(4) Berths for deep-draft vessels.

*f.* The best interest of the overall operation may be served by partially operating port structures simultaneously with their reconstruction, even though such operations hinder the engineer effort.

*g.* The ultimate capacity of a port is more frequently limited by its highway- and rail-egress facilities than by its waterside facilities.

*h.* A physical apportionment of areas of a port between two Allied forces or between the army and navy should be avoided since it requires much coordination, particularly in regard to rehabilitation and operation of common facilities, such as utilities and rail yards.

*i.* Technical assistance on highly specialized matters such as electrical circuits, operation of tidal locks, operation of existing cargo-handling equipment, and information on foundation conditions may be obtained from local port authorities. Prisoners of war may be a source of highly skilled labor.

*j.* A liberal proportion of the personnel making up port reconstruction units should be drawn from civilian construction firms experienced in this type of work. Even then, however, the units require extensive training.

## Section IX. PIPELINES

### 9–33. General

Enormous volumes of liquid fuels are consumed by a large military force engaged in active operations; this imposes a difficult problem of storage. Pipelines with rates of flow closely approximating the consumption rates of using units not only reduce storage requirements, but are the most economical means of transporting large quantities of bulk liquid fuels. However, storage requirements are based on the days of supply of fuel required by the theater plan and adequate storage facilities must be constructed and maintained in accordance with the plan.

### 9–34. Responsibilities

Engineer units are responsible for all construction and rehabilitation of military pipelines, including associated installed facilities (discharging, loading, pumping, and storage) and for field maintenance of engineer mechanical equipment components of military pipelines. Since ship transportation of POL products is handled by a naval operations group, the engineer coordinates with the navy on problems involving ship-to-shore lines. Storage facilities within an installation, such as airbases and naval bases, may be constructed by engineers, but are operated by troops under the control of the installation commander. Distribution priorities frequently involve coordination with Allies, and are normally controlled by the Joint Petroleum Office (JPO) of the theater commander's staff.

### 9–35. Special Considerations

*a.* Operation of pipelines for the distribution of bulk petroleum fuels within a theater is accomplished by the Petroleum Intersectional Service (POLIS) operating under the staff supervision and, normally, the operational control of the TALOG quartermaster.

*b.* Construction of pipelines will normally be under the staff supervision of the TALOG engineer; however, construction of temporary and

assault systems in the combat zone will ordinarily be accomplished under supervision of the staff engineer of the tactical command concerned. Construction and combat engineer units of TALOG and the field army are capable of pipeline construction when augmented by the engineer pipeline construction support company.

*c.* Close coordination between the engineer and the air force must be effected as the air force is one of the largest consumers of liquid fuel and has area control over its own installations.

*d.* New items of equipment such as jet planes, reaction motors, and guided missiles may introduce problems in the handling and storage of special fuels such as kerosene, alcohol, or turpentine.

*e.* The design, layout, and construction of a pipeline system is an extremely specialized and complex matter. The engineer may require on his staff a qualified pipeline engineer experienced in commercial practice.

*f.* The location of QM dispensing facilities should be planned along with the layout of the pipeline system.

*g.* Pipeline security should be considered when planning layouts of pipeline systems.

*h.* Special aircraft, such as helicopters, may be employed for patrolling lines, and for rapid delivery of pipeline construction materials and collapsible rubberized fabric storage tanks to worksites.

*i.* The need for camouflage and dispersion of tank-farm facilities is great. Protective construction may be required in some cases.

*j.* Desert operations may require a separate pipeline for water.

*k.* Multiproduct pipeline operation (using same line for several fuels) will be the normal method of operation.

*l.* Useful and essential control data, aerial photography, and intelligence data should be obtained from engineer mapping and intelligence sources when determining the best location of pipeline systems.

*m.* Close coordination with the quartermaster unit which will take beneficial occupancy of a pipeline facility is necessary during planning and construction phases.

*n.* Advance planning for offensive operations must include consideration as to alinement and capacity of systems required to sustain the forces involved and the rates of movement anticipated. Planning must also include arrangements for stockpiling and movement of materiel to extend pipelines and to construct additional storage complexes. During the advance, and as alinement of the lines of communications (LOC) are established, construction units from the communications zone extend fixed, large-diameter pipelines into the combat zone as far forward as time and effort permit and the situation demands. Combat engineers extend the fixed pipeline system by construction of temporary small-diameter pipeline and hoseline systems to serve army and corps supply points, airfields, and other points of high-fuel consumption or distribution. The temporary systems are recovered by either combat engineers or construction units as the large-diameter pipelines are advanced, and are reused as required.

# CHAPTER 10
# COMMUNICATIONS IN ENGINEER UNITS

## 10–1. General

Military operations cannot be carried on unless the commander can convey his orders to his subordinates and, in turn, receive information from them. With the exception of mail and personal interview, the means of doing this comes under the heading of signal communications. Communications are required within all engineer units for command and control. Normal requirements are met by the use of radio, wire, and messenger. Principal reliance will be on organic continuous wave and voice radio, with wire and messenger supplementing and alleviating radio traffic. These means normally are sufficient to carry peak loads generated by the units mission.

## 10–2. Responsibilities

*a.* The establishment of communications is a command responsibility and the commander is responsible for:

(1) Establishing communications from the higher headquarters to the lower headquarters within the resources at his disposal.

(2) Establishing lateral communications from left to right unless a higher headquarters direct otherwise.

(3) Providing communications to supported units.

*b.* Normally, each engineer unit at battalion or higher command echelon is authorized a communications officer by TOE. When a unit is not authorized a communications officer the S1 frequently performs the task as an additional duty. The communications officer supervises the installation, operation, and maintenance of communications equipment, and is responsible to the commander for instituting and enforcing sound communications security practices throughout the unit. He advises the commander and staff in communications matters, submits recommendations for establishing communications systems, and drafts or secures signal operations instructions (SOI) and standing signal instructions (SSI).

*c.* There are five means of communication:

(1) Radio.

(2) Wire.

(3) Messenger.

(4) Visual.

(5) Sound.

## 10–3. Radio

Radio is the primary means of communication within engineer units. The extensive use of radio makes it necessary for all engineer personnel to have a general understanding of radio communications operations and procedures. Most of the radios in engineer units are voice radio sets, but radio teletype (RATT) and continuous wave (CW) operations are also used. Radio has distinct advantages over wire communications. Radio communications can give the quick transmission, quick response type of communications and can be placed in operation quicker than wire circuits. Radios organic to engineer TOE units have limitations, however, such as transmission security, single channel capacity requiring a net control station when more than two stations are in the net, and possible interference from enemy or friendly stations. Deliberate jamming may be offset in part by security measures and training in operating procedures. The range and reliability of radio communications depends upon such factors as the frequency, power, and location of the transmitter and receiper; the terrain; the weather; the technical proficiency of operating personnel. type of antenna used, and similar factors. Organic radio communications permit rapid reaction to changes in tactical situations and are the principal communica-

tions means which can be relied upon in a fluid situation. However, organic radio communications should be supplemented by organic wire systems connected to the area communications system as soon as possible. Personnel must be trained in the proper employment and procedure for the operation of these organic radio nets. Lack of training can result in unnecessary transmissions and a security violation, which in turn may contribute to the loss of life. Radios which may be found in engineer units are listed in table 10–1 below. Figures 10–1 and 10–2 are typical radio and wire diagrams for engineer units in a theater of operations.

*Table 10–1. Radio Equipment*

| Type | Planning distance | Frequency range | Type of service | Remarks |
|---|---|---|---|---|
| AN/GRC–106 | 80 km | 2–30 mc | SSB-Voice<br>AM-Voice<br>AM-CW | Command net. Used by all engineer units down to company headquarters. |
| AN/PRC–25 | 5–8 km | 30–75.95 mc | FM | Portable transistorized set. Used at squad level or for utility set for dismounted operations. |
| AN/VRC–46 | 25–32 km | 30–75.95 mc | FM | Single receiver transmitter. Used at company and platoon level when working in one net only. Also used by battalion and higher staff. |
| AN/VRC–47 | 25–32 km | 30–75.95 mc | FM | Single transmitter with two receivers. Used at company and higher level to monitor one net while working in another. |
| AN/GRC–46 | 80 km | 1.5–20 mc<br>Transmit<br>0.5–32 mc<br>Reception | AM-Voice<br>AM-RATT<br>AM-CW | Used throughout the combat zone. Will be replaced by the AN/GRC–122 or AN/GRC–142. |
| AN/GRC–122 | 80 km | 2–29.999 mc | SSB-Voice<br>AM-CW<br>AM-Voice<br>SSB-RATT | Replaces AN/GRC–46. Used throughout the combat zone for command, operations, and intelligence nets. Has full duplex RATT capability. |
| AN/VRC–53 | 5–8 km | 30–75.95 mc | FM | Vehicular version of radio set AN/PRC–25. Used in units when short range vehicle radio is required. |
| AN/GRC–125 | 5–8 km | 30–75.95 mc | FM | Combination vehicular-man pack version of radio set AN/PRC–25. Employed in company and battalion. |
| AN/GRC–142 | 80 km | 2–29.999 mc | SSB-Voice<br>AM-CW<br>AM-Voice<br>SSB-RATT | Replaces AN/GRC–46 used throughout combat zone for command operation and intelligence nets. Has half duplex RATT capability. |

*Other Radio Equipment*

Also authorized by TOE is a variety of supplemental antennas, D.C. generators, radio set control groups, power supplies, and repair and testing equipment.

*Legend*

SSB—Single-Side Band
CW—Continuous Wave
RATT—Radio Teletypewriter
FM—Frequency Modulated
AM—Amplitude Modulated
mc—Megacycles

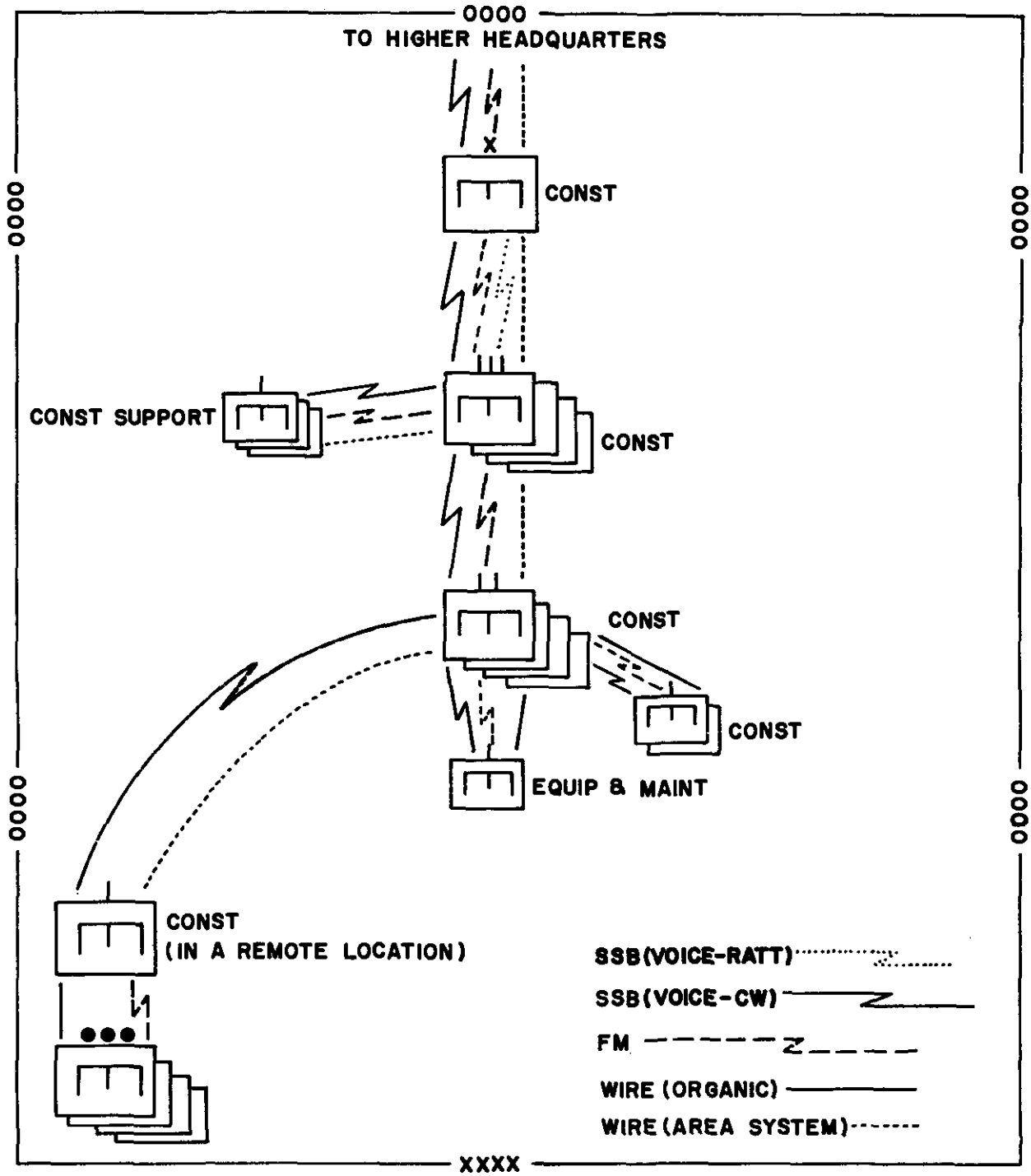



*Figure 10-1. Typical radio and wire diagram for COMMZ engineer construction units.*

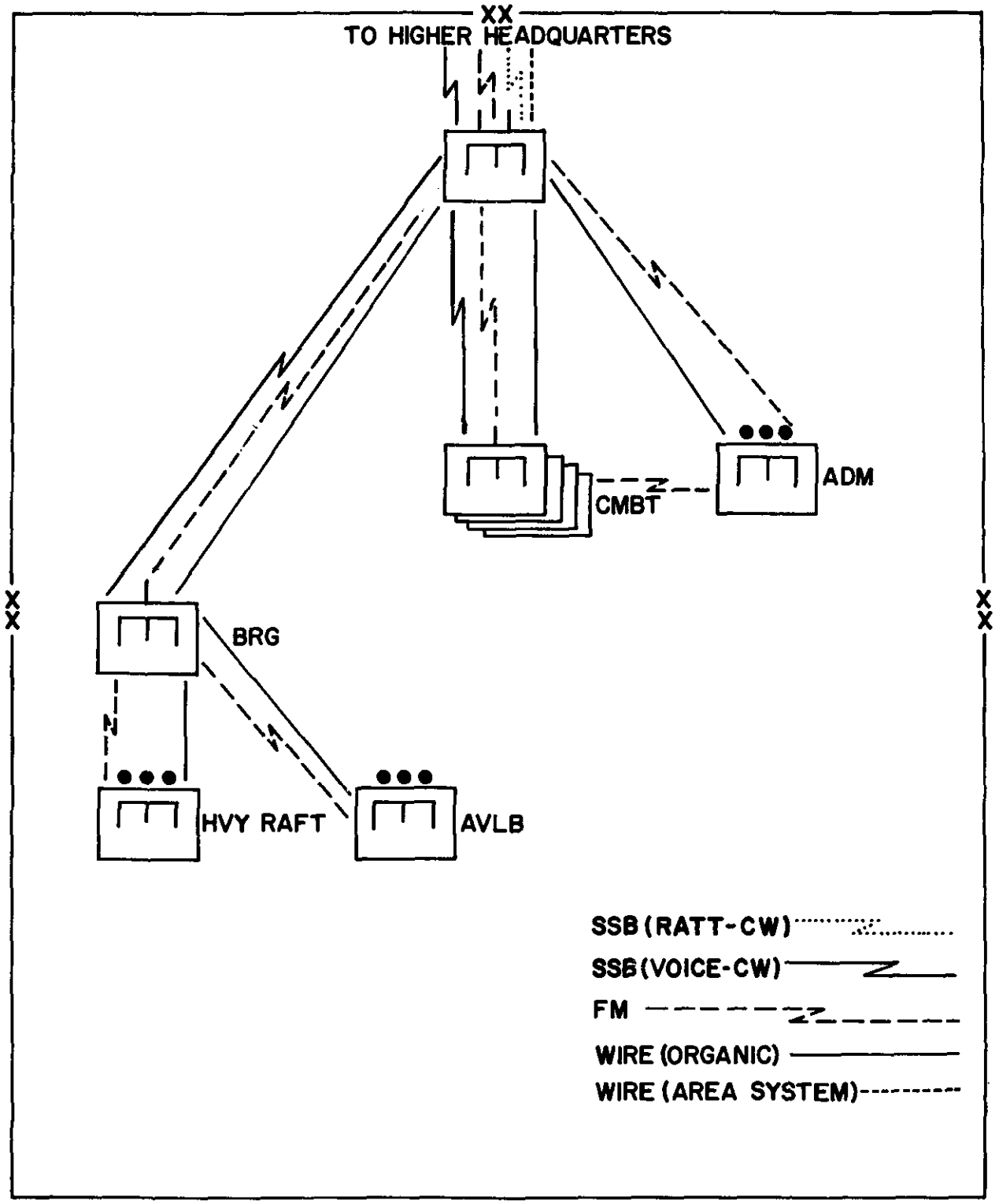



*Figure 10-2. Typical radio and wire diagram for divisional engineer battalion.*

## 10–4. Wire

The use of wire is not only desirable, but necessary in certain engineer operations. During periods of radio silence, severe atmospheric interference, and enemy jamming operations, wire may become the primary means of communications and, therefore, is an essential component of the operational communications system of engineer units. In the COMMZ, especially where there is a heavy load of administrative and logistical traffic, wire is employed to great advantage. Telephone and teletype systems contribute to the rapid interchange of information. Wire communications can and should be used in any situation where time and security permit its installation. In comparison with organic radio communications nets which are immediately available, wire nets may require more time to establish. They also are less flexible, and are susceptible to disruption by enemy fire, traffic, and sabotage. However, wire nets are generally more secure and more reliable than are radio nets and have the distinct advantage of being less adversely affected by variations in weather and terrain. Some of the wire equipment found in engineer units is listed in table 10–2 below.

*Table 10–2. Wire Equipment.*

| Type | Description |
|---|---|
| | *Switchboards* |
| SB–22/PT | A portable, local battery, monocord switchboard, capable of connecting 12 local battery telephone circuits, remote controlled radio circuits, or voice frequency teletypewriter circuits. |
| SB–993/GT | A lightweight, portable, emergency switchboard, capable of handling six local battery telephone lines. Normally employed in company size units. Must have a separate telephone instrument provided for the switchboard operator. |
| SB–86/P | A complete, transportable, single position nonmultiple, local battery, tactical switching central capable of terminating 30 magneto or common battery signaling lines or trunks. Employed throughout the combat zone. |
| | *Telephones* |
| TA–1/PT | A sound powered telephone for use on field wire lines to communicate with any field telephone, local battery switchboard, or common battery switchboard. Employed in forward combat areas at company level. |
| TA–312PT/ | A rugged, lightweight, waterproof, battery operated telephone set designed for local battery, common battery, or common battery signaling operation. Employed throughout the combat zone. |
| | *Teletypewriter* |
| AN/GGC–3 | A lightweight, transportable teletypewriter set. Provides facilities for manual transmission directly from keyboard, and tape transmission from transmitter-distributor. Received messages are printed and perforated on a paper tape for later transmission. Employed throughout the combat zone. |
| AN/PGC–1 | A portable send-receive teletypewriter page printer. Employed throughout the combat zone. |
| | *Wire* |
| WD–1/TT | General purpose, twisted pair, polyethylene field telephone wire packaged as follows: ¼ mile on spool, DR–8; ½ mile on wire dispenser, MX–306A/G; one mile on wire reel, RL–159/U; and 2½ miles on cable reel, DR–5. |
| | *Other wire equipment* |
| | Also authorized by TOE is a variety of wire dispensing reels, repair and installation sets, and testing equipment. |

## 10-5. Messenger

Messengers may be used extensively in local engineer operations for the delivery of low-precedence messages that would otherwise overload electrical facilities, when wire and radio communications are impracticable, when communications equipment breaks down, and for the delivery of bulky material. Messengers are the most secure means of communications.

## 10-6. Visual

Visual communications of various types are often employed in the course of engineer support operations. The use of flag or arm signals; lamps and flashlights; panels, pyrotechnics and smoke signals; and infrared signaling devices are means of communicating a visual message.

## 10-7. Sound

This classification includes communications by gong, siren, horn, whistle, klaxon, buzzer, and similar devices. Sound signals are normally employed to transmit prearranged messages or warnings, such as a gas or air-raid warning.

## 10-8. Displacement

*a. Command Posts.* The tactical situation occasionally may require the establishment of an alternate or an additional command post. Engineer units normally have only essential communications-electronics equipment; therefore, organic equipment must be used to the utmost. Normally the radios of the executive officer or the S3 are used when fragmentation is required. The unit communications officer must fully utilize communications equipment and realize that each tactical situation will present a different communications situation which will call for various combinations of communications equipment.

*b. "Jump Communications."* The capability to move forward and displace an engineer unit and still provide communications at both locations is called a jump. The communications officer normally will provide a jump team to move forward with the advance unit to provide communications. When the rear area moves forward, they become the jump team and assume the role of the advance communications team. No additional communications equipment is provided for this jump team and organic equipment must be used for this move.

*c. Radio-Relay.* In some situations out of line of sight or other situations where stations cannot make contact directly, a radio may be located on high ground as a radio-relay station.

*d. Radio Wire Integration.* Radio wire integration (RWI) can be used to connect the commander and staff or other radio stations of the engineer units to the unit switchboard and to subscribers thereof. The system is established so that continuous communications can be maintained within and between all units.

# CHAPTER 11

# COMBAT SERVICE SUPPORT

## Section I. RESPONSIBILITIES

### 11-1. Theater Army

The theater army commander is responsible for the combat service support of U.S. Army forces in the theater, and for the combat service support of such U.S. Navy, U.S. Air Force, and other forces as directed by higher authority. He accomplishes this mission by assigning responsibilities to his major subordinate commanders, primarily the commander of the theater army logistical command and the field army commanders.

### 11-2. Theater Army Logistical Command (TALOG)

The TALOG commander is responsible for the combat service support of all army forces in the theater, and of such navy, air force, Allied forces and civilians as directed. To aid him in the accomplishment of this mission he assigns responsibilities to his major subordinate commanders as follows:

*a. Base Logistical Command (BALOG).* The BALOG is normally located in the rear of the communications zone and is the initial point for the receipt of supplies from the Continental United States (CONUS). The BALOG commander is responsible for providing combat service support to designated advance logistical commands and units in the communications zone. He may also be required to support field army supply installations and organizations (where advance logistical commands are not existent). He accomplishes his supply mission through the functional supply units assigned to BALOG which operate the functional depots of the BALOG. He accomplishes his maintenance and service missions through the functional maintenance and service units assigned to BALOG. Principal operating elements of the BALOG are any or all of the following:

(1) Area commands.

(2) Functional depots.

(3) Functional maintenance, supply and service units.

(4) Tactical units required for rear area security missions.

(5) Military police prisoner of war command.

*b. Advance Logistical Command (ADLOG).* The ADLOG is located in the forward area of the communications zone and provides combat service support to forces in the combat zone. The ADLOG commander accomplishes his supply mission through the functional supply units assigned to ADLOG which operate the functional supply depots of the ADLOG. He accomplishes his maintenance and service missions through the functional maintenance and service units assigned to ADLOG. Principal operating elements of the ADLOG are any or all of the following:

(1) Area commands.

(2) Functional depots.

(3) Functional maintenance, supply and service units.

(4) Tactical units required for rear area security missions.

(5) Military police prisoner of war command.

### 11-3. Field Army

The field army commander is responsible for combat service support of field army units, for common item supply support of other services

as directed, and for support of civilians as directed. He accomplishes his combat service support mission by assigning these responsibilities to the commander of the field army support command (FASCOM). The corps commander normally is not in the chain of supply but determines allocation of critical supplies such as class V supplies and other selected items which may be in short supply. The division commander accomplishes his combat service support mission through his division support command (DISCOM).

## Section II. SUPPLY

### 11–4. Principles of Supply

The following basic principles underlie military supply:

*a.* Impetus of supply is from rear to front. It is a function of each element in the supply chain to push supplies forward to more advanced elements. However, supply is ultimately a command responsibility, and every commander is responsible for preparing advance estimates of his supply needs, making these known to higher headquarters, and arranging to draw and distribute supplies allocated to his unit.

*b.* Simplicity in supply procedures and economy of supplies are vital.

*c.* Local sources of supplies, improvisation, and expedient substitution for standard items which are not available must be utilized to the utmost.

*d.* Since the flow of supplies is always subject to interruption, safety levels as operating levels must be maintained throughout the theater. Reserve supplies at unit levels must be constantly replenished.

### 11–5. Classes of Supplies

All supplies issued to the Army fall into one of five classes, as follows:

*a. Class I Supplies.* Items which are consumed by personnel or animals at approximately uniform rates regardless of tactical or other factors. Examples are rations and forage. Post exchange supplies issued on a gratuitous basis are also included in class I.

*b. Class II Supplies.* Items of supply and equipment for which allowances are prescribed by such documents as tables of organization and equipment (TOE), tables of allowances (TA), prescribed load lists (PLL), or special lists or letters. Examples are weapons, clothing, vehicles, and repair parts.

*c. Class III Supplies.* These supplies consist of fuel and lubricants for all purposes, except for air vehicles or for use in weapons. Examples are gasoline, kerosene, diesel fuel, lubricating oil, grease, and solid fuels such as coal, coke, and wood. Aviation fuel is classified as IIIA.

*d. Class IV Supplies.* These consist of supply and equipment items for which allowance is not prescribed and which are not otherwise classified. A good portion of engineer materiel is class IV, such as construction and camouflage materiel, component sets of the engineer functional components system, and construction and utility equipment not authorized by TOE or other tables or lists. Aviation supplies and equipment for which allowances for initial issue to organizations are not prescribed by appropriate tables of allowance lists, or which require special measures of control are class IVA.

*e. Class V Supplies.* Class V supplies consist of ammunition containing explosives, propellants, pyrotechnics, initiating composition, or nuclear, biological, or chemical material, including atomic demolition munitions, for use in connection with defense or offense. Certain ammunition can be used for training, ceremonial, or nonoperational purposes. For definitions of conventional ammunition and special ammunition, see AR 320–5 and FM 9–6.

## Section III. MAINTENANCE

### 11–6. Categories of Maintenance

*a. Organizational Maintenance.* Organizational maintenance is that maintenance normally authorized for, performed by, and the re-

sponsibility of a using organization on equipment in its possession. This maintenance consists of functions and repairs within the capabilities of authorized personnel, skills, tools, and test equipment as prescribed in appropriate Department of the Army TOE's or TD's. (This function was formerly known as 1st and 2nd echelon maintenance.)

*b. Direct Support Maintenance.* Direct support maintenance is that maintenance normally authorized and performed by designated maintenance activities in support of specific using organizations. This category of maintenance is limited to the repair of end items or unserviceable assemblies on a return-to-user basis. (This function was formerly known as 3d echelon maintenance.)

*c. General Support Maintenance.* General support maintenance is that maintenance authorized and performed by designated TOE and TD organizations in support of the army supply system. Normally TOE and TD general support maintenance organizations will repair or overhaul materiel to required maintenance standards in a ready to issue condition based upon applicable supported army area supply requirements. (This function was formerly known as 4th echelon maintenance.)

*d. Depot Maintenance.* Depot maintenance activities, through overhaul of economically repairable materiel, augment the procurement program in satisfying overall army requirements, and when required provide for repair of materiel beyond the capability of general support maintenance organizations. (This function was formerly known as 5th echelon maintenance.)

## 11-7. Maintenance Responsibilities

*a. General.* Every member of the armed forces has a definite maintenance responsibility for the material that is directly or indirectly under his control. These responsibilities vary from organizational maintenance operations, to highly specialized repair and reconditioning techniques, to supervision and inspection. Equipment operating personnel, technical maintenance experts, and commanders of all echelons must prevent the deterioration, and insure the efficiency, of all engineer equipment through effective preventive maintenance procedures.

*b. Command and Staff Responsibility.* A large portion of the mechanical equipment in a theater of operations is engineer equipment. Commanders at all echelons are directly concerned with the use and maintenance of this equipment in their commands. Staffs of all intermediate commands—such as brigades, groups, battalions, separate headquarters, and corresponding air force and navy commands—plan, train, inspect, and coordinate to insure proper use and maintenance of engineer equipment within their commands.

*c. Unit Commanders.* Listed under the capability statement of each TOE or TD is the category of maintenance a unit is authorized to perform. The unit commander has the responsibility for maintenance and repair parts support commensurate with this stated capability. All unit commanders are responsible for the performance of organizational maintenance; some selected engineer units (e.g., the engineer construction battalion) are authorized a TOE capability to perform direct support maintenance on engineer equipment and the unit commander, in this case, has this additional responsibility. Unit commanders conduct command inspections, and schedule technical inspections of equipment in their units. They are responsible for proper operation of the equipment under their command and for the prevention of equipment abuse. They enforce safe operating rules and traffic regulations, and are responsible for the proper execution of all forms, records, and reports concerned with operation, maintenance, and inventory of equipment. They procure and distribute technical literature, training manuals, repair parts and maintenance tools. They establish maintenance facilities to aid in discharging their maintenance responsibilities.

## Section IV. THEATER COMBAT SERVICE SUPPORT

### 11-8. Levels of Supply

*a. Theater Levels and Objectives.* Supplies will flow into the theater, and through it to using troops, continuously and uniformly. The total quantity of supplies in the theater, or in any element of it, will fluctuate. Levels must be held high enough to avoid disastrous shortages and low enough to avoid congestion. For this purpose levels of supplies are established.

*b. Definitions.* For the theater as a whole:

(1) *The operating level of supply.* This is the quantity of materiel required to sustain operations in the interval between requisitions or the arrival of successive shipments.

(2) *The safety level of supply.* This is the quantity of materiel, in addition to the operating level of supply, required to be on hand to permit continuous operations in the event of minor interruption of normal replenishment or predictable fluctuation in demand.

(3) *Theater stockage objective.* The theater stockage objective consists of the sum of stocks represented by the operating level and the safety level (1) and (2) above.).

(4) *Order and shipping time.* Order and shipping time is the time elapsing between the initiation of stock replenishment action for a specific activity and the receipt by that activity of the materiel resulting from such action.

(5) *Theater requisition objective.* This is the maximum quantities of materiel to be maintained on hand and on order to sustain current operations. It will consist of the sum of stocks represented by the operating level, safety level, and the order and shipping time.

*c. Theater Subdivisions.* For subdivisions of the theater, levels of supply, in terms of days of supply of an item, are set by higher headquarters. Theater army determines the levels for both the field army and TALOG. TALOG, in turn, sets levels for BALOG and ADLOG. Levels are also set for depots and other supply installations. Staff engineers make constant recommendations for the levels of engineer supply to be maintained at the various echelons.

### 11-9. Procurement

*a.* Determination of engineer and other supply requirements for the current and future operations of any unit or installation in a theater is the responsibility of the commander and his staff.

*b.* For the theater as a whole, responsibility for determining requirements falls on the theater and TALOG headquarters. Initial equipment requirements are provided from the CONUS. Requirements for replacement of equipment and for current consumption are computed on the basis of actual or expected troops in the theater, tables of allowances, experience tables, and a consideration of tactical and strategic plans. Reserves are computed on the basis of minimum level of supply. Engineer projects require vast quantities and varied items of supply and equipment, and at higher levels, their determination with any degree of accuracy is complex and laborious. They are principally class IV items used in the construction, repair, and maintenance of field fortifications, roads, railroads, bridges, port and waterfront facilities, housing and structures of all types used in the theater, and water distribution and electric power systems. How much will be needed, when and where, is affected by such factors as the facilities and resources of the theater at the outbreak of war; the extent to which the enemy may have destroyed them; whether the campaign will develop offensively or defensively; and the extent to which we can keep command of the air and minimize enemy bombing.

*c.* Procurement from the CONUS is also a task handled primarily by theater, TALOG headquarters, and the Department of the Army. Initially, troop units are sent to a theater fully equipped. For a certain period fol-

lowing initial occupation, supply from the CONUS is largely automatic, at a rate prescribed by the Department of the Army. At a later stage the basis of procurement changes from automatic shipment to requisition. Theater requisitions for engineer and other supplies are based primarily on prescribed minimum and operating levels, but must take careful account of project requirements for special large-scale operations.

*d.* Requisitions for supplies from the CONUS are prepared and submitted as required in accordance with policies and directives of the Department of Defense and the Department of the Army (AR 725–50). All requisitions are prepared and forwarded by TALOG to the appropriate Army Inventory Control Point (AICP) or National Inventory Control Point (NICP). Chiefs of AICP and NICP are responsible for processing these requisitions and notifying the theater of shipment and expected date of arrival at destination. When the AICP's and/or NICP's are unable to supply an item by the time requested, TALOG is furnished a notice of the delay. This notice of delayed items includes information concerning the expected dates of availability for the items involved. In the event that the requisitioned item is not available in the CONUS and for any reason will not be procured, a notice of nonavailability is furnished the requisitioning agency, along with recommended available substitute items, if any.

## 11–10. Local Procurement

*a.* The task of providing engineer supplies for a modern army from the CONUS, especially in an oversea theater, is so large, so complex, and so costly in manpower, materials, and money, that every effort must be made to simplify it by local procurement. The four recognized methods for this are purchase, requisition, confiscation, or by requiring money contributions.

*b.* Class IV engineer supplies include many categories of items suitable for local procurement. Among these are:

(1) Items such as lumber, cement, structural steel, and railroad rails and ties, local procurement of which will save a great deal of shipping space on account of their bulk and tonnage.

(2) Other manufactured items such as plumbing and electrical supplies, hardware, paints, and camouflage materials obtainable from civilian sources. The local procurement of these items will reduce and simplify the support of the theater by the CONUS.

(3) Repair parts for nonstandard items such as local power plants, water distribution systems, and machine shops which engineer units must operate and maintain.

*c.* Engineer commanders and staff officers at all levels must always be alert to ascertain and utilize such local resources. Policies regarding utilization of local resources are set by theater headquarters.

*d.* Local procurement by engineers often involves using the output of industrial plants in the theater, and may involve taking over such plants and supervising their operation and maintenance.

*e.* Construction materials such as sand, gravel, rock, cement and lumber are the items most commonly procured locally for use by engineer units.

*f.* Close coordination with civil affairs units is vital in obtaining supplies through local procurement because of the effect such procurement may have on the local economy.

## 11–11. Organization of Maintenance Support

*a. General.* Functional maintenance units are disposed both laterally and in depth, in both the communications zone and the combat zone, to offer the best possible service to the equipment being maintained. Direct support maintenance units remain sufficiently close to units being served to give close contact support, but with due consideration to the tactical situation, terrain, cover, and concealment. As far as practicable, direct support maintenance units support the same tactical units throughout an operation. This improves liaison, understanding, and cooperation between supporting and sup-

ported units. Maintenance shops and facilities, once established, remain in operation in the same locality as long as tactically practicable without sacrificing service to supported units. Units performing depot maintenance, if depot maintenance is performed in the theater, are located in the base section.

*b. Engineer Units.* Because of the large quantity of equipment used by engineer units, continuing serviceability of these items is of great concern to the engineer unit commander. Proper organizational maintenance, including scheduled maintenance, and familiarity with the support provided by the supporting direct support maintenance unit will aid engineer units in keeping mission-essential equipment in an operational status.

*c. Maintenance Performance.* Organizational maintenance of equipment is performed by the using unit. Direct support maintenance of this equipment is provided by a designated direct support maintenance unit. When an item of equipment requires direct support maintenance, it is normally evacuated to the supporting direct support maintenance unit for repair and return. In emergencies, though, and in other cases where on-site repair is more practicable, repair may be accomplished at the site of equipment failure by work parties dispatched by the supporting maintenance unit. Liaison is maintained between the engineer unit and the supporting maintenance unit for the interchange of information, maintenance requirements, and for the establishment of mutually acceptable working relationships.

*d. Contact Repair.* When requesting on-site repair, the engineer unit must inform the supporting maintenance unit of the location of the equipment; the nature of the malfunction, if known; and any other information that may assist the maintenance unit in organizing and equipping the work party (e.g., any known repair parts requirements would be indicated). The engineer unit may also be required to furnish a guide to the equipment site.

*e. Liaison.* Liaison between the supporting maintenance unit and the engineer unit is routine. The maintenance unit may dispatch liaison parties to the engineer unit to discuss maintenance requirements, problems, and procedures, and to provide advice and assistance on the maintenance of equipment. The engineer unit may request additional advice and assistance at any time, and at times the scope of such required advice and assistance will result in the dispatch of a technical assistance team from the supporting maintenance unit.

*f. Repair Parts Requirements.* An adequate supply of repair parts, assemblies, and tools must be available if maintenance units are to operate at maximum efficiency. Each unit is authorized a supply of repair parts, assemblies, and tools commensurate with its maintenance responsibilities, and the replacement of these items is accomplished through maintenance and supply channels. Unit commanders normally obtain repair parts from the supporting direct support maintenance unit. Stockage of repair parts at user level is governed by the provisions of AR 735–35.

*g. References.* For a more detailed discussion of maintenance operations in the field army, see FM 29–22.

## Section V. FIELD ARMY COMBAT SERVICE SUPPORT

### 11–12. The Field Army Support Command (FASCOM)

The field army support command is a major subordinate command of the field army. It provides combat service support (less replacements and chemical, signal, and engineer services other than supply and maintenance) to all elements of the field army. Its mission is to command and control combat service support units and provide direct and general support to the entire field army. It also exercises territorial control over the field army service area to include responsibility for rear area security and area damage control activities. It is composed of a headquarters and various organizations and units, each organized according to a table of organization and equipment. The typical field army support command is designed to support

a type field army of three corps of four divisions each. The number and kinds of subordinate organizations composing the FASCOM, however, can be varied to suit the particular situation. For forces smaller than a field army, the support structure is modified to provide only the capabilities needed. A support command modified to meet the needs of a separate corps task force is known as a corps support command (COSCOM) while that for a division size task force is known as a force support command (FORESCOM). The discussion which follows is applicable only to the FASCOM.

## 11–13. Composition of FASCOM

The field army support command consists of the following elements:

*a.* Headquarters and Special Troops. FASCOM.

*b.* Inventory Control Center.

*c.* Army-Wide Services.

*d.* Support Brigades.

## 11–14. Headquarters and Special Troops, FASCOM

*a. Mission.* The mission of the headquarters and special troops, field army support command, is to—

(1) Command, control, and supervise all assigned or attached units.

(2) Plan for, develop implementing policies and procedures on, and supervise provision of combat service support to the field army (less replacements and chemical, signal, and engineer services other than supply and maintenance), including matters such as determining requirements for and recommending allocation of combat service support units, material, and personnel. This function includes management of stocks, movements, patient flow, PW flow, and similar functions requiring army-wide management at top level.

(3) Exercise territorial control over the field army service area to include responsibility for rear area security operations and area damage control activities.

(4) Coordinate combat service support operational matters with the supporting headquarters in the communications zone or base area.

*b. Organization.* FASCOM headquarters consists of a command section, chief of staff section, general staff sections, and selected special staff sections. It consists of a commanding general, a chief of staff, an information section; and a general staff consisting of assistant chiefs of staff for the following: personnel; security, plans and operations; services; supply; maintenance; and civil affairs. The special staff consists of an adjutant general, chaplain, finance officer, judge advocate, inspector general, and a headquarters commandant. The chemical, engineer, medical, ordnance, provost marshal, quartermaster, signal and transportation special staff sections are eliminated. However, provision for the necessary combat service support advice, except medical, is made by the inclusion of essential specialists in the appropriate general staff elements. The medical staff advice is provided by the commander of the medical brigade. The headquarters company consists of a commander and the necessary personnel to service the headquarters of FASCOM. The headquarters can be augmented by a flight support section.

## 11–15. The Inventory Control Center (ICC)

*a. Mission.* The inventory control center exercises centralized inventory control for the entire field army. It operates on the principle of rapid response rather than upon positioned reserve. It is essentially a control point in the field army supply operation with the mission of providing overall stock management for all field army supplies. This includes computing requirements, requesting supplies from the supporting communications zone units, managing the field army supply distribution system, monitoring stock levels, and providing supply data to the field army support command headquarters, the support brigades, the ammunition brigade, and the medical brigade.

*b. Organization.* Headquarters and Headquarters Company, Inventory Control Center

(ICC), consists of a headquarters to operate the center and a headquarters company which provides support to the center. The center headquarters consists of the command element, a stock management division which performs the inventory control and stock management, and the systems division which performs the necessary ADP analysis, programming and operations. Provisions are also made for the establishment of an alternate ICC.

## 11-16. Army-Wide Services

*a.* The units which comprise and perform the army-wide services are—

(1) The Ammunition Brigade.
(2) The Medical Brigade.
(3) The Military Police Brigade.
(4) The Transportation Brigade.
(5) The Civil Affairs Group.
(6) The Replacement Battalions.

*b.* Army-wide services consist of units which retain the identity of their branch of service. These units provide a specialized support or service where—

(1) The amount of support or service fluctuates greatly with the intensity of the campaign and thus imposes a requirement for great flexibility of organization. An example of this is the ammunition brigade which is faced with constantly changing ammunition consumption in the many areas of the field army area.
(2) The need for immobility of units is a requirement. An example of this is the medical brigade which can operate more efficiently when movement is at a minimum.
(3) The support or service is intersectional in nature. An example of this is the transportation brigade whose units are sometimes engaged in transportation operations from the COMMZ to the combat zone.

## 11-17. Support Brigades

*a. Mission.* The support brigades are major subordinate units of FASCOM. The mission of the headquarters and headquarters company, support brigade, is to command, control, and supervise assigned direct and general support groups and other designated units operating in the corps or the field army service area.

*b. Organization.* The support brigades consist of a headquarters and headquarters company to which are attached two direct and two general support groups and other designated units. The brigade headquarters is organized on the lines of the general staff structure and has a selected special staff. In a field army there is one army rear support brigade which operates in the field army service area and one corps forward support brigade for each of the three corps.

*c. General Support Groups.* The general support groups assigned to the support brigades are functional units and are of two types: the GS Group (Rear) assigned to the Army support brigade and the GS Group (Forward) assigned to the corps support brigade. The mission of the group headquarters is to provide command, control staff planning, and supervision of composite multifunction supply, service, and maintenance units that provide general support to divisions and direct support units in the combat zone. The headquarters company of the general support group provides necessary housekeeping and communications facilities to the group headquarters, to include general support cryptologistics services.

*d. Direct Support Groups.* The Direct Support Groups assigned to the support brigades are multifunctional task organizations and are of two types: the DS Group assigned to the Army support brigade and the DS Group assigned to the corps support brigade. The groups are essentially the same in structure except that the group assigned to the army support brigade has an additional Light/Medium Truck Company in the supply and service battalion. Both have a group headquarters and headquarters company, one supply and service battalion, and two maintenance battalions. The DS groups provide direct support of the corps and field army. Specifically they provide—

(1) Classes I and III retail supply support.
(2) Classes II and IV retail supply support (less that provided by the army-wide services).

(3) Direct support maintenance and technical assistance service (less that provided by the army-wide services).
(4) Graves registration.
(5) Laundry and bath services.
(6) Bakery services.
(7) Decontamination services.

*e. Employment.* The FASCOM, as a major subordinate element of the field army, commands designated units which provide the principal combat service support to the field army in their respective functional areas and which plan for and control their operations. The FASCOM commander is not responsible for the replacement program or for chemical, signal, and engineer services other than supply and maintenance. The army-wide services of FASCOM perform specialized services and specialized supply for the field army. The support brigades, with their assigned general and direct support units, are functionalized to permit one stop service for the elements of the field army they support. The FASCOM also exercises territorial control over the field army service area to include responsibility for rear area security operations and area damage control activities.

## Section VI. DIVISION COMBAT SERVICE SUPPORT

### 11–18. Division Support Command (DISCOM)

The division support command is a major subordinate unit of the division at the same echelon as the brigades and division artillery. It is organized functionally to provide division-level combat service support. Combat service support provided by the division support command includes:

*a.* All classes of supply. This support is provided by the supply and transport battalion of DISCOM.

*b.* Transportation for combat service support operations (less transportation for class V supply in infantry, mechanized, and armored divisions). This support is provided by the division supply and transport battalion of DISCOM.

*c.* Direct support maintenance. This support is provided by the maintenance battalion of DISCOM.

*d.* Medical service. This service is provided by the medical battalion of DISCOM.

*e.* Personnel administrative services. This support is provided by the administration company of DISCOM.

*f. Miscellaneous services.* This support includes recovery and evacuation of damaged and captured materiel and salvage; bath and clothing exchange, when augmentation is provided; and graves registration. These services are provided by the supply and transport battalion and the maintenance battalion of DISCOM, as appropriate.

### 11–19. Divisional Engineer Battalion

The divisional engineer battalion is responsible for providing potable water for the division. With this exception, the principal supply functions of this battalion are those of procurement and evacuation of supply within its own organization.

### 11–20. Class I Supplies

*a. Requisitioning.* The division adjutant general provides the division supply and transport battalion of the division support command with the estimated strength figures for the division. Using these figures as a basis, the supply and transport battalion prepares the division daily ration request and dispatches it to the FASCOM class I supply facility supporting the division 72 hours prior to the time rations are to be delivered. Units of the division submit daily ration requests to the supply and transport battalion. When a unit desires a specific type ration, it notifies the supply and transport battalion in advance. Distribution of rations is based on the unit request.

*b. Distribution.* The FASCOM supply installation supporting the division delivers class I supplies to the division distribution point located in the division support area or to the

division forward distribution points located in the brigade trains area. Rations are broken down into unit (battalion) lots and picked up by the requesting units with organic transportation at their prescribed class I distribution point. When the location of units and the tactical situation permit, rations may be delivered direct to the using units in division or corps/army transportation.

## 11-21. Class II Supplies

*a. Requisitioning.*

(1) Units of the division forward requests to the supply and transport battalion which in turn forwards the division requirement to the appropriate FASCOM supply unit or facility supporting the division. Units of the division request engineer spare parts from the division maintenance battalion.

(2) Units request medical supplies from their battalion aid stations. The battalion aid stations replenish their supplies by informal requests sent to the clearing station by ambulances evacuating patients. The clearing station in turn forwards unfilled requests and any requests for replenishment of its own supplies to the division medical supply point. The clearing station does not consolidate supply requests.

*b. Distribution.*

(1) Fast moving class II supplies are forwarded directly by the supporting FASCOM unit or facility to the division class II distribution point in the division support area or, where appropriate, directly to the requesting unit. Large end items are delivered to specific destinations within the division as requested by the support command. Within the division, unit distribution of fast moving class II items is normal.

(2) The method of distributing medical supplies in combat is informal. The division medical distribution point is normally established by the medical battalion at a site which is convenient and accessible to ambulances providing support to the majority of forward medical facilities. Requests are sent to the rear by vehicles, e.g., trucks, ambulances, and aircraft, or via radio or telephone, and supplies are dispatched forward by trucks, ambulances, or aircraft.

## 11-22. Class III

*a. Requisitioning.* Each supported unit of the division submits a periodic forecast for bulk and package (grease, oil, and lubricants) products to the division supply and transport battalion indicating any change to the previously experienced supply rates. The supply and transport battalion makes a similar report to the FASCOM supply facility supporting the division.

*b. Distribution.*

(1) Supply point distribution is normally employed in supplying bulk class III to the division. When supply point distribution is used, the division transports its fuel from the FASCOM supply installation outside the division area to the division distribution point in the division service area, using the tankers provided in the supply and transport battalion. When expedient, the battalion may exchange empty for full tankers at the FASCOM supply point. When feasible, FASCOM may employ unit distribution transporting bulk POL to the division class III distribution points located in the division support area and in the brigade areas. Unit distribution using the tankers is the normal method of distribution within the division. A portion of the tankers operate at the class III distribution point in the division service area to support units in the division rear area. A portion of the tankers may also be allocated to the forward class III distribution points in the brigade trains areas. This arrangement within the division provides supply point distribu-

tion to the units in the division service area and unit distribution to units in the brigade trains areas. When major elements of the division are operating on independent missions, additional tankers are normally attached to them. Individual vehicles replenish their fuel at division mobile filling stations.

(2) The organic tankers of the brigade headquarters, division artillery headquarters, aviation battalion, and air cavalry troop are used for class IIIA supply of their respective units. The supply and transport battalion provides tankers for the supply of all additional class IIIA requirements by attachment directly to the organizations having aircraft or by allocating tankers to the class III distribution point supporting these organizations.

(3) The main reliance for class III supply in the airborne division is placed on packaged products delivered by airdrop or air-landing in the objective area. In garrison or in marshaling areas, the class III supplies are delivered to the division units by tank trucks from nondivisional agencies. If the airborne division is committed to a sustained ground role, it is normally augmented for supply of bulk class III.

## 11-23. Class IV

Class IV supply is accomplished generally in the same manner as class II. However, certain critical items of class IV supply are command controlled; that is, they are requisitioned through command channels. Engineer fortification materials are normally delivered by the FASCOM units supporting the division and are carried as far forward as possible without transshipment.

## 11-24. Class V

*a. Requisitioning.* Ammunition requests (transportation orders) from divisional using units are presented to the division ammunition officer (DAO) or his representative for authentication. Ammunition requests from nondivisional units are authenticated by the unit commander or his representative. The normal basis for approval of requests is replacement within authorized allowances. The DAO maintains records of the available supply rate and of the ammunition requested by each unit; he controls the issue of ammunition. All ammunition requests are validated by the DAO or his representative before they are presented at any FASCOM supply point or a division distribution point. Overall coordination and control of class V is accomplished through the support command post.

*b. Distribution.* Ammunition is normally supplied through supply point distribution. The ammunition vehicles of the using units return to the FASCOM ammunition supply points or special ammunition supply points to replenish the basic load of the unit. The airborne division operates mobile distribution points in the division support area. The composition of stocks in these points will depend on the nature of the tactical operations and the availability of transportation. For specific information on requisitioning and distribution of ammunition, see FM 9-6.

## 11-25. Maps

The division supply and transport battalion of the division support command obtains maps for the division from the supporting map depot and distributes them to using units. Quantities are based on the recommendations of the G2 and the engineer, using the army table of map allowances in FM 101-10 as a guide.

## 11-26. References

For details concerning division combat service support, see FM 54-2 and FM 61-100.

# CHAPTER 12

# REAL ESTATE

## 12–1. General

Real estate, in relation to army military activities, includes—land, buildings, and wharves, office and storage space, rights-of-way, or easements, and any interests which may be acquired or held for use by or for the benefit of the United States. It also includes equipment, appliances, or fixtures that are so attached or fixed in place that their removal would damage the property. Under the provisions of international law, a nation cannot own land in another nation, limiting acquisition in a foreign theater of operations to lease and rental in Allied territory and to requisition, confiscation, and seizure in enemy territory. The method of acquisition and administrative procedures to be followed depend on geographical location, civilian needs, density of population, whether the territory is in Allied or enemy possession, and the policies of the theater commander. See TM 5–300 for a complete discussion of real estate operations in a theater of operations.

## 12–2. Responsibilities

*a.* The Chief of Engineers is the Department of the Army staff officer responsible for all real estate functions, and he exercises staff supervision at the Departmental level over unilateral Army real estate activities in oversea commands. He is responsible for providing technical advice and assistance; initiating and maintaining the recording and reporting systems; issuing instructions; conducting inspections and staff visits to insure that oversea real estate activities are conducted properly; and reviewing oversea real estate data, including estimates, justifications, records, and reports.

*b.* The theater commander is responsible for all real estate activities within the theater. He may delegate his authority to a designated deputy or to the theater army, navy, or air force commander; normally the commander having the greatest requirement is delegated the authority. If the theater army commander is assigned responsibility for all real estate operations, he may redelegate his responsibility to the TALOG commander, along with such real estate support as may be required by combat commanders, or he may retain control and redelegate responsibility for rear areas only.

*c.* Staff supervision of real estate operations is a responsibility of the theater G4. The theater engineer is charged with the operating functions.

*d.* Engineers of commands below the theater army engineer are responsible for furnishing technical real estate guidance to their commanders, staffs, and subordinate echelons of the commands. They are also responsible for such other real estate duties as may be assigned or subdelegated to them.

*e.* Theater engineer real estate teams are responsible to the theater army engineer for conducting real estate operations within their assigned areas in accordance with the directives, instructions, and standing operating procedures issued by higher headquarters.

## 12–3. Objectives

A successful real estate administrative program will be achieved only when all echelons, both engineer and nonengineer, are indoctrinated in the basic objective to be achieved. These objectives are:

*a.* To provide each unit of the command those real estate facilities essential to its mission.

*b.* To insure compliance with the rules of land warfare.

*c.* To minimize the requirements for construction.

*d.* To protect the local population against unnecessary hardship, damage, looting, vandalism, or wasteful utilization of property by United States and Allied forces.

*e.* To provide property owners a reasonable recompense for their property and to avoid exorbitant claims against or costs to the United States and Allies.

## 12–4. Acquisition

*a. Allied Countries.* Acquisition of real estate in friendly countries in the name of the United States is always by lease or rental agreement, and, is handled through the designated authorities in each country in accordance with local diplomatic and economic requirements. Normal procedure requires the using service to file requirements with the staff section representing the theater engineer on real estate matters. This agency processes the requirements through the designated authorities of the country who select suitable sites and arrange with the owners for release of the properties. Payment for rental, as well as for damages is accomplished in accordance with the agreements between the two countries. Generally, an inspection and survey is made before the property is used and when it is returned. Any damages may then be resolved when the property is returned. Usually, all relations with owners are the responsibility of the local government.

*b. Enemy Territories.* Acquisition of real estate in enemy territory is made in accordance with the rules of land warfare based on Hague Convention Number 4, commonly referred to as the Hague Rules (TM 5–300).

## 12–5. Procedures

The method of procurement depends on the policy of the theater commander. Leasings, requisition, and seizure are the methods used by the United States Army in hostile territory. From military necessity, all real estate required for use by combat units is normally seized or confiscated. If the buildings or areas desired are vacant, the unit moves in. If they are occupied, local authorities are advised what buildings are required and directed to have them available at the desired time.

## 12–6. Reconnaissance Site Board

*a.* When time permits, Site Boards representing the using service, the signal officer, and the engineer should be established to consider sites for large installations such as hospitals and depots. Factors to be considered include area required, adequacy of water source, accessibility to routes of communications, suitability of terrain, local labor, materials, signal communications, and any other specific consideration. In the absence of a Site Board, the using service conducts its own reconnaissance and requests the desired real estate.

*b.* All real estate matters are coordinated by the designated engineer agency responsible for processing the necessary forms and keeping records on all real estate transactions.

## 12–7. Allocation to Using Agencies

Whenever it becomes necessary to divide an item of real estate between two or more using elements, an allocation is necessary. The assistant chief of staff G4, or Director of Services, is responsible for supervising this allocation. His action is based on the facts of the particular case, which are submitted by the interested engineer and the users.

## 12–8. Disposal

Real estate, when no longer required for military purposes, is promptly returned to its owner. A detailed survey and inventory is made of all property both before occupation and upon vacating. Upon vacating, the using agency is required to explain any damages or deficiences to the engineer officer handling the transaction.

## 12–9. Records and Reports

Records and reports on real estate outside CONUS are made in accordance with TM 5–300. It is important that complete, accurate information be maintained on the property to avoid controversy when the property is returned to the owner. Some of the important elements are: the condition of the property when taken over; quantity and condition of installed property; and quantity and condition of removable property. It is desirable to pre-

serve duplicate copies of basic real estate records in secure locations.

## 12–10. Checklist of Real Estate Interests

There are many and varied real estate "interests." The following checklist of the common phases of "interests" most frequently encountered is provided for inclusion in agreements, as necessary and applicable.

*a. Roads.* When main and access roads are designated, there should be clear statements as to load limitation, repair responsibility, maintenance, and traffic control responsibility.

*b. Rights-of-Way.* Clear agreement is required as to rights of the United States to all types of rights-of-way for signal, pipe, sewers, communications, or power lines.

*c.* Water sources. The capacity of the water source and the amount that can be used by U.S. forces should be determined. Civil affairs agencies coordinate if there is joint use by both the military and civilian population. Authority for U.S. forces to correct contamination is vital to maintaining a potable water source. The effect of drought and joint use should be clearly stated in the agreement.

*d. Utilities.* Right of entry to local electric, gas, water, sewer, pipeline, surface drain, or stream and water course right-of-way, or easement, for purpose of repair, maintenance or improvement should be determined. If U.S.-owned or U.S.-financed equipment or materials are installed on a privately owned utility, right-of-way, or easement, rights of ingress and egress must be retained by the U.S. forces.

*e. Sanitary and Surface-Water Outfall Drains.* The rights or interests that the U.S. forces have or acquire in areas below the terminus of the drain, both as to land and water, should be covered by protective agreement or protective agreement or easement. If the sanitary outfall will contaminate civilian water sources below the terminus of the drain, steps must be taken to protect the United States from future claims.

*f. Railroads.* The rights of the U.S. forces to connect spurs from the main or nearest rail line to the U.S. installations and areas should be clearly defined. The status of the easement or right-of-way lying between the boundary of the U.S. installation and the railroad right-of-way should be determined if constructed by the railroad. Right-of-way and ingress and egress for maintenance and repair should be decided on before beginning construction.

*g. Rights in Waters Bordering U.S. Installations.* Security requires that limitation of traffic and use of water surfaces (coastal, tidal, and/or navigable) bordering U.S. installations be added to protect future U.S. interests. Police power over this bordering water surface can be extended if the water surface is a U.S. installation.

*h. Ammunition and POL Storage Areas.* When the U.S. forces are not able to obtain sufficient area in compliance with quantity-distance safety criteria, protective easements or rights-of-way agreements should provide protection against claims for injuries or damage within the U.S. installation.

*i. Telecommunications.* Rights of ingress and egress to public thoroughfares should be provided for all isolated radar, microwave, or similar electronic equipment, and to all areas within central exchange or repeater stations which provide interconnection of U.S. forces long lines.

*j. Overwater Firing Ranges.* Agreements covering overwater firing ranges should provide for police powers before, during, and after firings; responsibility for publication of firing dates and hours; responsibility for removing duds; responsibility for posting the area; and a clear understanding of liability for strays, shorts, overs, and defective ammunition wherever the requested areas are restricted, limited, or reduced by the local government.

*k. Local Use of Training or Maneuver Areas.* When the local population or the military forces or militia of a foreign country enter U.S. forces training and maneuver areas for the purpose of farming or harvesting, or when military forces or militia enter such areas for military training, the permit of use should "save the United States harmless" against claims for injury or damage.

*l. Airfield Approach Zones.* When additional land is acquired for runway extensions, agreements should also provide for the height restrictions. Coordination with the Air Force is required if it is an Air Force installation.

*m. Navigable Water and Docks.* When navigable waters required for egress and ingress to U.S. wharves or beach facilities are subject to silting and filling, the agreement should contain, where possible, responsibility for dredging, maintenance, navigation markings, lights, and aids.

*n. Rights in Event of Labor Picketing.* One of the most important real estate interests is the right to maintain ways of ingress and egress to U.S. installations in the event of picketing by local labor unions. Intergovernmental agreements or understandings are required on this particular problem.

# CHAPTER 13

# STAFF ENGINEERS IN THE THEATER OF OPERATIONS

## Section I. THEATER ARMY

### 13–1. Theater Army Engineer

*a.* The theater army engineer is the planner, supervisor, and coordinator of all army engineer activities within the theater. He provides information and technical advice for the theater commander and for the theater general and special staffs, keeping them constantly informed of the condition, capabilities, and requirements of the engineer elements assigned to the command. The theater army engineer coordinates theater construction programs; devises uniform methods of administrative procedures for the engineer service; aids in the development of new, improved, or specialized types of supplies to meet the needs of the theater; formulates training policies for his service; advises and assists the responsible theater staff and logistical agencies in the preparation of estimates of logistical requirements, and makes recommendations for procurement and distribution of the supplies and services pertaining to his service. He converts the commander's decisions into operational plans for his service and is responsible for producing engineer intelligence.

*b.* The theater army engineer does not command the engineer troops of lower echelon. He exercises technical supervision over his service as a whole. Engineer operational plans that affect lower echelons are issued through command channels only, and thus are normally part of the plans of the commander. To insure proper execution of these plans, the theater army engineer makes such technical inspections and requires such reports as are necessary.

*c.* In the theater army headquarters, the engineer is a member of the special staff if the headquarters is organized under the general staff structure. If the headquarters is organized under the directorate structure or the "J" staff structure, the engineer is integrated into the coordinating staff group. In either case the responsibilities of the engineer remain the same and are stated in FM 101–5.

### 13–2. Deputy

The theater army engineer has as his principal assistant a deputy who is his main coordinating agent and adviser. The deputy supervises and directs the engineer division to insure unified action. He formulates and develops policies for the general operation of the division, and represents the theater army engineer during that officer's absence.

### 13–3. Engineer Division

Although specific responsibilities of the engineer and his staff may vary considerably from one theater to another, generally the branches of the engineer division are organized and perform functions as follows:

*a. Personnel and Administration Branch.* The personnel and administration branch maintains the central and classified files, prepares and supervises internal office moves, and allocates office space and transportation for the branch; operates the message center and prepares the administrative regulations of the branch; and supervises and coordinates all reproduction as required by the engineer division, except the reproduction of maps and surveys, which is the responsibility of the intelligence and mapping branch. In addition, it coordinates with the theater army G1 on personnel policies and requisition of engineer personnel, and coordinates with the Theater Army Replacement Command to insure an adequate flow of qualified personnel to the theater army logistical command (TALOG) and to army group (or

field army) engineer units and headquarters. It determines priorities for assignment of critically needed specialists between TALOG and army group.

*b. Intelligence and Mapping Branch.* The intelligence and mapping branch assists and advises the army engineer and other staff agencies on matters pertaining to the planning and execution of the engineer intelligence and mapping programs; prepares mapping and engineer intelligence appendixes to operations plans and contingency plans; provides guidance and staff supervision for geodetic, mapping, engineer intelligence, military hydrology, and military geology activities within the theater in conformance with policy established by the Department of the Army, and theater G2; maintains liaison with higher, lateral, and lower commands on requirements concerned with geodesy, procurement of mapping photography, production, reproduction, and distribution of maps, engineer intelligence, and military geology; promulgates policy on all technical aspects of mapping and engineer intelligence activities, including required facilities, troop bases, production specifications and techniques; promotes, develops, and exploits cooperative mapping agreements with friendly foreign nations in the theater area of interest and furnishes technical advice and assistance to topographic agencies of these countries; and maintains the theater engineer intelligence and map reference library.

*c. Troops and Training Branch.* The troops and training branch determines requirements for the distribution of engineer troops in the theater and recommends the initial assignments of units to the theater army engineer and studies the adequacy of units and equipment for current and future operations. It prepares recommendations for new or revised engineer unit TOE, develops logistical data on operational capabilities of engineer units and equipment; prepares engineer operational reports and prepares and distributes special engineer training literature and training aids; maintains liaison with higher echelons and with Allied forces on matters pertaining to engineer training and engineer schools, and formulates engineer schools' policies; inspects status of unit training; keeps data on strength, composition, assignment, and station of all engineer units in the theater; maintains contact with Allied forces and other sources on new techniques and developments. If an R&U branch is not authorized, it plans and coordinates all theater fire-fighting activities.

*d. Maintenance and Supply Branch.* This branch provides advice and assistance to the appropriate theater staff as to the general levels of supply of class II and IV engineer materials and certain ordnance class V materials within the theater. In coordination with the intelligence and mapping branch it advises theater intelligence units on policies regarding inspection, collection, and use of captured engineer supplies. It prepares and distributes technical instructions concerning the plans for destruction of engineer equipment or supplies which might be subject to capture or abandonment. It advises the responsible theater staff on engineer logistical requirements and assists in planning at theater level to insure a continuous and adequate flow of engineer supplies and equipment. It advises and assists the responsible theater staff in the formulation of policies regarding maintenance and repair parts support of engineer equipment.

*e. Construction Branch.* The construction branch of the theater army engineer division advises the theater army engineer on the scales of accommodation for troop housing and design standards for construction. It determines construction requirements to support present and future operations in the theater in coordination with G4 and the engineers of army, army group, and TALOG. It provides staff supervision of construction planning and construction operation of subordinate commands.

*f. Real Estate and Labor Branch.* This branch of the theater army engineer division advises the theater army engineer as to the operating procedures for the procurement of all real estate and civilian labor, and the requirement and allocation of same. It exercises technical supervision over lower echelons for procurement of real estate and labor.

## Section II. THEATER ARMY LOGISTICAL COMMAND (TALOG)

### 13–4. TALOG Engineer

Logistic support of the entire theater is based upon the ability of TALOG to discharge effectively the logistical functions in accordance with policies established by theater army. When such factors as the complexity of the operation require it, the communications zone may be divided, with the TALOG commander delegating territorial responsibility to the advance logistical command (ADLOG) commanders and base logistical command (BALOG) commanders. The TALOG engineer is charged with supervising, planning, and coordinating all engineer operations in the communications zone and performing those operational duties assigned by higher headquarters. The TALOG engineer functions as the staff adviser on engineer matters to the TALOG commander, and when applicable, recommends assignment of engineer missions to the subordinate logistical commands.

### 13–5. Executive Officer and Deputies

*a.* The TALOG engineer has as his principal assistant an executive officer who is his main coordinating agent and adviser; essentially, he performs the same duties for the TALOG engineer as does the deputy theater army engineer for the theater army engineer.

*b.* Further augmenting the office of the TALOG engineer may be two more assistants, a *Deputy for Plans* and a *Deputy for Operations*. Both deputies work closely together since the majority of their functions overlap, necessitating their functioning as an entity.

(1) The deputy for plans is responsible to the TALOG engineer for all future planning affecting the engineers. He supervises, and coordinates with the appropriate branches, the preparation of future troop, maintenance, real estate, utilities, and labor requirements. He is also responsible for the preparation of the engineer estimate and engineer portion of the base development plan, the engineer annex to the TALOG operation plan and order, and the TALOG administrative plan and order. He normally assists in the preparation of the engineer portion of the rear area security and area damage control plans for the communications zone.

(2) The deputy for operations is mainly interested in current day-to-day operations and coordination of the division. He supervises the inactivation or conversion of engineer units; the execution of special nonroutine investigations and reports; and the coordination of construction operations with construction supply activities.

### 13–6. Engineer Division

The engineer division is composed of the following branches:

*a. Personnel and Administration Branch.* The responsibilities of this branch correspond to the responsibilities of the personnel and administration branch of the theater army engineer division, insofar as they pertain to TALOG.

*b. Intelligence and Mapping Branch.* The intelligence and mapping branch compiles processes, and disseminates engineer intelligence pertaining to the logistical phase of proposed operations. In cooperation with the troops and training branch, it compiles and disseminates information on engineer techniques, including those of the Allied forces and the enemy. It controls and directs the procurement, storage, and distribution of maps, operates the map library, supplies maps to staff divisions of the headquarters, and maintains an engineer intelligence library. It exercises staff supervision over operations of engineer intelligence teams and security units assigned or attached to TALOG; prepares procedures for handling classified documents and material; and supervises and inspects the internal security of the engineer division.

*c. Troops and Training Branch.* This branch recommends assignment of engineer units in COMMZ, continually studies the adequacy of units and equipment for current and future operations, and determines requirements for engineer troops in COMMZ for current and fu-

ture operations. It supervises and coordinates TALOG engineer troop movements; is responsible for the preparation of the engineer portion of the rear area security and area damage control plans; supervises and coordinates the training of TALOG engineer troops and the organization and operation of a theater level specialists school; maintains liaison with the theater army engineer on training and quotas for attendance at engineer schools; prepares periodic disposition reports, engineer operational reports, engineering training policies, standards, tests, and general directives for engineer troops in COMMZ. It assembles data and prepares the historical report of the engineer division.

*d. Maintenance and Supply Branch.* This branch of the TALOG engineer division makes recommendations as to the general level and types of engineer supplies and equipment needed for operation in both the COMMZ and CZ. It aids in the preparation of logistical plans at TALOG level to insure a continuous and adequate flow of engineer supplies and equipment to support present and future operations in the theater. It recommends supply level for engineer supplies and equipment for subordinate units of TALOG.

*e. Construction Branch.* This branch determines detailed requirements of construction material for known and anticipated construction projects within the communications zone and forwards these requirements to the TALOG Director of Supply; recommends allocation of engineer construction troops to permit maximum use of civilian and PW labor; provides a staff of experienced engineers for consultation on special engineering problems; compiles and publishes statistical data and maintains records showing progress on all construction activities. It prepares plans for future TALOG construction in accordance with data provided by the TALOG coordinating staff. In accordance with approvals and priorities established by TALOG and theater and theater army policies, it prepares detailed plans and provides, by rehabilitation or new construction, all installation required in COMMZ by U.S. forces.

*f. Real Estate, Labor, and Utilities Branch.* This branch prepares procedures, standards, and plans for the procurement and utilization of real estate in conformance with policies of higher headquarters; prepares procedures, standards, and plans for the maintenance of real estate records; supervises the utilization of real estate; supervises and coordinates repairs and utilities activities in COMMZ and prepares policies, procedures, standards, and plans for these activities. It supervises and coordinates all TALOG fire prevention and firefighting activities and prepares and publishes policies and programs for fire prevention and firefighting activities in COMMZ; and supervises the procurement, utilization, and administration of indigenous labor for engineer units in conformance with policies of higher headquarters.

## Section III. FIELD ARMY

### 13–7. Field Army Engineer

Each field army is authorized an engineer brigade to command, control, and coordinate the activities of the nondivisional engineer units assigned to it. The commander of this brigade also serves on the staff of the field army commander in a dual capacity as the field army engineer. The field army engineer may perform any of the duties stated in FM 101–5 for the engineer.

### 13–8. Army Engineer Section

*a. General.* The army engineer section of the field army headquarters is authorized by TOE 5–101, which is the TOE for the Engineer Brigade, Army. This section is located at field army headquarters and assists the army engineer brigade commander in executing his responsibilities in his capacity as the field army engineer. The section includes a deputy army engineer who supervises the section and acts for the field army engineer at army headquarters in his absence. There are also sufficient officers and enlisted men to allow organization of an administration branch, an intelligence and mapping branch, an operations branch, a construction branch, a real estate branch, and a maintenance and supply branch. The organi-

zation is flexible and can be varied to meet the desires of the field army engineer. This section can be activated and assigned to the army, minus the engineer brigade, when there is no requirement for an engineer brigade at army. In this instance the deputy army engineer, authorized by the TOE, becomes the army engineer.

*b.* The administration branch handles personnel matters pertaining to engineer troops; miscellaneous administrative duties; maintains the files for the engineer section and operates the army engineer message center; works closely with G1 and the adjutant general; and provides a stenographic and typing pool for the engineer section.

*c.* The intelligence and mapping branch collects and evaluates information, and disseminates engineer intelligence; exercises technical supervision over engineer intelligence and topographic activities of engineer intelligence teams assigned to the field army. It handles all matters pertaining to the preparation, revision, reproduction, and distribution of maps and map substitutes, as far as they pertain to the army engineer's sphere of responsibility, and within the framework of field army policy announced by G2, with whom it works closely.

*d.* The operations branch includes an operations officer; two commissioned officers as assistants; and an operations sergeant and assistant operations sergeant. The operations branch, working with other branches, is primarily responsible for assembling and drafting army engineer plans and the engineer paragraphs and annexes of army operations orders. It handles all staff matters pertaining to the organization and operation of engineer units in the field army (except construction, maintenance, supply, topographic, and intelligence activities); supervises training, and prepares training directives; and maintains records pertaining to engineer operations, including unit combat efficiency reports. It works closely with G3 and G4.

*e.* The construction branch supervises all engineer construction activities in the field army, including the installation and maintenance of structures; designs and prepares plans for structures, to the extent that this cannot be handled by corps or division engineers or other attached engineer units; and assists the operations branch in the preparation of orders, annexes, and training directives as far as they concern construction activities. It works closely with G3 and G4, and the engineer construction units under field army control.

*f.* The maintenance and supply branch works closely with the G4. It advises and assists the G4 in the preparation of engineer supply and equipment requirements for the field army.

*g.* The real estate branch is responsible for the acquisition, management and disposal of real estate for the field army in the combat zone.

## Section IV. CORPS

### 13–9. Corps Engineer

Each of the three corps of a field army is authorized an engineer brigade. In similar fashion to the commander of the engineer brigade, army, the commander of the engineer brigade, corps, serves also as the corps engineer. The corps engineer may perform any of the duties stated in FM 101–5 for the engineer.

### 13–10. Corps Engineer Section

The corps engineer section of the corps headquarters is authorized by TOE 5–101, which is the TOE for the Engineer Brigade, Corps. This section, although smaller in number than the army engineer section, operates in a similar fashion to the army engineer section. It has a deputy corps engineer who supervises the section and who acts for the corps engineer at corps headquarters, and sufficient officer and enlisted personnel to operate the section. Its organization is flexible and is tailored to fit the needs of the corps to which it is assigned. This section can be activated, minus the corps brigade, when there is no requirement for an engineer brigade at corps. When so activiated, the TOE provides for an augmentation of necessary personnel with the required skills to operate the separate section.

## Section V. DIVISION

### 13–11. Division Engineer

Each engineer combat battalion, organic to the four types of divisions (infantry, infantry (mechanized), armored, and airborne), is authorized a division engineer section. The commander of these battalions serves in a dual capacity as both the battalion commander and the division engineer. As division engineer he serves on the staff of the division commander and may perform any of the duties stated in FM 101–5 for the engineer.

### 13–12. Division Engineer Section

The division engineer section is authorized by the TOE under which the divisional engineer combat battalion is activated. It consists of an assistant division engineer who supervises the section at division headquarters and acts for the division engineer during his absence, and a staff of officers and enlisted men capable of rendering engineer planning and advice to the division commander and his staff.

# CHAPTER 14

# THE ENGINEER UNIT COMMANDER AND HIS STAFF

## Section I. THE COMMANDER

### 14–1. General

*a.* The command and staff of engineer construction commands are organized under the double deputy structure outlined in FM 101–5 and are not discussed in this chapter. The discussion in this chapter is confined to the engineer brigade and subordinate engineer units.

*b.* The unit engineer at army, corps, and division level has a dual function as the engineer staff officer and a troop commander. As a troop commander he commands all organic engineer troops and other troops attached to his command.

*c.* Nondivisional engineer units of corps or army may be attached to a division. Regardless of the grade or seniority of the commander of such attached units, the battalion commander of the engineer battalion organic to the division remains the division engineer. Nondivisional engineer units of battalion size or less may be further attached to the organic battalion, in which case they function as similar units of the organic battalion.

*d.* The commander of any engineer unit, attached to or in support of a nonengineer organization, performs additional duties as the engineer of the organization to which attached or placed in support.

### 14–2. Duties of the Engineer Unit Commander

*a.* Besides requiring a knowledge of the principles of war outlined in FM 100–5, normal engineer tasks require that the engineer unit commander have a thorough knowledge of military engineering. Specifically, he may be required to perform all or some of the duties of the engineer listed in FM 101–5.

*b.* The engineer unit commander employs all means available to accomplish missions of his organization. He issues necessary plans and orders and supervises their implementation. He is responsive to the needs of his subordinates for staff support, additional equipment, and labor and material, when these are required. He must constantly coordinate the activities of his command and maintain liaison with adjacent, senior, and supporting units.

*c.* The commander goes where he is most required and where he is best able to direct the activities of his command. When he leaves his command post, however, he provides for constant communications with his executive officer who remains at the command post.

### 14–3. The Engineer Unit Commander and His Staff

The engineer unit commander's duties are complex and varied. Since he is alone is responsible for all his unit does or fails to do, his staff must be organized to provide him with the most effective assistance and to act with single purpose for mission accomplishment.

## Section II. STAFFS OF ENGINEER UNITS

### 14–4. General

*a.* Each engineer brigade, group, and battalion is authorized a staff to assist the commander. The composition of these staffs and the duties of the staff members vary in accordance with the type of organization, its mission, and its echelon of command. It may be generally stated that engineer staffs at group or higher echelons of command normally perform as planners, designers, advisors, supervisors, in-

spectors, and coordinators. At battalion level the staff members are operators. They supervise the implementation of the plans of the higher headquarters. As an example, upon receipt of a task directive from brigade, the group staff designs the project, plans the tasks, allocates the assignment of tasks, and directs the battalions, which are the operating units, to perform the tasks. Upon receipt of a directive from the group, the battalion commander orders his staff to issue an implementing directive to the organic or attached units of the battalion to perform the task. In similar vein, the brigade and group S4's aid battalions and other attached units in obtaining logistical support but do not actually requisition, store, or issue supplies and equipment. The battalion logistics officer (S4), on the other hand, is in the direct chain of supply, and he requisitions, stores, and issues supplies and equipment. In general, staffs of engineer organizations are patterned after, and function in a manner similar to the staffs of divisions and larger units. They consist of a unit staff group (coordinating staff), a special staff group, and in the case of the engineer brigade, a personal staff group. Accordingly, the duties of the staffs of engineer organizations are similar to those outlined for the general staff organization in FM 101–5. These duties, however, are subject to any modification required because of type organization, mission, and echelon of command. The duties may be changed further by any modification desired by the commander in order to obtain flexibility and responsiveness. The discussion of staff duties which follows, is therefore general in nature. Composition of the three staff groups is as follows:

(1) The unit staff normally is composed of the executive officer, the adjutant (S1), the intelligence officer (S2), the operations and training officer (S3), the logistics (supply) officer (S4), and the sergeant major.

(2) The special staff of an engineer organization may consist of all or some of the following staff officers depending on the mission of the organization:
   (*a*) Chaplain.
   (*b*) Surgeon.
   (*c*) Equipment and maintenance officer.
   (*d*) Engineering officer.
   (*e*) Communications officer.
   (*f*) Aviation officer.
   (*g*) Reconnaissance officer.
   (*h*) Liaison officer.
   (*i*) Chemical officer.

(3) The personal staff is found only in the engineer construction command and the engineer brigade where the commander is a general officer and is authorized an aide-de-camp.

*b.* In addition to the staff officers shown above, the commander appoints other special staff officers for such functions as safety, claims, and postal. As these positions are not authorized by tables of organization and equipment, the officers so appointed perform these duties in addition to their other primary duties.

## 14–5. The Unit Staff

The unit (coordinating) staff is composed of the principal assistants to the commander. The responsibilities and functions of the unit staff are comparable to those of the general staff outlined in FM 101–5.

*a. The Executive Officer.*

(1) The executive officer is the principal assistant and advisor to the commander. His functions and responsibilities combine those of a chief of staff and a deputy commander. He supervises the staff, and represents and acts for the commander during the temporary absence of the latter when directed to do so. He is prepared to assume command of the organization at any time.

(2) The executive officer is normally located at the command post, the continuing function of which is his direct responsibility. He and the commander should not be absent from the command post at the same time.

*b. The Adjutant (S1).* The adjutant performs the functions of the personnel officer of the general-staff-type organization, the functions of the secretary of the general staff, and the personnel functions of special staff officers who are not present in the brigade, group, or

battalion staffs, such as the adjutant general, inspector general, staff judge advocate, provost marshal, and special services officer. He is the supervisor of the administrative section. His major areas of responsibility for staff supervision are:

(1) Maintenance of unit strength to include but not limited to—
  (*a*) Preparation of loss estimates.
  (*b*) Maintenance of personnel records and reports reflecting the status of personnel matters in the command.
  (*c*) Obtaining replacements (unit and individual) and arranging for their reception, processing, assignment, quartering.

(2) Personnel management to include—
  (*a*) Classification, including promotion, demotion, and awarding and chang- of MOS's.
  (*b*) Assignment, including reassignment, transfer, reporting, and requisitioning of personnel.
  (*c*) At battalion level (except the divisional engineer battalions where the division administration company handles unit personnel), supervision of the unit personnel section which maintains the personnel records of the personnel of the organic and attached companies. At group level, supervision of a unit personnel section where the personnel records of the personnel of the attached separate companies are maintained.
  (*d*) Reenlistment.
  (*e*) Preparation and processing of reports on casualties and prisoners of war.
  (*f*) Administration of civilian employees operating with the unit or in the unit area.
  (*g*) Arrangements for the collection and evacuation of prisoners of war in coordination with the S2 and S4.

(3) Development and maintenance of morale to include but not limited to—
  (*a*) Personnel services, including leaves of absence, and awards and decorations.
  (*b*) Operation of the postal service.
  (*c*) Recovery and disposition of the dead.
  (*d*) Coordination of recreation for personnel and evaluation of morale.

(4) Maintenance of discipline, law and order, to include but not limited to—
  (*a*) Recommendations to the commander of measures that will maintain or improve discipline within the organization.
  (*b*) Maintenance of records on military justice procedures and assistance in the review of courts-martial proceedings from an administrative viewpoint.

(5) Headquarters management to include but not limited to—
  (*a*) Operation of the headquarters communciation control, distribution centers, and messenger service.
  (*b* Internal arrangement of the command post and establishment of a standing operating procedure to guide its operation.
  (*c*) Assignment of shelter and quartering areas in the headquarters area for troops and for headquarters.

(6) *Miscellaneous.* The S1 is responsible for all administrative matters not assigned another staff officer.

*c. The Intelligence Offier (S2).* The S2 has staff responsibility for intelligence matters. He supervises the intelligence section. In some engineer organizations (e.g., the construction brigade, group, and battalion) an S2 is not authorized by TOE, and some other staff officer such as the operations officer (S3) or the reconnaisance officer assumes the responsibilities of the S2 as additional duties. The duties of the S2 are similar to those of the G2 (FM 101–5). He keeps the commander, staff, subordinate units, and all other interested agencies fully informed of the enemy situation and capabilities, and terrain and weather. Additionally, the S2 of an engineer organization information which is processed into engineer intelligence for the use of his commander in making engineer plans. Among his duties, he—

(1) Plans and supervises (in conjunction with the S3) the intelligence training of the organization.
(2) Plans and supervises troop counterintelligence measures in the organization.
(3) Prepares and presents the intelligence estimate.
(4) Prepares the intelligence plan, including the collection plan and orders and requests to collecting agencies, and coordinates subordinate collecting agencies (coordinating with the S3).
(5) Records all pertinent enemy information on the situation map.
(6) Evaluates and interprets enemy information, and disseminates intelligence information to his commander, the staff, and higher, lower, and adjacent organizations.
(7) Examines captured enemy personnel, including civilians (hostile or friendly) who may posses information of immediate tactical value. Examines captured documents and materiel if of immediate tactical value, and expedites the sending of captured materiel, documents, and personnel to higher headquarters.
(8) Requests and supervises distribution of maps, naval charts, airphotos, photointerpretation reports, defense overprints, annotated airphotos and photomaps for the organization.
(9) Collects, evaluates, and disseminates engineer information.
(10) Coordinates with the S3 and S4 on security measures for the movement and storage of ADM (combat engineer organization).
(11) Prepares, in conjunction with the S3, engineer recommendations for divison main supply routes, other routes, and traffic circulation.
(12) Keeps the S2 situation and radiological maps, and the S2 journal.

*d. The Operations and Training Officer (S3).*

(1) The duties of the S3 are similar to those of the G3 (FM 101–5). Among the duties an S3 may be required to perform are the following:

(*a*) Supervises the operations section. Supervises the combined operations and intelligence section when an S2 is not authorized by TOE and he is designated by the TOE or by the commander to assume the duties of the S2.
(*b*) Is the commander's principal adviser on organization of the unit for combat and for its operational mission.
(*c*) Has staff responsibility for civil affairs functions, and staff supervision over civil affairs elements or personnel that may be attached, unless otherwise directed by the commander.
(*d*) Is responsible for planning and supervision of tactical security for the command post including rear area security.
(*e*) Prepares the operations order including material obtained from other staff officers (S1, S2, S4, and communications officer).
(*f*) Plans troop movements, including units involved, formation, and type of transportation required (coordinating with the S4). He prepares the march order after the plan of movement is approved.
(*g*) Keeps the engineer operations situation map.
(*h*) Prepares tactical and technical reports as directed.
(*i*) Coordinates (with the S4 and other agencies) the flow of supplies and material to the operating units engaged in construction or engineer combat operations.
(*j*) Designates the areas for bivouac, quartering, and staging of units.

(2) Among his specific training duties, the S3—

(*a*) Prepares and has staff supervisory responsibility for the execution of training directives, programs, orders, field exercises, and maneuvers, based on plans approved by the commander.

(*b*) Selects training areas and ranges, and allocates training aids and equipment.

(*c*) Organizes and conducts unit schools. Based upon the commander's directives, he prepares the program of instruction, selects and trains instructors, and recommends the selection of units or personnel to attend schools.

(*d*) Makes training inspections, and prepares and supervises training tests based on Army training tests.

(*e*) Prepares training records and reports.

(*f*) Supervises the command information program.

(3) Dependent on the mission and level of the engineer organization of which he is S3, his *operations duties* may include any of the following:

(*a*) Designs and plans proposed construction projects, including camouflage projects. Prepares and reproduces construction plans and drawings; conducts site surveys; and performs soils, materials, and terrain analysis. He advises and assists the commander and subordinate units in all matters relating to design and planning activities.

(*b*) Coordinates and inspects construction projects. Advises the commander on project assignment, troop and equipment allocation; and scheduling.

(*c*) Assists higher staffs in nuclear target analysis and selection.

(*d*) Plans for the use of atomic demolition munitions (ADM) and coordinates with S2 on security and S4 on movement and storage of ADM in the organization (combat engineer organizations).

(*e*) Supervises the utilities section.

(*f*) Supervises the production of potable water. (Construction battalion only—supervision of water production in other battalions, and at group and brigade level is a function of the S4.)

*e. The Logistics Officer (S4).*

(1) *Engineer brigade or group S4.* The engineer brigade or group logistics officers (S4) normally enter logistical channels only to coordinate and establish priorities for critical items of supply. Their duties are similar to those of the G4 (FM 101–5). At this level their primary mission is to insure that assigned or attached subordinate organizations receive adequate supplies to support the operational mission. These logistical officers do not receive, store, or issue supplies. The duties of the engineer brigade or group S4 are as follows:

(*a*) Advises the commander and staff of the status of the logistical situation for current and future operations and supervises the supply section.

(*b*) Controls the movement of, and provides protection for, supply convoys on the MSR or axis of supply and evacuation as appropriate.

(*c*) Coordinates with subordinate unit S4's and the logistical control facility of the higher headquarters.

(*d*) Receives reports from subordinate units on their supply and maintenance status, and forwards them to higher echelons, normally without consolidation.

(*e*) Coordinates, displaces, and exercises tactical control of the logistical support elements attached to or in support of the unit and provides security and protection for these elements.

(*f*) Monitors the operations of logistical support elements operating with the organization to insure that continuous and adequate logistical support is provided.

(*g*) Prepares area damage control plans.

(*h*) Coordinates the utilities program of the organization and the supply of potable water.

(*i*) Coordinates the movement and storage of ADM with the S2 and S3.

(*j*) Supervises and inspects food service

activities within the organization and advises the command and subordinate units on matters pertaining to food service.

(*k*) Plans and supervises (in conjunction with the S3) the supply training of the organization.

(2) *Battalion logistics officer (S4).* Battalion logistics officers are in the direct chain of logistical support from service support elements. As a logistical operator, the battalion S4 receives, stores, and issues supplies. He is responsible to the commander for the formulation of logistical policy and for planning, coordinating, and supervising the logistical effort of the battalion. His duties are generally as described for the G4 in FM 101–5 and include:

(*a*) Advising and keeping the commander informed on logistical matters.

(*b*) Planning, coordinating, and supervising supply, maintenance, and evacuation.

(*c*) Coordinating with the higher headquarters on logistical matters.

(*d*) Assisting subordinate commanders with logistical matters.

(*e*) Submitting logistical reports as directed.

(*f*) Accomplishing area damage control planning.

(*g*) Preparing paragraph 4 of the operation order.

(*h*) Exercising staff supervision over receiving, storing, and issuing supplies.

(*i*) Supervising the movement and storage of ADM with the S2 and S3.

(*j*) Supervising the supply of potable water.

*f. The Sergeant Major.* The sergeant major is the senior noncommissioned officer in the organization. He acts as the commander's representative in dealing with other noncommissioned officers, and is his noncommissioned officer adviser on enlisted personnel matters. The sergeant major holds periodic meetings with the key noncommissioned officers of subordinate organizations to disseminate information and instructions from the commander. He assists in inspections of activities as prescribed by the commander. When directed, he accompanies the commander on official visits and at ceremonies.

## 14–6. The Special Staff

The mission and echelon of command determine the composition of the special staff group authorized by the TOE of an engineer organization. The special staff group is composed of professional, technical, and subject area specialists who are sometimes placed under the members of the unit staff for staff supervision. The special staff officers perform duties similar to those outlined for the special staff officers in FM 101–5 and the duties outlined for their MOS in AR 611–101.

*a. The Chaplain.* The chaplain—

(1) Advises the commander and staff on all matters pertaining to religion, morals and morale as affected by religion.

(2) Provides religious services, including sacraments, ordinances, rites, and funeral services.

(3) Assists in implementing the command character guidance program.

(4) Counsels military personnel and their dependents as required and corresponds with relatives of deceased personnel.

(5) Prepares reports on religious activities of the command and prepares estimates of funds for their support.

(6) When assigned to an organization at any echelon above battalion—

(*a*) Furnishes technical assistance and coordinates the activities of the chaplains of subordinate units in order to insure area and denominational religious coverage throughout the command.

(*b*) Reviews applicable operational, contingency and damage control plans to determine chaplain requirements or impact on chaplain support.

(*c*) Prepares and coordinates contingency plans for the chaplain section and provides input for plans

written or coordinated by other staff sections of the headquarters concerned.

*b. The Surgeon.* The surgeon—

(1) Advises the commander on all medical matters, including sanitation, first aid, and health of the command.
(2) Recommends and supervises procedures for locating, giving first aid, collecting, sorting, and evacuating patients; and provides for and supervises medical treatment furnished by the organization.
(3) Recommends measures for the prevention and control of disease.
(4) Advises the commander concerning the effects of CBR agents on personnel, to include estimation of the number and type of casualties which can be expected from immediate and delayed effects of nuclear explosions.
(5) Supervises the training of all troops in first aid, hygiene, and sanitation, and the training of all medical troops for individual and unit proficiency.
(6) Recommends and supervises provision of medical care for prisoners of war and, when directed by the commander, medical care for noncombatants in the organization.
(7) Supervises the examination of captured medical documents and equipment, in coordination with S2, to obtain intelligence information.
(8) Establishes the aid station and supervises its operation, and arranges for displacement of the aid station when required.
(9) Performs professional medical treatment duties as required.

*c. The Equipment and Maintenance Officer.* The equipment and maintenance officer—

(1) Advises the commander, the staff, and subordinate commanders of all technical aspects of equipment maintenance and operation; and the training of engineer equipment operators.
(2) Assists the S3 in the preparation of equipment schedules and equipment allocation by furnishing technical information and advice as to the maintenance status of engineer equipment.
(3) Maintains liaison with supporting direct support and general support maintenance units as required.

*d. The Engineering Officer.* The engineering officer—

(1) Supervises the engineering section.
(2) Designs and plans proposed construction projects, and coordinates the final stages of planning with the operations section.
(3) Assists subordinate units in the solution of engineer design problems and reviews the plans of such units.
(4) Conducts site surveys and soils, materials, and terrain analysis.

*e. The Communications Officer.* The communications officer—

(1) Is the commander's principal adviser of communications matters in the organization.
(2) Coordinates with the S1 on communication personnel matters and exact location and interior arrangement of the command post.
(3) Coordinates with the S2 on the location of observation posts and on communication security measures.
(4) Coordinates with the S3 on tactical communication requirements and training of communication personnel.
(5) Obtains current signal operation instructions (SOI) and standing signal instructions (SSI) from higher headquarters. He prepares and distributes extracts of the SOI and SSI as required.
(6) Coordinates with the S4 on matters of supply and maintenance of signal equipment and route priorities.
(7) Prepares the communication portion of the organization SOP.
(8) Submits recommendations for paragraph 5 of the operation order and signal annexes, when required.
(9) Plans, supervises, and coordinates matters pertaining to signal supply and maintenance.
(10) Supervises employment of signal elements attached to the organization.

(11) Procures, stores, and distributes codes, ciphers, and crypto material.

(12) Supervises the operation of communication installations.

(13) Supervises the movement of communication installations when the command post displaces.

*f. The Aviation Officer.* The aviation officer—

(1) Commands the aviation section, advises the commander on aviation matters, and is responsible for the operation of the organic aircraft.

(2) Conducts aerial or site reconnaissance in conjunction with the commander and staff personnel such as the operations officer, the intelligence officer, or the reconnaissance officer.

(3) When directed by the commander, may be under the staff supervision of the S3.

(4) Maintains liaison with aviation staffs of higher and lower headquarters and with adjacent and supporting units.

*g. The Reconnaissance Officer.* The reconnaissance officer performs engineer and combat intelligence reconnaissance to provide the commander, interested staff members, and subordinate units with accurate intelligence data on which to base construction or combat plans. In some engineer organizations (e.g., construction brigade) he may perform additional duties as S2.

*h. The Liaison Officer.* The liaison officer performs the duties outlined in FM 101–5. The liaison officer's primary duty is to maintain continuity in the exchange of information between his own and the supported organization, and to promote cooperation and coordination of effort by personal contact between the two headquarters.

*i. The Chemical Officer.* The chemical officer advises the comander and staff on the CBR organization, weapons, equipment, tactics, and techniques. Specifically, he—

(1) Advises on the effects of enemy and friendly CBR weapons, area and duration of effects, target selection, and munitions requirements for chemical weapons.

(2) In coordination with S3, is responsible for the organization and training of individuals and units in CBR operations. This includes training of the company radiological survey and monitoring team; and the chemical detection team.

(3) Is responsible for coordination of CBR surveys and maintenance of radiological and chemical contamination maps.

(4) Interprets CBR information and advises the commander and staff and appropriate higher headquarters on these matters.

(5) Supervises the technical training and operational implementation of CBR measures.

(6) Provides technical advice and staff supervision over field methods of decontamination and impregnation, issue, installation, and maintenance of CBR equipment in the organization.

(7) Advises the commander and staff on the utilization of CBR trained personnel.

(8) Prepares the organization CBR SOP.

(9) Plots radiological fallout predictions.

(10) Disseminates the Effective Wind Message and the Fallout Prediction Message to subordinate units.

(11) Prepares recommendations for the integration of persistent effect chemical agents in minefield and barrier plans.

(12) Recommends CBR reconnaissance of routes and areas.

(13) Assists in the preparation of records and reports regarding CBR casualties.

## 14–7. The Personal Staff

The commanders of the engineer brigades are general officers and are authorized a personal staff. This staff consists of a commissioned officer who serves as aide-de-camp and two enlisted men. The aide-de-camp—

*a.* Coordinates the personal activities of the commander.

*b.* Maintains the commander's schedule of events.

*c.* Provides for the personal comfort and security of the commander.

*d.* Coordinates the activities of any other personnel provided for the commander's personal use.

## Section III. COMPANY COMMANDER

### 14–8. The Company Commander

The company commander is responsible for the administration, operation, training, discipline, and supply of his company. The company commander:

*a.* When assigned a direct support mission or when attached, aids the commander and staff of the organization he supports or to which he is attached, in developing plans for the employment of the engineer effort available to the command.

*b.* Analyzes each task and assigns missions to his subordinate commanders.

*c.* Supervises the execution of work to see that tasks are carried out properly; correct methods are used; supply of materials is maintained; difficulties are anticipated and provided for; and platoon leaders are given all possible facilities, including personnel and equipment from company headquarters or higher headquarters, to help them execute their assigned work.

*d.* Inspects tools, equipment, weapons, transportation, and all classes of supply to insure that they are properly maintained, used or stored. He also makes certain that the mess, supply, communication, administration, and maintenance sections of his company are operating properly.

*e.* Conducts continuing engineer reconnaissance and reports appropriate information to the headquarters of the unit which he supports, and to his platoons.

*f.* Provides liaison with, and engineer staff advice for, the organization he supports or to which his unit is attached.

### 14–9. The Company Commander's Staff

The company commander's staff normally consists of an executive officer and the noncommissioned officers who supervise the administrative, supply, mess, communications, and maintenance sections.

# CHAPTER 15
# TRAINING

## Section I. GENERAL

### 15–1. General

To a great degree, the success of an army in a theater of operations depends upon the quality and quantity of instruction given to the individuals and units. From basic combat training of the individual, to his participation with his unit in field exercises and maneuvers, training of all types must be conducted and stressed. The prospective engineer soldier should be taught in order, first, to be a soldier, second, an engineer soldier, and finally, a specialist. To teach him teamwork, he must first work as an integral part of a squad, the squad then operating as part of a platoon, and the platoon as a major element of the company. When training has progressed to this stage the individual and the company must participate in operations at battalion and higher level.

### 15–2. Responsibilities

*a.* The engineer brigade commander, through his operations officer, is responsible for implementing Department of the Army training policies and directives; for conducting specific training as necessary; for determining and carrying out training requirements generated by operational missions; and for maintaining his subordinate units at the peak of operational readiness.

*b.* The engineer group commander, through his operations officer, is responsible for coordinating the training program of his group. This includes the coordination of the various schedules, the use of training areas, and the use of training aids and facilities. The group operations section plans and prepares the training programs of its organic headquarters and headquarters company and the attached separate companies, and is responsible for inspecting the training programs of the attached battalions.

*c.* The battalion commander is responsible for the training of his battalion's organic units in the operations for which they are organized. Assisted by his S3, and under the broad and general guidance of the group S3, he plans, directs, conducts, and supervises. In the case of a divisional engineer battalion, he receives broad and general guidance from the G3 of the division. The battalion commander, in accordance with the directives and guidance he receives from higher headquarters, prepares master training schedules, designating the time to be spent on specified subjects; assigns responsibility for the conduct of the training; insures the use of performance and proficiency standards consistent with higher headquarters; and procures and controls the use of training facilities, aids, and equipment. He is responsible for organizing and supervising battalion schools and determining student quotas of subordinate units for attendance at service or specialist schools conducted by higher headquarters. As necessary, he issues training directives regarding the types of instruction or information to be given. In all of this he utilizes the various members of his staff to assist him in the planning and supervision of those particular areas of training pertaining to the staff officers' specialified fields of responsibility.

*d.* The company commander is responsible for training his company in accordance with the training directives and policies of battalion or higher headquarters. Each company commander constantly supervises the training and requires maximum participation by all members of his unit.

*e.* Detachment or team commanders of units organized under TOE 5–500 are charged with

the same training responsibilities as the company commander above. They receive training guidance and assistance from the organizations to which they are attached.

### 15–3. Engineer Training

*a. Unit and Individual Training.* Individuals assigned to engineer units should receive training in general engineer subjects to include demolitions and explosives, fixed and floating bridges, mines and boobytraps, barriers and obstacles, field fortifications, camouflage, elementary construction, engineer tools and equipment, river crossings, and amphibious operations. When thoroughly proficient in these subjects, additional training should be given in the subject areas required for the accomplishment of the unit's mission and in the MOS specialities found in the unit. When training as units, maximum use should be made of the broad guidance contained in the Army Training Programs (ATP) in the 5 series provided for the various categories of engineer units.

*b. Battle Drills.* Battle drills should be devised for small units which cover various operational situations that may be expected on the battlefield. These situations should range from those which an infantry unit may expect to those which require employment of engineer equipment and techniques. Response of the unit to these situations should follow a prescribed routine. Constant use of expedients and improvisation should be stressed. Examples of battle drills which may be devised are those for defense of a road block, gap crossings, fire and movement (FM 23–12), and clearing of minefields.

## Section II. ARMY TRAINING PROGRAM

### 15–4. General

The training being conducted by the Army at any given period can be appropriately placed into one of three categories: individual training, unit training, and combined training. Training may be subdivided into two stages, the cycle training and the postcycle or operational readiness training.

### 15–5. Army Training Program Cycle Training

The five formal phases of cycle training in sequence of conduct are as follows:

*a. Basic Combat Training (BCT) Phase.* The basic combat training phase is the first part of individual training and transforms the untrained filler into a basic soldier. Basic training is conducted in accordance with ATP 21–114.

*b. Advanced Individual Training (AIT) Phase.* The second part of individual training is the advanced individual training phase which includes training to qualify the soldier in branch material subjects and the skills he must know to effectively perform in the military occupational specialty (MOS) authorized by the TOE.

*c. The Basic Unit Training (BUT) Phase.* The basic unit training phase is conducted to integrate individuals into effective working teams of squads, sections, platoons, and companies for the performance of both combat and noncombat tasks.

*d. The Advanced Unit Training (AUT) Phase.* This phase integrates the company-sized teams, now fully capable of accomplishing their TOE missions, into the coordinated units (battalion, group, or brigade) within their respective branches.

*e. The Field Exercise and Maneuvers Phase.* This phase provides for the training of large units on the ground under simulated combat conditions.

### 15–6. Operational Readiness Training

Operational readiness training is the sixth phase of training and is begun when a unit has satisfactorily completed its Army Training Test (ATT) and is awaiting movement to a combat zone. The objectives during this cycle are to—

*a.* Correct deficiencies noted during the conduct of cycle training.

*b.* Develop and maintain the unit at a peak of operational proficiency.

*c.* Perfect the unit's proficiency in the conduct of special exercises.

## 15–7. Training Management

The commander, in discharging his responsibility for training, makes use of the many training publications and aids provided for his guidance by the Department of the Army. Assisted by his staff, he plans, directs, and supervises the training program using this literature to guide and assist in the development and execution of effective procedures in training management. In addition to the Army Regulations that state broad training policies and requirements, he and his staff must be familiar with the following training publications concerning the appropriate unit.

*a. Army Training Programs (ATP).* ATP's are prepared for each unit. They outline minimum essential training for units and individuals of the Active Army Reserve Components. They prescribe subjects, hours to be devoted to each subject, and applicable supporting Army Subject Schedules.

*b. Army Subject Schedules.* Army Subject Schedules provide detailed guidance to instructors for the preparation of lesson plans and the scheduling of branch, general, or military occupational specialty training, in a particular subject, as outlined in the Army Training Programs.

*c. Training Circulars.* Training Circulars promulgate training directives, policies, or information of an interim nature which requires revision too frequently for inclusion in training literature. They are also used to promulgate new training doctrine, tactics, or techniques, the immediate dissemination of which is essential.

*d. Army Training Tests (ATT).* ATT's provide guidance for testing, under simulated combat conditions, individuals and units, to evaluate the ability of the unit to perform its assigned mission, and to evaluate the ability of the soldier to perform the minimum skills requisite to success in battle.

*e. Training Directives.* A training directive is an all-inclusive term given to oral instructions or written training publications that are of a directive nature, regardless of contents or publishing headquarters. Generally, a directive establishes a definite policy or orders a specific requirement or objectives to be accomplished. Training directives include such publications as training memorandums and training schedules.

*f. References.* For a more detailed discussion of training and training management, see FM 21–5 and FM 21–6.

# CHAPTER 16
# REAR AREA SECURITY AND AREA DAMAGE CONTROL

## 16-1. General

*a. Sources of Danger.* The sources of danger in rear areas include airborne drops; airmobile penetrations; armored penetrations; amphibious landings; infiltration; sabotage; guerrilla attack; bombing and strafing by conventional weapons; CBR warfare; and nuclear weapons delivered by long-range artillery, aircraft, and guided missiles. The enemy's ability to strike within these areas with little or no warning requires that commanders give special attention to—

(1) Security of the army service areas, with particular emphasis on lines of communication and installations required for the combat service support of operations.

(2) Area damage control which minimizes the disruptive effects of enemy attack or natural disaster.

*b. Rear Areas.* A rear area is the geographical space within a command area where the bulk of combat service support functions are performed. In the combat zone rear areas are the division service area, the corps rear area, and the army service area. The entire communications zone is normally considered to be a rear area.

*c. Rear Area Security.* Rear area security consists of measures taken prior to, during, and after an enemy airborne attack, sabotage action, infiltration, guerrilla action, or initiation of psychological or propaganda warfare to minimize the effects thereof.

*d. Area Damage Control.* Area damage control consists of the preventive and control measures taken prior to, during, and after an attack or natural disaster to *minimize* the effects thereof which may aid in the continuation or reestablishment of combat service support.

## 16-2. Responsibilities

Within rear areas, all commanders are responsible for local security and damage control at their respective units and installations. Local security and damage control for U.S. Air Force and Navy installations are a responsibility of those services. Army commanders who have area responsibility insure that coordinated plans provide for mutual assistance between Army units and other services. Designated commanders are responsible for rear area security and area damage control; these commanders integrate local security and damage control plans into overall area plans.

*a. Combat Zone.* The field army commander is responsible for rear area security and area damage control in the combat zone. He delegates this responsibility to the commander of the field army support command (FASCOM). These functions are under the general staff supervision of the assistant chief of staff for security, plans and operations, FASCOM. The implementation of rear area security and area damage control operations is a responsibility of the FASCOM support brigades and other units located in the army and corps areas.

*b. Division Area.* At division level the commander of the division support command is assigned responsibility for the planning and execution of rear area security and area damage control in the division support area. The division G3 has general staff responsibility for rear area security. The division G4 has general staff responsibility for area damage control.

*c. Communications Zone.* The TALOG commander is responsible for rear area security and area damage control in the communications zone; he assigns responsibility for general supervision of these two functions to his deputy commander. In a divided communications zone, he delegates territorial responsibility for rear area security and area damage control to the

commanders of BALOG and ADLOG. Further details on rear area security and area damage control for the communications zone are contained in FM 54–1.

## 16–3. Command and Control

*a. General.* Army and communications zone commanders normally retain command of all assigned combat and service troops. The utilization of either tactical or service troops in a manner which detracts from their ability to perform their primary mission is a command decision.

*b. Rear Area Security.* Combat troops assigned rear area security missions under approved security plans execute those plans upon order of the appropriate commander, with the rear area security controller supervising and directing the execution of such plans for the commander.

*c. Area Damage Control.* Service troops with area damage control missions prescribed under an approved area damage control plan continue to operate under their commanders until the damage control plan is implemented. Upon implementation of the damage control plan, those portions of service units which have damage control missions are directed and supervised by the rear area security controller.

*d. Communications.* Communications required for rear area security and area damage control are provided from equipment and facilities available to the headquarters and units involved.

## 16–4. Rear Area Security

*a.* Enemy action in rear areas is characterized by surprise, deception, and mobility, necessitating a closely integrated and controlled defense to offset the attacker's advantage. This control and coordination is achieved by the commander through the rear area and subarea controllers. In organizing the defense of the area, the rear area security controller depends primarily on units permanently located in the area for execution of defense plans.

*b.* Military forces located in rear areas may consist of: combat service support units; combat units stationed in the rear area for security; combat units in transit, in reserve, and in rest areas; air defense units; personnel replacements; and Air Force and Naval troops. The rear area security plans of units located outside the geographic area of responsibility of their parent headquarters conform to the rear area security plans of the headquarters controlling the area in which the unit is located. Commitment of such a unit to rear area security operations is directed by the headquarters controlling the area in which the unit is located, but only after prior coordination with the parent headquarters of the unit.

*c.* Training of combat service support units includes instruction in infantry weapons and tactics; practice alerts; and tactical exercises to include training in defense against guerrillas, infiltrators, and saboteurs. Seldom are there sufficient combat troops available to secure the entire area simultaneously. Combat units should not be utilized to garrison static defensive positions or to protect rear area units; they are normally held under centralized control to provide a mobile reserve and patrol. The type and strength of combat units allocated depend on the size of the area, enemy capabilities, terrain, and available forces.

*d.* Civilian personnel may be used, as well as local and national police forces, whose value lies in their familiarity with the population and terrain.

*e.* Information is essential to the conduct of rear area security. Intelligence sources include intelligence agencies from air force, navy, air defense, and special intelligence agencies available to the army or TALOG commander.

## 16–5. Area Damage Control

*a. General.* Area damage control is a form of passive defense and consists of the measures taken prior to, during, and after a mass-destruction attack or a natural disaster. Damage control does not embrace the responsibility for the reestablishment of disrupted combat service support—this remains the responsibility of the appropriate commander. When necessary, he requests construction and other support to reestablish his facilities.

*b. Measures Taken Prior to Disaster.*

(1) *Dispersion.* Installations and facilities

must be so dispersed, when possible, as to prevent concentrations which offer profitable targets.

(2) *Cover and concealment.* Every means must be used to deceive the enemy and prevent him from attempting to destroy logistical installations. Engineers are responsible for providing the necessary technical assistance for all camouflage measures taken.

(3) *Duplication.* Duplication is a division of an installation into two or more parts, each part able to function with little additional administrative support. This duplication by division is another way of reducing the attractiveness of a target.

*c. Measures Taken During and After Disaster.*

(1) *Control of personnel and traffic.* The most important problem during and after a major disaster is the control of personnel and traffic. The military police are trained to do this and their responsibilities include rerouting supply convoys from the disaster area to the alternate logistical installations; permitting only traffic connected with the rescue effort to enter the disaster area; and giving instructions to vehicle and equipment operators who are permitted to cross radioactive areas. These instructions include the routes to take, the speed of crossing, stay times, and other required information. Traffic and straggler control posts are established to collect personnel within the target area who have been separated from their units, and who must be returned to their units, if they exist, or reassigned to another unit.

(2) *First aid and evacuation.* First aid and evacuation of patients are of prime importance. All military personnel are trained in first aid techniques. Every means of transportation is utilized to evacuate the patients from the area to patient sorting stations and/or to hospitals. The functions of rescue, first aid, and movement of patients to sorting stations must be performed by nonmedical troops in the disaster area. The casualty load and the limited medical means available make it essential that medical service personnel be used primarily in medical facilities to render emergency medical care and treatment. The surgeon provides the required number of medical service teams to man sorting stations together with hospital facilities to care for the tremendous number of patients that can be expected in a mass-destruction attack.

(3) *Protection from CBR.* Protection from chemical, biological, and radiological attack is mandatory for all personnel. With an aggressor who has the capability of launching such attacks every precaution is taken to counteract his effort. Decontamination teams are utilized to clear critical areas, supplies, and equipment. For a discussion of protective shelters, see TM 5–311.

(4) *Firefighting.*

(*a*) *General.* In heavily built-up areas firefighting is conducted in a manner similar to fighting forest fires. Because of the excessive demands for their services, TOE firefighting units will not normally be available and firefighting teams organized from available units must be prepared to control fires. The primary duties of these firefighting teams are the evacuation of troops and equipment and the isolation of fires allowing them to burn themselves out.

(*b*) *Responsibilities.*

1. Commanders are responsible for command and technical supervision of fire prevention and fire protection activities throughout their respective areas.
2. Area fire marshals, appointed by the area commanders, are responsible for carrying out the commander's program.
3. In the theater of operations it is the responsibility of major commanders to indoctrinate all military personnel in the fundamentals of firefighting and fire prevention. All units

should be trained as auxiliary fire teams to handle fire equipment for the protection of installations and personnel. Dispersion makes this imperative. In addition to the technical advice and inspections of the engineer fire marshals, demonstrations and instruction by teams from engineer firefighting organizations aid in unit training.

(5) *Provision of food, clothing, and water.* Provision of food, clothing, and water is made for both military personnel and affected local civilians. Engineers provide potable water.

(6) *Explosive Ordnance Disposal (EOD).* This service is designed to detect, identify, render safe, recover, and field evaluate all munitions containing high explosives, nuclear fission or fusion materials, and chemical, biological, and radiological agents. The service is provided by the ammunition service support structure; i.e., ammunition brigade, groups, and battalions. Coordination for the use of engineer heavy rescue teams may be required for dozers, cranes, and other heavy equipment. Notification, recovery, and disposition procedures and responsibilities are prescribed in AR 75–15 and AR 755–14.

(7) *Salvage.* Salvage is an important operation in damage control activities. Each service sets up a salvage collection point, or a composite collection point may be organized. Every effort is devoted to returning all usable equipment and supplies back to the supply chain in the interests of supply economy.

*d. Damage Control Units.* A subarea or sector damage control plan gives specific missions to the units within its subarea or sector.

(1) Heavy rescue teams are normally furnished by engineer units and ordnance maintenance units since these are units most likely to have the required dozers, cranes, air compressors, and other heavy equipment. Engineer units vary so much in their composition and structure that it is impossible to establish a single criterion in regard to the rescue teams they are required to provide. Heavy rescue teams from construction-type units are provided in accordance with the major command's damage control plan. The size of these teams varies with the situation. They can be organized, using the organic squad as a nucleus. They are equipped with their squad tools plus air compressors, bulldozers, and a crane or heavy wrecker. By using the squad as the nucleus, the team can be increased to a platoon-, company-, battalion-, or larger-size rescue team if the situation dictates. These teams enter the disaster area and move heavy loads, clear routes of communication of rubble and debris, fight fires, and perform other work necessary to rescue personnel.

(2) Light rescue teams are organized by each company-size unit, except medical units and those units furnishing heavy rescue teams. These teams also use the squad as a nucleus for the team. They rescue personnel and equipment when such rescue does not require the use of heavy equipment.

(3) Labor teams are furnished by all company-size units and are based also on the unit's organic squad. They perform tasks which do not require special training or equipment.

(4) Decontamination teams are organized by each company-size unit. They perform all decontamination activities within the disaster area.

(5) Medical service teams are organized from the local medical installations; the number, type, and size are determined by the surgeon. These teams provide emergency medical treatment and sorting stations established near the disaster area. The surgeon designates hospital facilities for those patients requiring hospitalization.

## 16–6. References

For further details on rear area security and area damage control, see FM 100–10 and STANAG 2079.

# APPENDIX A

# REFERENCES

## A–1. Department of the Army Pamphlets (DA Pam)

| | |
|---|---|
| 310–series | Indexes Pertaining to Administration, Training, Maintenance and Supply |
| 750–1 | Preventive Maintenance Guide for Commanders |

## A–2. Army Regulations (AR)

| | |
|---|---|
| 55–650 | Railroads |
| 75–15 | Responsibilities and Procedures for EOD |
| 117–5 | Military Mapping and Surveying |
| 320–5 | Dictionary of United States Army Terms |
| 320–50 | Authorized Abbreviations and Brevity Codes |
| 415–30 | Troop Construction for the Air Force |
| 755–14 | Responsibilities for EOD |

## A–3. Field Manuals (FM)

| | |
|---|---|
| 3–5 | Chemical, Biological and Radiological (CBR) Operations |
| 3–10 | Chemical and Biological Weapons Employment |
| (S) 3–10A | Chemical and Biological Weapons Employment (U) |
| 3–12 | Operational Aspects of Radiological Defense |
| 3–50 | Chemical Smoke Generator Units and Smoke Operations |
| 5–13 | The Engineer Soldier's Handbook |
| 5–15 | Field Fortifications |
| 5–20 | Camouflage, Basic Principles and Field Camouflage |
| 5–21 | Camouflage of Fixed Installations |
| 5–22 | Camouflage Materials |
| 5–23 | Field Decoy Installations |
| 5–25 | Explosives and Demolitions |
| 5–26 | Employment of Atomic Demolition Munition (ADM) |
| 5–29 | Passage of Mass Obstacles |
| 5–30 | Engineer Intelligence |
| 5–31 | Booby Traps |
| 5–34 | Engineer Field Data |
| 5–35 | Engineers' Reference and Logistical Data |
| 5–36 | Route Reconnaissance and Classification |
| 5–135 | Engineer Battalion, Armored, Mechanized, and Infantry (Mechanized) Divisions |
| 5–136 | Engineer Battalion, Airborne Division |
| 5–142 | Nondivisional Engineer Combat Units |
| 5–144 | Engineer Shore Assault Units |

| | |
|---|---|
| 5–146 | Engineer Topographic Units |
| 5–162 | Engineer Construction and Construction-Support Units |
| 7–11 | Rifle Company, Infantry, Airborne, and Mechanized |
| 7–15 | Rifle Platoon and Squads, Infantry, Airborne and Mechanized |
| 7–30 | Infantry, Airborne, and Mechanized Division Brigades |
| 8–10 | Medical Service, Theater of Operations |
| 9–6 | Ammunition Service in the Theater of Operations |
| 17–1 | Armor Operations |
| 19–5 | The Military Policeman |
| 19–25 | Military Police Traffic Control |
| 19–30 | Physical Security |
| 20–32 | Land Mine Warfare |
| 21–5 | Military Training Management |
| 21–6 | Techniques of Military Instruction |
| 21–11 | First Aid for Soldiers |
| 21–26 | Map Reading |
| 21–30 | Military Symbols |
| 21–40 | Small Unit Procedures in Chemical, Biological and Radiological (CBR) Operations |
| 23–12 | Technique of Fire of the Rifle Squad and Tactical Application |
| 24–18 | Field Radio Techniques |
| 24–20 | Field Wire and Field Cable Techniques |
| 29–22 | Maintenance Operations in the Field Army |
| 30–10 | Terrain Intelligence |
| 31–10 | Barriers and Denial Operations |
| 31–11 | Doctrine for Amphibious Operations |
| 31–12 | Army Forces in Amphibious Operations (The Army Landing Force) |
| 31–16 | Counterguerrilla Operations |
| 31–22 | U.S. Army Counterinsurgency Forces |
| 31–25 | Desert Operations |
| 31–30 | Jungle Training and Operations |
| 31–50 | Combat in Fortified and Built-Up Areas |
| 31–60 | River Crossing Operations |
| 31–70 | Basic Cold Weather Manual |
| 31–71 | Northern Operations |
| 31–72 | Mountain Operations |
| 41–5 | Joint Manual of Civil Affairs/Military Government |
| 41–10 | Civil Affairs Operations |
| 54–1 | The Logistical Command |
| 54–2 | The Division Support Command |
| 55–35 | Motor Transportation Operations and Motor Transport Units |
| 57–10 | Army Forces in Joint Airborne Operations |
| 57–35 | Airmobile Operations |
| 57–100 | The Airborne Division |
| 61–100 | The Division |
| (S) 100–1 | Field Service Regulations; Doctrinal Guidance (U) |
| 100–5 | Field Service Regulations; Operations |
| 100–10 | Field Service Regulations; Administration |
| (C) 100–20 | Field Service Regulations—Counterinsurgency (U) |

| | |
|---|---|
| 101–5 | Staff Officers Field Manual;Staff Organization and Procedure |
| 101–10 | Organizational, Technical and Logistical Data (Parts I and II) |
| 101–31–1 | Staff Officers Field Manual; Nuclear Weapons Employment |

## A–4. Technical Manuals (TM)

| | |
|---|---|
| 3–210 | Fallout Prediction |
| 3–220 | Chemical, Biological, and Radological (CBR) Decontamination |
| 5–220 | Passage of Obstacles Other Than Minefields |
| 5–230 | General Drafting |
| 5–232 | Elements of Surveying |
| 5–233 | Construction Surveying |
| 5–235 | Special Surveys |
| 5–240 | Map Compilation, Color Separation and Revision |
| 5–243 | Cartographic Aerial Photography |
| 5–245 | Map Reproduction |
| 5–248 | Foreign Maps |
| 5–258 | Pile Construction |
| 5–297 | Well Drilling Operations |
| 5–301 | Staff Tables of Engineer Functional Components System |
| 5–302 | Construction in the Theater of Operations |
| 5–303 | Bills of Materials and Equipment |
| 5–311 | Military Protective Construction (Nuclear Warfare) |
| 5–312 | Military Fixed Bridges |
| 5–330 | Planning, Site Selection, and Design of Roads, Airfields, and Heliports in the Theater of Operations |
| 5–331 | Management, Utilization of Engineer Construction Equipment |
| 5–332 | Pits and Quarries |
| 5–335 | Drainage Structures, Subgrades and Base Courses |
| 5–337 | Paving and Surfacing Operations |
| 5–343 | Military Petroleum Pipeline Systems |
| 5–349 | Arctic Construction |
| 5–360 | Port Construction and Rehabilitation |
| 5–370 | Railroad Construction |
| 5–441 | Topographic Surveying |
| 5–460 | Carpentry and Building Construction |
| 5–530 | Materials Testing |
| 5–541 | Control of Soils in Military Construction |
| 5–545 | Geology and Its Military Application |
| 5–624 | Roads, Runways and Miscellaneous Pavements; Repairs and Utilities |
| 5–627 | Railway Track Maintenance; Repairs and Utilities |
| 5–630 | Repairs and Utilities; Grounds Maintenance and Land Management |
| 5–700 | Field Water Supply |
| 5–704 | Construction Print Reading in the Field |
| 5–725 | Rigging |
| 5–742 | Concrete and Masonry |
| 9–500 | Data Sheets for Ordnance Type Materiel |
| 9–1375–204–10 | Demolition Kit, Projected Charge, M157 |
| 9–1900 | Ammunition, General |
| 9–1910 | Military Explosives |

| | |
|---|---|
| 9–2350–222–10 | Operator's Manual, Vehicle, Combat Engineer, Full Tracked |
| 10–1109 | Military Petroleum Pipeline System, Maintenance (QM Corps) |
| 10–1110 | Military Petroleum Pipeline System, Pump Stations |
| 21–300 | Driver Training and Selection |
| 38–750 | The Army Equipment Record System and Procedures |

## A–5. Technical Bulletins, Engineer (TB Eng)

| | |
|---|---|
| 310 | Planning and Procedures for Air Movement of Engineer Organizations in C–97 Aircraft |
| 311 | Planning and Procedures for Air Movement of Engineer Organizations in C–119 Aircraft |
| 312 | Planning and Procedures for Air Movement of Engineer Organizations in C–123 Aircraft |
| 313 | Planning and Procedures for Air Movement of Engineer Organizations in C–124 Aircraft |
| 314 | Planning and Procedures for Air Movement of Engineer Organizations in C–130 Aircraft |

Note. Air movement instructions (grouping, modification, disassembly, and reassembly) for particular items of Engineer heavy equipment are located in the TB Eng section of DA Pam 310–4.

## A–6. Other References

| | |
|---|---|
| SB 5–110 | Weight, Cubage and Transportation Data for Engineer TOE Units |
| STANAG 2041 | Operational Road Movement Orders, Tables, and Graphs |

# APPENDIX B

# ENGINEER TROOP ORGANIZATIONS

## Section I. CLASSIFICATION OF UNITS

### B–1. Category I Units

*a. Definition.* Category I units are units organized under tables of organization and equipment whose mission includes the seizing and holding of ground, in addition to that of destroying the enemy, and their corresponding headquarters and service companies, together with units whose missions include destruction of the enemy in support of, or assistance to, the ground gaining troops by fire or other tactical support. These units operate habitually in the forward portion of the active combat area.

*b. Engineer Responsibility.* Category I units normally operate as a part of a combined arms team whose primary mission is the destruction of the enemy forces. These engineer units are specifically trained, organized, and equipped to fulfill their combat type missions by construction and destruction.

### B–2. Category II Units

*a. Definition.* Category II units are units organized under tables of organization and equipment whose missions include support and assistance of a nontactical nature to category I units in the forward active portion of the combat area. They are found habitually forward of the army rear boundary and normally are assigned to division, corps, or army.

*b. Engineer Responsibility.* Category II units furnish engineer support within the corps and army forward areas to the tactical commanders. These units are trained to accomplish a wide variety of engineer tasks. They support category I engineer units in the performance of a particular engineer task, and they support field army in the overall combat effort of the army.

### B–3. Category III Units

*a. Definition.* Category III units are units organized under tables of organization and equipment whose missions include service and operations in support of a combat area and the operating agencies of a communications zone. These units are found normally in the communications zone or along the lines of communication leading thereto, to include the continental United States.

*b. Engineer Responsibility.* Category III units furnish engineer combat service support for forward units, and provide engineer support in the construction of rear area installations.

## Section II. MODIFICATION OF UNITS

### B–4. General

*a.* All TOE have been or will be converted to a new format in accordance with the New Army Authorization Documents System (NAADS). These TOE are identified by the suffix G. Under this system TOE will show units at three strength levels: level 1, full or 100 percent; level 2, approximately 90 percent of level 1; and level 3, approximately 80 percent of level 1. Equipment may be reduced to conform to the lower strength levels. Where appropriate, type B units (para B–6) may be included. TOE may be modified only by a Modification Table of Organization and Equipment (MTOE). Major commanders may approve MTOE which require only command assets. If

the MTOE exceeds the major command assets, DA approval is required. An MTOE is applicable only to specific individual units in a command whereas a TOE is applicable to all like units army-wide.

*b.* As an interim measure, and until all units are reorganized under the G-series TOE there may exist two TOE for the same type of unit; one under the NAADS format and one under the prior format.

## B–5. Reinforcement

*a. MTOE Authority.* As stated above an increase in personnel and equipment for a specific unit may be authorized by an MTOE.

*b. Other Authority.* The capabilities of a unit may be increased through direct-hiring, straight labor contracts, attachment of U.S. Army units, attachment of elements of Allied armies, or the assignment of prisoners of war.

*c. Special Considerations.*

(1) Since supplemental labor is seldom trained or skilled in the precise job to which it will be assigned, increased supervisory and inspection responsibilities fall upon the supplemented unit (usually falling to U.S. personnel who normally are equipment operators or other type specialists).

(2) Lack of familiarity with U.S. equipment by supplemental labor normally will cause a sharp increase in the maintenance workload.

(3) Supplementation also normally requires considerable nonengineer support such as food, transportation, and gasoline. Also, considerable supplementary engineer support in the form of construction materials, shelters, solid fuels, construction equipment, and tools, usually is needed.

(4) Supplementation of a unit by any of the above means does not necessarily result in a corresponding proportional rise in the supplemented unit's work output. However, provision of logistic support (rations and shelter) is sometimes a significant incentive to supplemental labor hired in a theater of operations.

## B–6. Type B Units

*a.* The type B column of a TOE adapts it to the lesser requirements for U.S. military personnel. Such units consist of the minimum U.S. personnel necessary for command, supervision, administration, technical assistance, and specialized maintenance. Vacancies existing in the type B column are indicative of the types of positions which can be filled by non-U.S. personnel. The number of such personnel must be determined by the commander of the major command to which the unit is assigned, and will depend on the capacity of available personnel to produce, number of shifts, and other local conditions.

*b.* Interpreters and translators required when organized under the type B column will be provided from appropriate teams available to the theater commander.

*c.* Authorization of the U.S. military personnel shown in the type B column may be modified by troop basis proponents as required by local area conditions of employment to enable the unit to effectively accomplish its mission when authorized by DA.

*d.* Maximum effort should be made to activate type B construction and construction-support units for employment in the communications zone. Non-U.S. personnel, after a period of familiarization and training with the equipment organic to these units, normally provide a stable work force familiar with local construction methods.

## Section III. EXTRACTS FROM TABLE OF ORGANIZATION AND EQUIPMENT

*Note.* The Tables of Organization and Equipment listed above may be classified into three groups as follows:

*Group I.* Those published tables which are not in the process of revision. These are the E and G tables with no parenthetical note following the title.

*Group II.* Those tables which are in the process of revision. These are followed by a parenthetical note.

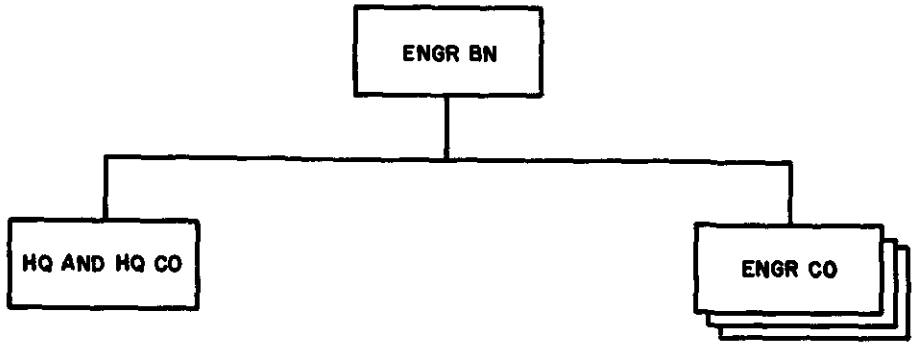
*Group III.* Test tables. These are followed by a T suffix.

The tables which fall into Group II are listed rather than the existing tables to provide the reader with an advance indication on forthcoming revisions. The tables in Group III are listed to provide the reader with advance information on new tables. As these tables have not been finally approved and published, they are subject to change in equipment, personnel, and mission. Accordingly, any planning which may be required should be based on the actual TOE authorized at the time and under which the unit is organized by General Order.

TOE 5–25G

# ENGINEER BATTALION, AIRBORNE DIVISION

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 32 | 2 | 544 | 578 |
| 2 | 31 | 2 | 485 | 518 |
| 3 | 27 | 2 | 433 | 462 |

*Figure B–1. Organizational chart, engineer battalion, airborne division.*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the airborne division by providing combat support.

*b.* To undertake and carry out airborne infantry combat missions when required.

### 2. Assignment

Organic to Airborne Division, TOE 57.

### 3. Capabilities

*a.* At level 1 this unit furnishes combat engineer support for the airborne division by providing—

(1) Engineer staff planning and supervision for organic and attached engineer troops.
(2) Engineer reconnaissance and producing engineer intelligence for the division.
(3) Limited construction, repair, and maintenance of roads; bridges; fords; and culverts to facilitate the movement of the division.
(4) Limited general construction work including construction of assault landing strips.
(5) Planning for the employment of atomic demolition munitions (ADM). Preparation for and the firing of ADM is provided as required by the attachment of TOE 5–570 cellular type teams.
(6) Personnel and equipment for the purification and supply of potable water.
(7) Close engineer combat support by personnel and equipment landed by parachute and aircraft.
(8) Technical assistance in camouflage operations.
(9) Emplacement and removal of obstacles, including mines and boobytraps.
(10) Construction and placement of deceptive devices.

(11) Organizational maintenance repair service for engineer, ordnance, and signal equipment organic to the battalion.
(12) Technical advice to supported units on engineering matters including recommendations for employment of engineer troops.
(13) Assistance in the assault of fortified positions.
(14) Assistance in the exploitation of locally available materials for construction, fortifications, and camouflage.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

*e.* The limited capability of this unit may be increased as required for specific operations by attaching needed elements of TOE 5–195T, Engineer Combat Battalion, Airborne, and/or TOE 5–54, Engineer Company, Light Equipment, Airborne.

## 4. Basis of Allocation

One per Airborne Division, TOE 57.

## 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

## 6. Mobility

*a.* Ninety-five percent mobile in organic transportation.

*b.* One hundred percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

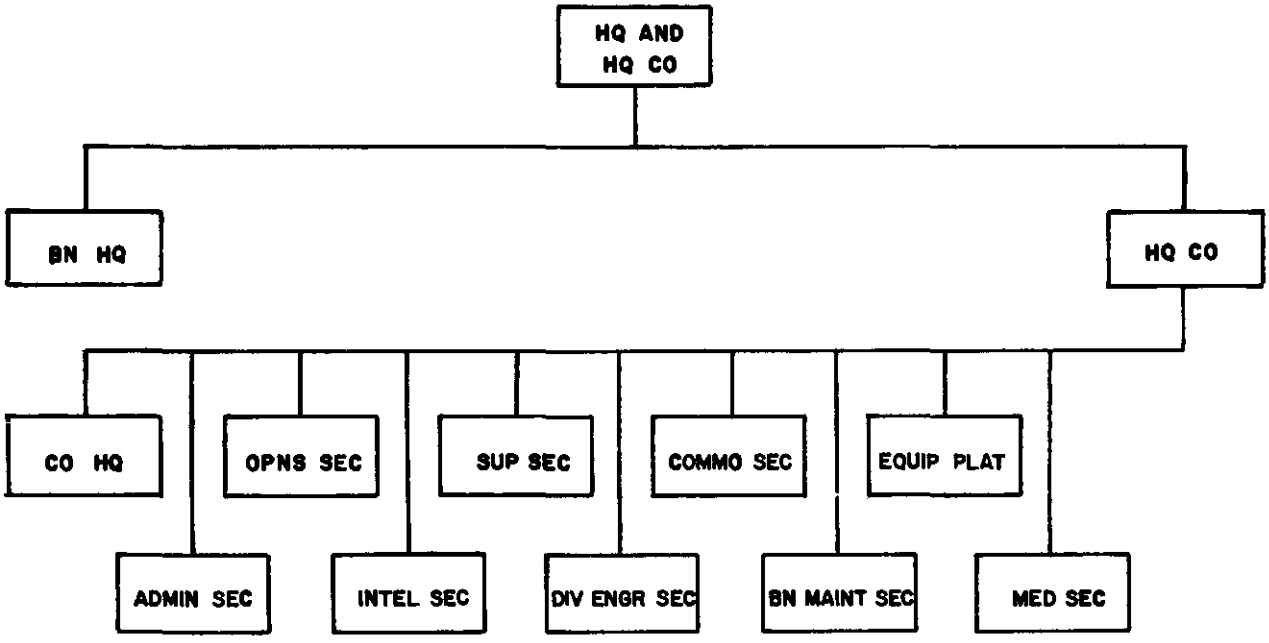
(Level 1. At levels 2 and 3 the number of some major items is reduced.)

| | Aggr breakdown within organic units 5–25G (1 ea) | 5–26G (3 ea) | 5–27G (3 ea) |
|---|---|---|---|
| *Weapons* | | | |
| Gun machine 7.62mm lt flex | 17 | 5 | 4 |
| Launcher grenade 40mm | 71 | 8 | 21 |
| *Vehicles* | | | |
| Truck ambulance ¼ T | 1 | 1 | 0 |
| Truck cargo ¾ T | 52 | 13 | 13 |
| Truck cargo 2½ T | 7 | 4 | 1 |
| Truck dump 2½ T | 27 | 15 | 4 |
| Truck platform utility ½ T | 28 | 1 | 9 |
| Truck utility ¼ T | 27 | 15 | 4 |
| Truck wrecker 2½ T | 1 | 1 | 0 |
| *Engineer Equipment* | | | |
| Boat recon pneu 3 man | 11 | 2 | 3 |
| Breaker paving—drill sinker combination ged | 15 | 0 | 5 |
| Demolition set explosive initiating | 27 | 0 | 9 |
| Detecting set mine ptbl metallic | 32 | 5 | 9 |
| Detecting set mine trk mtd | 1 | 1 | 0 |
| Generator set 3 KW 1–3 ph 60 cy 120/240 V 120/208 V skid mtd | 8 | 5 | 1 |
| Generator set 3 KW 28V DC skid mtd | 7 | 4 | 1 |
| Grader road mtzd ded 12 ft blade | 4 | 4 | 0 |
| Loader scoop ded 1½ cu yd | 4 | 4 | 0 |
| Lubricat serv unit power oper trlr mtd | 1 | 1 | 0 |
| Penetrometer airfield cone | 20 | 5 | 5 |
| Pneu tool and comp outfit 250 cfm trlr mtd | 2 | 2 | 0 |
| Saw chain 18 in | 27 | 0 | 9 |
| Shop equip contact maint trk mtd | 1 | 1 | 0 |
| Shop equip orgnzl repair lt trk mtd | 1 | 1 | 0 |
| Survey set gen purp | 1 | 1 | 0 |
| Toolkit welders | 1 | 1 | 0 |
| Tool outfit pioneer portable elect tools | 3 | 0 | 1 |
| Tractor full trkd ded w/bulldoz lt dbp | 6 | 6 | 0 |
| Trailer basic util 2½ T | 9 | 0 | 3 |
| Transporter airmobile | 6 | 6 | 0 |
| Water purification equipment trailer mtd 600 GPH | 5 | 5 | 0 |
| Welding equip elect cc–cp type | 1 | 1 | 0 |
| Welding set arc inert gas shielded DC 115 V | 1 | 1 | 0 |
| *Signal Items* | | | |
| Radio set AN/GRR–5 | 4 | 1 | 1 |
| Radio set AN/GRC–106 | 1 | 1 | 0 |
| Radio set AN/PRC–25 | 40 | 1 | 13 |
| Radio set AN/VRC–46 | 15 | 6 | 3 |
| Radio set AN/VRC–47 | 8 | 2 | 2 |
| Radio set AN/VRC–49 | 1 | 1 | 0 |
| Radio teletypewriter set AN/VSC–2 | 2 | 2 | 0 |
| Switchboard telephone manual SB–993/GT | 12 | -- | 4 |
| Switchboard telephone manual SB–22/PT | 2 | 2 | 0 |

TOE 5-26G

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER BATTALION, AIRBORNE DIVISION

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 17 | 2 | 166 | 185 |
| 2 | 16 | 2 | 149 | 167 |
| 3 | 15 | 2 | 130 | 147 |

*Figure B-2. Organizational chart, headquarters and headquarters company, engineer battalion, airborne division.*

## Section B. GENERAL

### 1. Mission

*a. Headquarters.* To provide an engineer special staff section for the division and to provide command and staff for the engineer battalion, airborne division.

*b. Headquarters Company.* To provide alternate CP, administration, operations control, communications, reconnaissance and engineer intelligence, supply, organizational maintenance support, supplemental engineer and ordnance construction equipment, and unit level medical service for the engineer battalion. To provide potable water for the division, and provide additional combat support by the planning for employment of atomic demolition munitions (ADM), when appropriate teams are attached.

*c. Other.* To fight as airborne infantry when required.

### 2. Assignment

Organic to Engineer Battalion, Airborne Division, TOE 5–25.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Staff planning and supervision of division engineer operations, including attached engineer troops.

(2) Five water points for purification and supply of water for the division.

(3) Engineer reconnaissance and intelligence for the engineer battalion and the division.

(4) Atomic demolitions munitions support to the division when TOE 5–570 cellular-type ADM teams are attached.

(5) Unit level medical service for the battalion, to include unit level medical care and intrabattalion evacuation.

(6) Organizational maintenance and repair service for equipment of the battalion.

(7) Radio and wire communications for the battalion when performing a normal engineer mission and when reorganized for combat as infantry.

(8) Additional construction equipment for subordinate units.

*b.* At levels 2 and 3, operational capabilities are reduced, respectively, to 90 percent and 80 percent of level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

*e.* This unit is dependent upon the division Administration Company, TOE 12–157, for personnel administration services.

### 4. Basis of Allocation

One per Engineer Battalion, Airborne Division, TOE 5–25.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

*a.* Ninety percent mobile with organic transportation.

*b.* One hundred percent air transportable in medium transport aircraft.

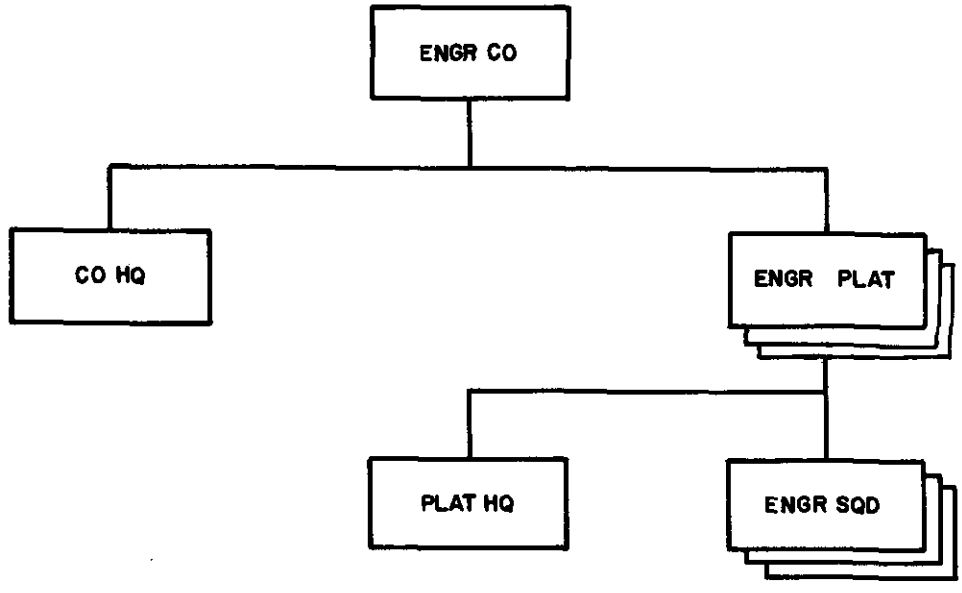
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–25G)

TOE 5–27G

# ENGINEER COMPANY, ENGINEER BATTALION AIRBORNE DIVISION

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 126 | 131 |
| 2 | 5 | 0 | 112 | 117 |
| 3 | 4 | 0 | 101 | 105 |

*Figure B–3. Organizational chart, engineer company, engineer battalion, airborne division.*

## Section B. GENERAL

### 1. Mission

*a.* To provide an operating component of the engineer battalion, airborne division.

*b.* To undertake and carry out airborne infantry combat missions when required.

### 2. Assignment

Organic to the Engineer Battalion, Airborne Division, TOE 5–25.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Performs pioneer tasks; when reinforced with engineer equipment can execute more complex engineer work to include hasty construction of assault aircraft landing facilities.

(2) Provides engineer support for combined arms teams of the airborne infantry brigade.

*b.* At levels 2 and 3, operational capabilities are reduced, respectively, to 90 percent and 80 percent of level 1.

*c.* This unit is not adaptable to type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

*e.* This unit is dependent upon the division Administration Company, TOE 12–157, for personnel administration services.

### 4. Basis of Allocation

Three per Engineer Battalion, Airborne Division, TOE 5–25.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

*a.* One hundred percent mobile by organic transportation.

*b.* One hundred percent air transportable in medium transport aircraft and air droppable.

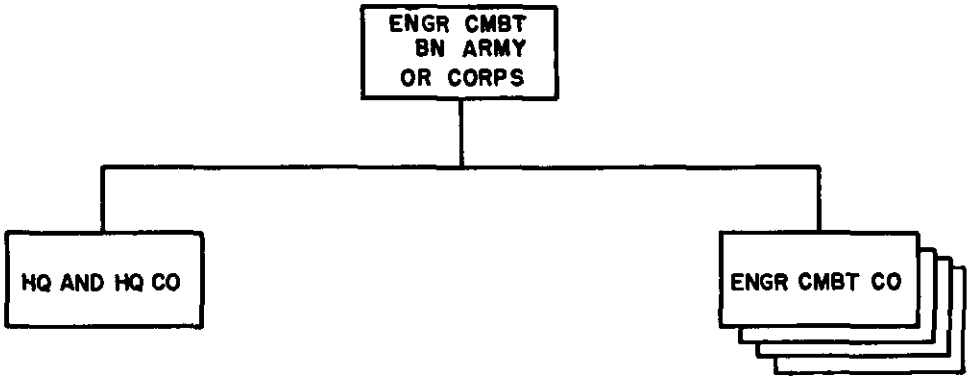
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–25G)

TOE 5–35G

# ENGINEER COMBAT BATTALION, ARMY OR CORPS

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 37 | 4 | 795 | 836 |
| 2 | 36 | 4 | 712 | 752 |
| 3 | 29 | 4 | 636 | 669 |

*Figure B–4. Organizational chart, engineer combat battalion, army or corps.*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of corps and army by means of engineer combat support and general engineer work.

*b.* To reinforce divisional engineer units when required.

*c.* To perform infantry combat missions when required.

### 2. Assignment

To corps or army with normal attachment to an engineer combat group.

### 3. Capabilities

*a.* At level 1 this unit provides for—

(1) Engineer staff planning and supervision of organic and attached engineer troops.

(2) Engineer reconnaissance and intelligence.

(3) Construction, repair, and maintenance of roads, fords, culverts, landing strips, heliports, command posts, supply installations, buildings, structures, and related facilities.

(4) Planning and preparation of sites, and supervision of ADM teams (TOE 5–570) in the execution of atomic demolition munitions missions.

(5) Preparation and removal of obstacles to include minefields.

(6) Installation and operation of field potable water supply facilities.

(7) Construction and placement of deceptive devices and technical assistance in camouflage operations.

(8) Site preparation for air defense artillery units.

(9) Construction of defensive installations.

(10) Engagement in river-crossing operations, to include assault crossing of troops and construction of tactical rafts and bridges.

(11) Participation in amphibious operations as part of the shore party to perform engineer tasks.

(12) Participation in the assault of fortified positions.

(13) A unit to undertake and carry out an infantry combat mission when required.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Normally eight per corps and twelve per field army with attachment to an engineer combat group.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in heavy transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

(Level 1. At levels 2 and 3 the number of some major items may be reduced.)

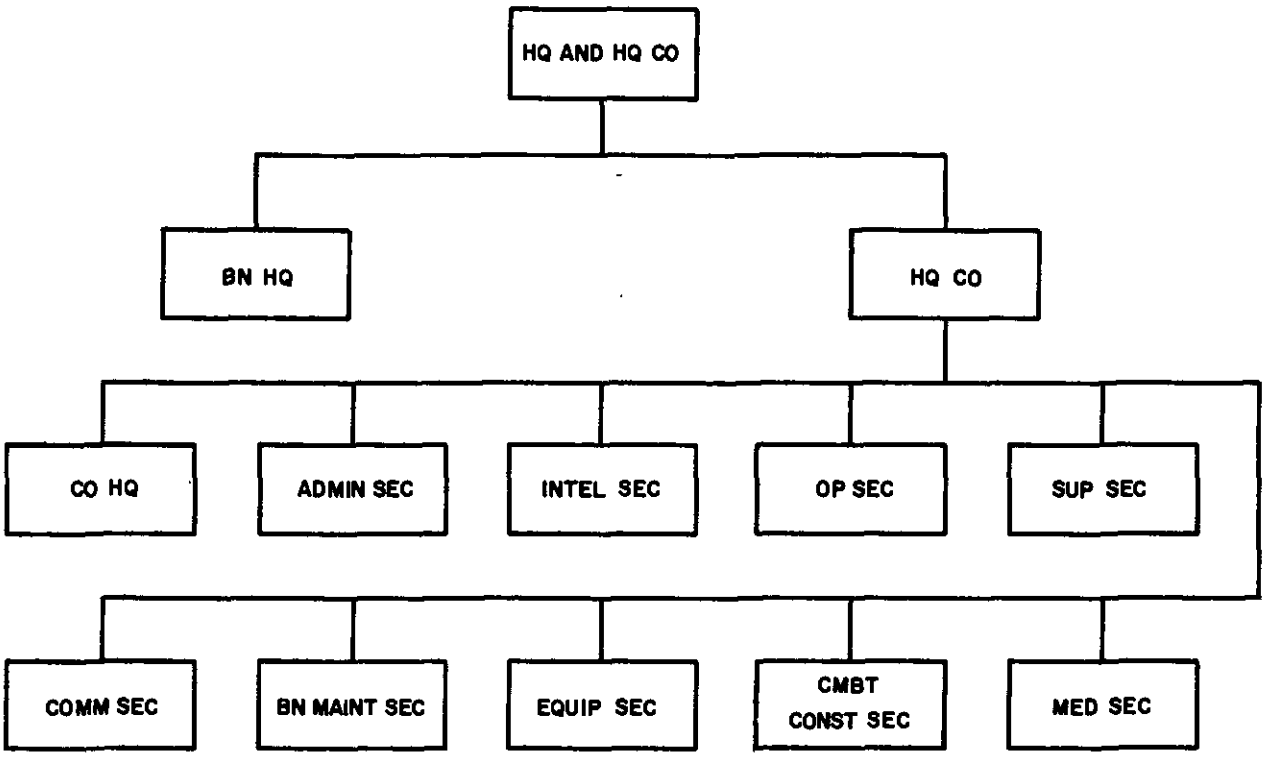
| | Aggr breakdown within organic units | | |
|---|---|---|---|
| | 5–35E | 5–36E (1 ea) | 5–37E (4 ea) |
| *Weapons* | | | |
| Gun mach 7.62mm, lt flex | 17 | 5 | 3 |
| Launcher grenade 40mm | 79 | 7 | 18 |
| *Vehicles* | | | |
| Truck ambulance ¼ T | 1 | 1 | |
| Truck cargo ¾ T | 25 | 9 | 4 |
| Truck cargo 2½ T | 29 | 13 | 4 |
| Truck dump 5 T | 56 | 4 | 13 |
| Truck tank fuel servicing 2½ T | 2 | 2 | |
| Truck tractor 5 T | 1 | 1 | |
| Truck tractor 10 T | 10 | 2 | 2 |
| Truck utility ¼ T | 29 | 9 | 5 |
| Truck wrecker 5 T | 1 | 1 | |
| *Engineer Equipment* | | | |
| Boat recon pneu 3-man | 15 | 3 | 3 |
| Crane shovel trk mtd 20 T ¾ cu yd | 2 | 2 | |
| Crane whl mtd 20 T ¾ cu yd rough terrain | 1 | 1 | |
| Demolition set explosive initiating | 48 | -- | 12 |
| Detecting set mine ptbl metallic | 40 | 4 | 9 |
| Generator set 1.5 KW 120V 60 cy | 1 | 1 | |
| Generator set 1.5 KW 28V DC | 9 | 5 | 1 |
| Generator set 3 KW 1–3ph 60 cy 120/240 V 120/208 V | 12 | -- | 3 |
| Generator set 5 KW 1–3 ph 60 cy 120/240 V 120/208 V | 2 | 2 | |
| Generator set 10 KW 1–3 ph 60 cy 120/240 V 120/208 V | 7 | 7 | |
| Grader road mtzd | 4 | 4 | |
| Ion exch unit water purification 3,000 gph trk mtd | 1 | 1 | |
| Loader scoop 2½ cu yd | 13 | 1 | 3 |
| Lubricat-serv unit trlr mtd pwr oper | 1 | 1 | |
| Mixer conc trlr mtd 16 cu ft | 1 | 1 | |
| Pneu tool and compressor outfit trlr mtd 250 cfm | 5 | 1 | 1 |
| Saw chain 18 in | 12 | -- | 3 |
| Semitrlr low bed 25 T | 10 | 2 | 2 |
| Semitrlr van 6 T | 1 | 1 | |
| Shop equip contact maint trk mtd | 1 | 1 | |
| Shop equip organzl repair light trk mtd | 1 | 1 | |
| Shop equip woodwork base maint trlr mtd | 1 | 1 | |

| | Aggr breakdown within organic units | 5–35E (1 ea) | 5–36E (4 ea) | 5–37E |
|---|---|---|---|---|
| Survey set gen purp | 1 | 1 | | |
| Tool outfit pioneer ptbl elec tools | 12 | -- | 3 | |
| Tractor full tracked med DBP | 10 | 2 | 2 | |
| Trailer utility 2½ T | 36 | -- | 9 | |
| Trailer flat bed 10 T | 2 | 2 | | |
| Water purification equip set trk mtd 1500 GPH | 5 | 5 | | |
| Welding shop trlr mtd | 1 | 1 | | |

| | Aggr breakdown within organic units | 5–35E (1 ea) | 5–36E (4 ea) | 5–37E |
|---|---|---|---|---|
| *Signal Items* | | | | |
| Radio set AN/PRC–25 | 2 | 2 | | |
| Radio set AN/VRC–47 | 22 | 2 | 5 | |
| Radio set AN/GRR–5 | 5 | 1 | 1 | |
| Radio set AN/VRC–46 | 6 | 6 | | |
| Radio set AN/GRC–125 | 52 | -- | 13 | |
| Radio set AN/VRC–49 | 1 | 1 | | |
| Teletypewriter set AN/PGC–1 | 1 | 1 | | |
| Teletypewriter set AN/GGC–3 | 1 | 1 | | |

# HEADQUARTERS AND HEADQUARTERS COMPANY ENGINEER COMBAT BATTALION, ARMY OR CORPS

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 17 | 4 | 203 | 224 |
| 2 | 16 | 4 | 192 | 212 |
| 3 | 13 | 4 | 176 | 193 |

*Figure B–5. Organizational chart, headquarters and headquarters company, engineer combat battalion, army or corps.*

## Section B. GENERAL

### 1. Mission

*a. Headquarters.* To provide command and staff for the engineer combat battalion, army or corps.

*b. Headquarters Company.* To provide an alternate CP, administration, operations control, communications, reconnaissance and engineer intelligence, supply, organizational maintenance support, supplemental engineer and ordnance construction equipment, and medical service for the battalion. To provide

for the production and supply of potable water for the corps or army. To provide for combat support by the planning and preparation for employment of atomic demolitions munitions (ADM).

*c. Other.* To undertake infantry combat missions when required.

### 2. Assignment

Organic to Engineer Combat Battalion, Army or Corps, TOE 5–35.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command, staff planning, and supervision of battalion operations, including attached engineer troops.

(2) Engineer reconnaissance and intelligence service for the battalion and army or corps.

(3) Limited ADM support to the army or corps by the planning and preparation for the employment of ADM. Full support, including execution of an ADM mission, is provided when TOE 5–570 teams are attached.

(4) Water purification and supply with five water points.

(5) Organizational maintenance and repair support for battalion equipment.

(6) Supplemental construction equipment for subordinate units and a vertical construction reinforcement capability.

(7) Battalion administration and supply service.

(8) Unit level medical service to include medical treatment and evacuation, operation of a battalion aid station, supervision of sanitation, and furnishing company aid men.

(9) Radio and wire communications for the battalion.

*b.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Combat Battalion, Army or Corps, TOE 5–35.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

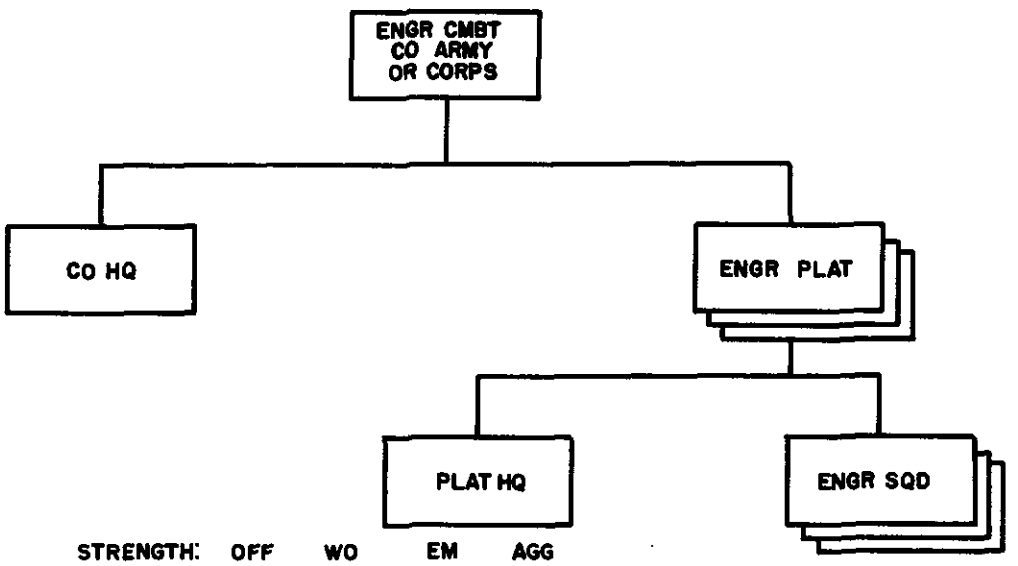
One hundred percent mobile in organic transportation and one hundred percent air transportable in heavy transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–35G)

# ENGINEER COMBAT COMPANY, ENGINEER COMBAT BATTALION, ARMY OR CORPS

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 5 | 0 | 148 | 153 |
| | 2 | 5 | 0 | 130 | 135 |
| | 3 | 4 | 0 | 115 | 119 |

*Figure B–6. Organizational chart, engineer combat company, engineer combat battalion, army or corps.*

## Section B. GENERAL

### 1. Mission

*a.* To provide an operating component of the engineer combat battalion for performance of engineer work in support of the field army or corps.

*b.* To undertake and carry out infantry combat mission when required.

### 2. Assignment

Organic to Engineer Combat Battalion, Army or Corps, TOE 5–35.

### 3. Capabilities

*a.* At level 1 this unit is capable of—

(1) Performing combat engineer tasks to include more complex engineer tasks when reinforced with additional heavy equipment.

(2) Preparing sites and assisting attached ADM teams in the execution of ADM missions.

(3) Construction, repair, and maintenance of roads, fords, culverts,

landing strips, heliports, command posts, and supply installations.

(4) Preparing and removing obstacles to include minefields.

(5) Construction and placement of deceptive devices.

(6) Site preparation for air defense artillery units.

(7) Construction of defensive installations.

(8) Engaging in river-crossing operations, to include assault crossing of troops and construction of tactical rafts and bridges.

*b.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Four per Engineer Combat Battalion, Army or Corps, TOE 5–35.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

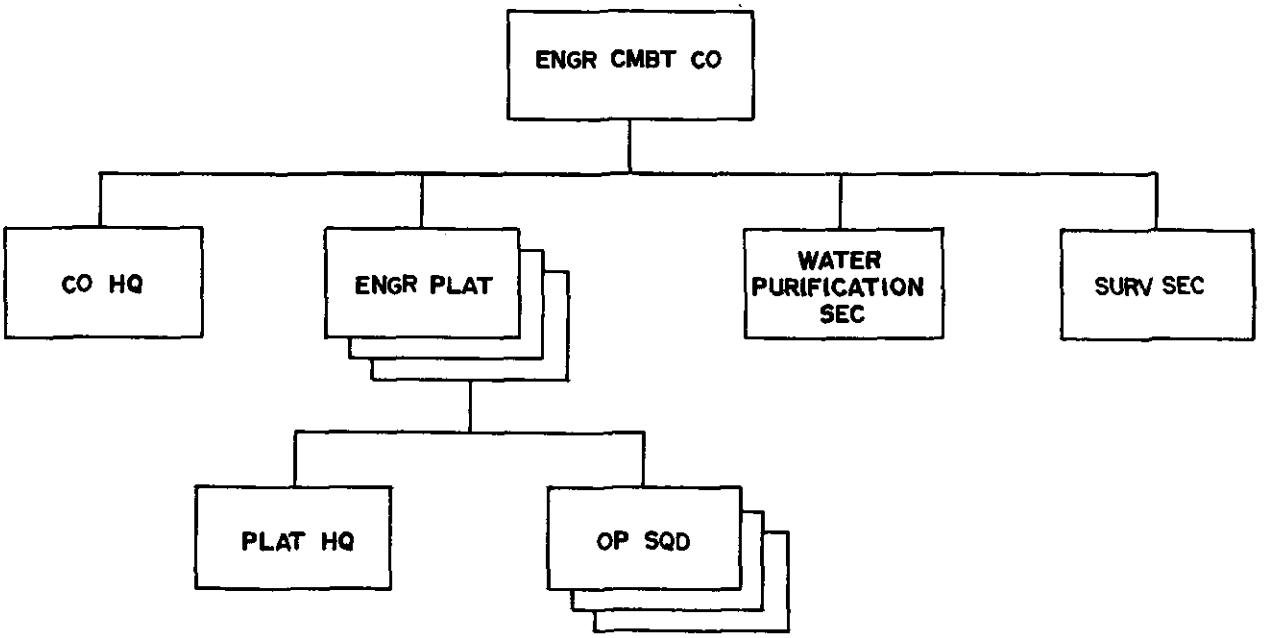
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–35G)

TOE 5–38G

# ENGINEER COMBAT COMPANY
# UNITED STATES ARMY MISSILE COMMAND, AIR TRANSPORTABLE

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 1 | 186 | 192 |
| 2 | 5 | 1 | 166 | 172 |
| 3 | 5 | 1 | 148 | 154 |

*Figure B–7. Organizational chart, engineer combat company, United States Army Missile Command, air transportable.*

## Section B. GENERAL

### 1. Mission

*a.* To provide an operating component for performance of engineer work in support of the United States Army Missile Command, air transportable.

*b.* To perform infantry combat missions when required.

### 2. Assignment

Organic to United States Army Missile Command, Air Transportable, TOE 39–51.

### 3. Capabilities

*a.* At level 1 this unit is capable of—

(1) Performing combat engineer mis-

sions to include heavy engineer tasks when reinforced with additional heavy equipment.

(2) Purifying up to 1,200 gallons of potable water per hour, and providing storage facilities for 9,000 gallons.

(3) Fielding one topographic survey party to provide 2d order survey data for missile command.

(4) Preparing and executing conventional demolitions and atomic demolition munitions (ADM), when reinforced by Team MC, TOE 5–570.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per United States Army Missile Command, Air Transportable, TOE 39–51.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation, and one hundred percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Gun mach 7.62mm lt flex | 7 |
| *Vehicles* | |
| Truck cargo ¾ T | 6 |
| Truck cargo 2½ T | 5 |
| Truck dump 2½ T | 12 |
| Truck tractor 10 T | 2 |
| Truck utility ¼ T | 9 |
| *Engineer Equipment* | |
| Astronomic position set astronomic observations | 1 |
| Demolition set explosive initiat | 12 |
| Detecting set mine ptbl metallic | 9 |
| Drafting equip set bn | 1 |
| Gen set 0.5 KW 60 cy 1 ph 120V | 1 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 1 |
| Gen set 1.5 KW DC 28V | 1 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 6 |
| Gen set 3 KW DC 28V | 1 |
| Grader road mtzd hvy | 1 |
| Loader scoop 1½ cu yd | 1 |
| Pneu tool and comp outfit 250 cfm trlr mtd | 1 |
| Saw chain 18 in | 9 |
| Semitrailer low bed 25 T | 2 |
| Shop equip contact maint trk mtd | 1 |
| Stereoscope lens aerial photo interpr | 2 |
| Survey inst dist measur electron microwave miniaturized | 3 |
| Survey set plane table 5 man | 2 |
| Survey set precise travers | 1 |
| Survey set suppl equip topo bn | 1 |
| Survey set triang | 1 |
| Target survey beacon | 4 |
| Theodolite survey direct 1 sec | 2 |
| Tool outfit pioneer ptbl elec tools | 3 |
| Tractor full trkd med dbp | 2 |
| Trailer basic util 2½ T | 9 |
| Water purif equip trlr mtd 600 gph | 2 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/VRC–46 | 5 |
| Radio set AN/VRC–47 | 2 |
| Radio set AN/PRC–77 | 9 |
| Radio set AN/GRC–106 | 1 |
| Radio teletypewriter set AN/GRC–142 | 1 |
| Receiver radio R–390/URR | 1 |

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER COMBAT GROUP OR HEADQUARTERS AND HEADQUARTERS COMPANY, AIRBORNE ENGINEER COMBAT GROUP

## Section A. ORGANIZATION

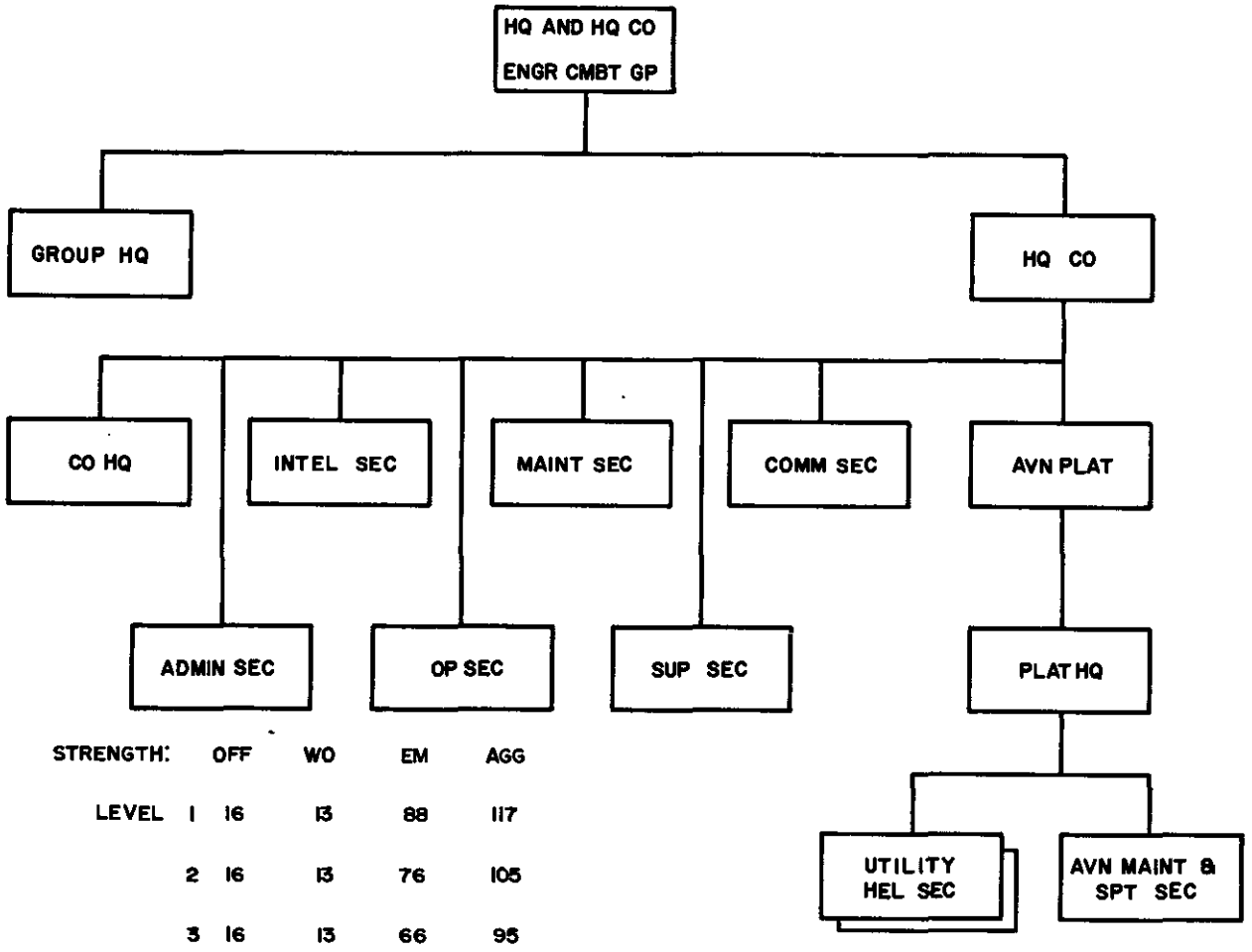



*Figure B–8. Organizational chart, headquarters and headquarters company, engineer combat group, or airborne engineer combat group.*

## Section B. GENERAL

### 1. Mission

*a.* To command assigned or attached units.

*b.* To plan and coordinate the operations of a group which may consist of engineer com-

bat or construction battalions, and other assigned or attached units engaged in engineer support activities.

### 2. Assignment

To corps or army with normal attachment to an engineer brigade, corps, airborne corps, or army.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Staff planning and supervision of operations of assigned and attached units.

(2) Engineer reconnaissance by air and ground means; supervision of engineer intelligence collection activities; evaluation and dissemination of engineer intelligence.

(3) Rotary wing aircraft for support of reconnaissance and combat support activities for the group.

(4) Planning for employment of Atomic Demolition Munitions and conventional demolitions.

(5) Supervision and assistance in administration, supply, (to include resupply of ADM) mess, and maintenance matters of assigned and attached units.

(6) A group message center and supervision of the group communications operations.

(7) Supervision of unit medical service within the group.

*b.* When organized as an airborne engineer combat group, all personnel are parachute qualified.

*c.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those at level 1.

*d.* This unit is not adaptable to a type B organization.

*e.* Preventive medical field services are provided by TOE 8–500 Medical Teams.

*f.* Individuals of this organization, except chaplain and surgeon, can engage in effective, coordinated defense of the unit's area of installation.

### 4. Basis of Allocation

One per four to seven engineer battalions.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

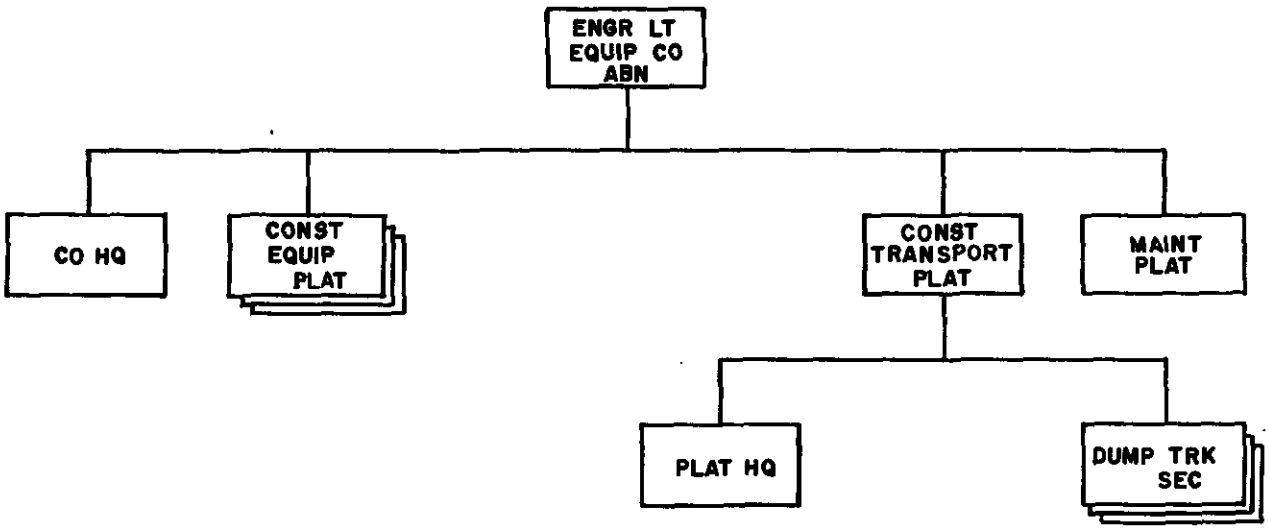
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Armament subsystem helicopter 7.62mm mach gun twin | 6 |
| *Vehicles* | |
| Truck cargo ¾ T | 13 |
| Truck cargo 2½ T | 7 |
| Truck utility ¼ T | 10 |
| *Engineer Equipment* | |
| Drafting equip set bn | 3 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 3 |
| Generator set 3 KW DC 28 V | 1 |
| Generator set 3 KW 60 cy 1–3 ph 120/240 V 120/208 V | 1 |
| Generator set 10 KW 60 cy 1 ph 115/230 V | 1 |
| Generator set 10 KW 60 cy 1–3 ph 120/240 V 120/208 V | 2 |
| Reproduction set diazotype mach | 1 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/GRC–106 | 2 |
| Radio set AN/VRC–46 | 3 |
| Radio set AN/VRC–47 | 4 |
| Radio set AN/VRC–49 | 1 |
| Radio set AN/VRC–24 | 1 |
| Radio set AN/URC–10 | 9 |
| Teletypewriter set AN/GGC–3 | 1 |
| Teletypewriter set AN/PGC–1 | 1 |
| *Aircraft* | |
| Helicopter observ OH/6A | 6 |
| Helicopter utility UH–1D | 3 |

TOE 5–54G

# ENGINEER LIGHT EQUIPMENT COMPANY, AIRBORNE

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 7 | 0 | 207 | 214 |
| | 2 | 7 | 0 | 185 | 192 |
| | 3 | 7 | 0 | 162 | 169 |

*Figure B–9. Organizational chart, engineer light equipment company, airborne.*

## Section B. GENERAL

### 1. Mission

To support airborne engineer combat operations with manned engineer construction equipment.

### 2. Assignment

To an airborne corps.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Construction equipment support for one engineer combat group in an airborne operation.

(2) Construction equipment support for an airborne division engineer battalion in the development of an airhead.

(3) Dump truck capability of 125 cubic yards or equivalent tonnage per lift.

(4) Two-shift operation of all engineer construction equipment.

*b.* This unit may be landed by parachute and all types of medium assault aircraft.

*c.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*d.* This unit is not adaptable to a type B organization.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per airborne corps.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in medium assault type aircraft. The one hundred percent ground mobility is predicated on the use of 2½ ton dump trucks as tow vehicles for the cranes and rock crusher.

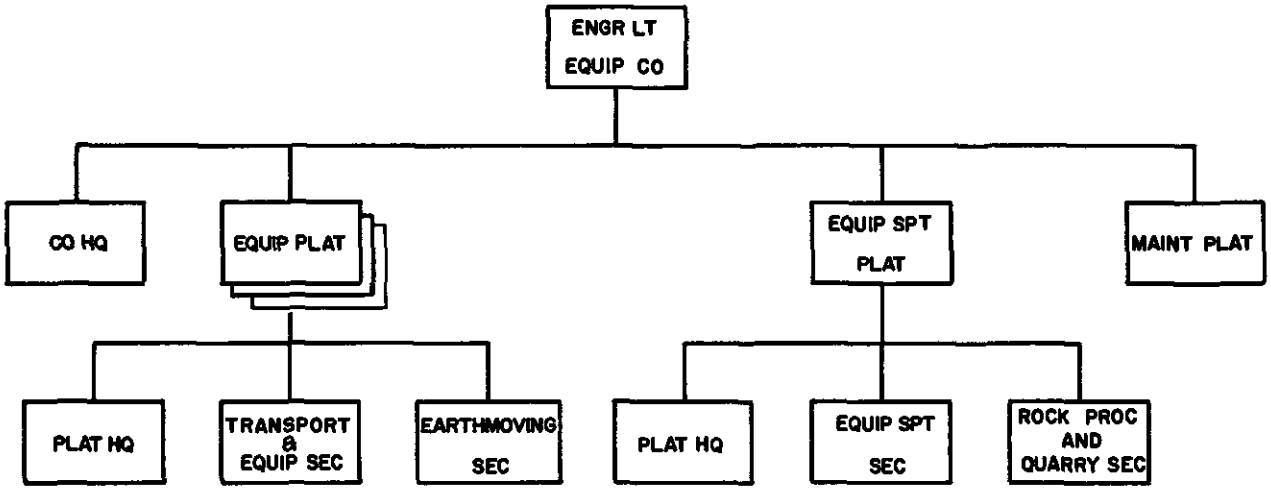
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Gun machine 7.62mm lt flex | 6 |
| Launcher grenade 40mm | 8 |
| *Vehicles* | |
| Truck cargo ¾ T | 1 |
| Truck cargo 2½ T | 7 |
| Truck dump 2½ T | 18 |
| Truck dump 5 T | 12 |
| Truck utility ¼ T | 6 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Crane shovel whl mtd GED ½ cu yd | 3 |
| Crusher jaw whl mtd 15 TPH | 1 |
| Detecting set mine AN/PRS–4 | 1 |
| Detecting set mine ptbl metallic | 1 |
| Distributor water collapsible tank 900 gal | 3 |
| Floodlight set elec ptbl 6 light 5 KW 120/208 V | 3 |
| Gen set 1.5 KW 60 cy 120 V | 1 |
| Gen set 1.5 KW DC 28 V | 1 |
| Gen set 3 KW DC 28 V | 1 |
| Gen set 5 KW 60 cy 1–3 ph 120/240 V 120/208 V | 3 |
| Grader road mtzd 12 ft blade | 9 |
| Loader scoop 1½ cu yd | 6 |
| Lubricat serv unit trlr mtd | 1 |
| Pneu tool and comp outfit trlr mtd | 3 |
| Roller airmobility vibrating | 3 |
| Roller towed pneu tire 13 tire 9 T | 3 |
| Roller towed sheepsfoot 2 dr | 3 |
| Scraper towed 7½ cu yd | 9 |
| Shop equip contact maint trk mtd | 3 |
| Shop equip orgnzl repair lt trk mtd | 1 |
| Tractor full trkd lt DBP | 12 |
| Tractor whld ind lt DBP | 9 |
| Transporter airmobile | 12 |
| *Signal Items* | |
| Radio set AN/VRC–46 | 5 |
| Radio set AN/VRC–47 | 2 |

TOE 5–58G

# ENGINEER LIGHT EQUIPMENT COMPANY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 6 | 0 | 206 | 212 |
| | 2 | 6 | 0 | 185 | 191 |
| | 3 | 6 | 0 | 160 | 166 |

*Figure B–10. Organizational chart, engineer light equipment company.*

## Section B. GENERAL

### 1. Mission

To support engineer combat operations with manned engineer construction equipment.

### 2. Assignment

To Army or corps with normal attachment to the engineer combat group.

### 3. Capabilities

*a.* At level 1, this unit provides—

(1) Construction equipment support for from one to three engineer combat battalions engaged in general engineer combat construction operations.

(2) Construction equipment support for divisional engineer combat battalions when required.

(3) Two shift operation of selected items of equipment.

(4) Organizational maintenance on organic equipment; when geographic, operational or combat requirements necessitates, direct support maintenance of engineer equipment will be provided by the attachment of a maintenance direct support cellular team.

(5) A capability of transporting 75 cubic

yards of bulk material per trip, on a single shift basis, when not conducting quarrying operations.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per engineer combat group.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

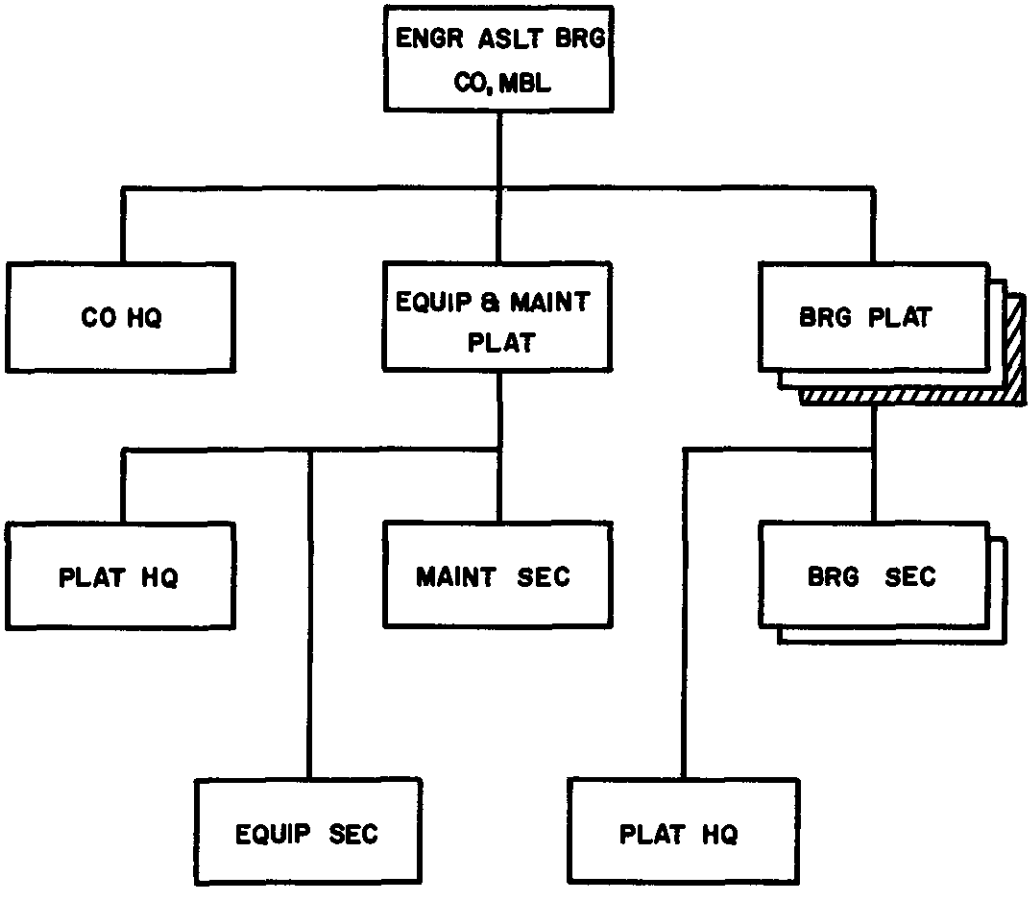
One hundred percent mobile inorganic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Gun mach 7.62mm lt flex | 6 |
| Launcher grenade 40mm | 6 |
| *Vehicles* | |
| Truck cargo ¾ T | 9 |
| Truck cargo 2½ T | 5 |
| Truck dump 5 T | 16 |
| Truck tractor 10 T | 7 |
| Truck tractor 5 T | 4 |
| Truck utility ¼ T | 6 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Auger earth skid mtd | 1 |
| Compressor rotary whl mtd 600 CFM | 1 |
| Crane shovel crwlr mtd 12½ T ¾ cu yd | 2 |
| Crane whl mtd 20 T ¾ cu yd | 4 |
| Crushing and screening plant 25 cu yd per hour | 1 |
| Detecting set mine AN/PRS–4 | 1 |
| Detecting set mine ptbl metallic | 1 |
| Distributor bitumin matl trk mtd 800 gal | 3 |
| Distributor water trk mtd 1,000 gal | 3 |
| Ditching mach DED whl mtd ladder | 3 |
| Floodlight set elec 6 light 5 KW 120/208 V | 4 |
| Gen set 1.5 KW 60 cy 120 V | 1 |
| Gen set 1.5 KW DC 28 V | 1 |
| Gen set 3 KW DC 28 V | 2 |
| Gen set 5 KW 60 cy 1–3 ph 120/240 V 120/208 V | 4 |
| Grader road mtzd heavy | 9 |
| Kettle heating bitumin trlr mtd 165 gal | 2 |
| Loader scoop 2½ cu yd | 4 |
| Lubricat-serv unit pwr oper trlr mtd | 1 |
| Mixer conc trlr mtd 16 cu ft | 2 |
| Pneu tool and compressor outfit trlr mtd 250 CFM | 3 |
| Rock drilling equip | 1 |
| Roller air mobility vibrating | 3 |
| Roller mtzd 3 whl 10 T | 1 |
| Roller towed sheepsfoot 2 dr | 3 |
| Roller towed 13 tire 9 T | 1 |
| Scraper towed 18 cu yd | 9 |
| Semitrailer low bed 25 T | 8 |
| Semitrailer van 6 T | 1 |
| Shop equipment contact maint trk mtd | 3 |
| Shop equipment organizational repair lt trk mtd | 1 |
| Tractor full trkd hvy DBP | 1 |
| Tractor full trkd med DBP | 3 |
| Tractor whld ind med DBP | 9 |
| Trailer flat bed 10 T | 5 |
| Welding set arc inert gas shielded DC 115 V | 4 |
| *Signal Items* | |
| Radio set AN/VRC–46 | 5 |
| Radio set AN/VRC–47 | 2 |

# ENGINEER ASSAULT BRIDGE COMPANY, MOBILE (ARMY OR CORPS)

## Section A. ORGANIZATION




STRENGTH OFF 6 WO 1 EM 209 AGG 216

NOT INCLUDED IN REDUCED STRENGTH ORGANIZATION

*Figure B-11. Organizational chart, engineer assault bridge company, mobile (army or corps).*

## Section B. GENERAL

### 1. Mission

To provide personnel and equipment to load, maintain, transport, erect, operate, and maintain, stream- and gap-crossing equipment in support of tactical operations.

### 2. Assignment

To field army or separate corps with normal attachment to an engineer brigade.

### 3. Capabilities

*a.* At full strength this unit provides—

(1) Floating bridges and self-propelled rafts in various combinations using organic mobile assault floating bridge equipment, for example—

(*a*) One 698-foot class 60 floating bridge, or

(*b*) Six self-propelled class 60 rafts each with a usable length of 132 feet, or

(*c*) One 438-foot class 60 floating bridge and five self-propelled class 60 rafts each with a usable length of 80 feet, or

(*d*) One 568-foot class 60 floating bridge and five self-propelled class 40 rafts each with a usable length of 54 feet, or

(*e*) Two 386-foot class 60 floating bridges, or

(*f*) Three 282-foot class 60 floating bridges.

(2) Two armored vehicle launched bridges to span wet or dry gaps 60 feet or less in width depending on soil bearing conditions.

(3) Engineer reconnaissance for site selection, routes, and deep-fording operations in conjunction with the erection of tactical bridging.

*b.* The reduced strength column adapts this table of organization and equipment to the lesser requirements for personnel and equipment during prolonged noncombat periods and for a limited period of combat. At reduced strength this unit provides—

(1) Floating bridges and self-propelled rafts in various combinations using organic mobile assault floating bridge equipment, for example—

(*a*) One 490-foot class 60 floating bridge, or

(*b*) Four self-propelled class 60 rafts each with a usable length of 132 feet, or

(*c*) Two 282-foot class 60 floating bridges, or

(*d*) One 334-foot class 60 floating bridge and three self-propelled class 40 rafts each with a usable length of 54 feet.

(2) The capabilities listed in *a*(2) and (3), above.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Normally two per corps.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile with organic transportation.

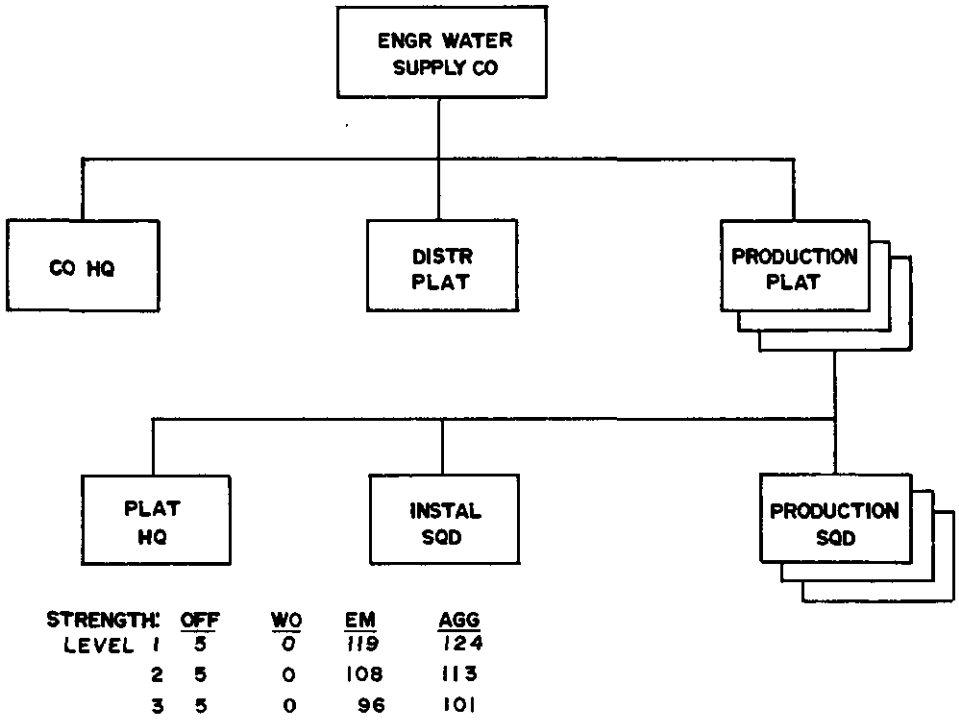
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Launcher rocket 3.5 inch | 1 |
| Machinegun light flexible | 1 |
| *Vehicles* | |
| Truck cargo ¾ T | 7 |
| Truck cargo 2½ T | 8 |
| Truck stake 5 T bridge transporting | 3 |
| Truck tank fuel servicing 2½ T | 2 |
| Truck tractor 5 T | 1 |
| Truck tractor 10 T | 2 |
| Truck utility ¼ T | 5 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Boat bridge erection GED 19 ft lg | 3 |
| Boat bridge erection GED 27 ft lg | 3 |
| Bridge armored vehicle launched scissoring type 60 ft | 3 |
| Bridge-ferry unit interior bay amphib mobile float assault | 24 |
| Bridge-ferry unit end bay amphib mobile float assault | 12 |
| Crane shovel whl mtd 20 T ¾ cu yd rough terrain | 1 |
| Detecting set mine ptbl metallic | 4 |
| Detector set mine microwave | 5 |
| Diving equipment set open circuit | 4 |
| Launcher M60 tank chassis for bridge armored vehicle launched | 2 |
| Loader scoop 2½ cu yd | 1 |
| Lubricating and servicing unit trlr mtd | 1 |
| Semitrailer low bed 25 T | 2 |
| Semitrailer repair parts shop van 6 T | 1 |
| Shop equipment contact maint trk mtd | 2 |
| Shop equipment organizational repair lt trk mtd | 1 |
| Tractor full trkd DED med DBP | 1 |
| Trailer basic utility 2½ T | 3 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/VRC–46 | 4 |
| Radio set AN/VRC–47 | 2 |
| Radio set AN/GRC–125 | 37 |

TOE 5–67G

# ENGINEER WATER SUPPLY COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 119 | 124 |
| 2 | 5 | 0 | 108 | 113 |
| 3 | 5 | 0 | 96 | 101 |

*Figure B–12. Organizational chart, engineer water supply company.*

## Section B. GENERAL

### 1. Mission

To produce and distribute potable water in the field.

### 2. Assignment

*a.* To a theater army with normal attachment to the engineer command or to an engineer construction brigade.

*b.* To a field army with normal attachment to an engineer combat brigade, army.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Personnel and equipment for operating up to nine separate water supply points.

(2) Approximately 27,000 gallons of potable water per hour of operation with organic purification equipment.

(3) Transportation of 20,000 gallons of water from source to distribution points in one lift.

(4) Reconnaissance for water sources, and plans the location and layout of water supply points and installations.

(5) Limited rehabilitation and operation of civilian water supply facilities in territory under military control.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Capability for the production and distribution of potable water may be increased when required by the attachment of appropriate teams from TOE 5–520.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per field army or one per 400,000 troops in a theater army.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

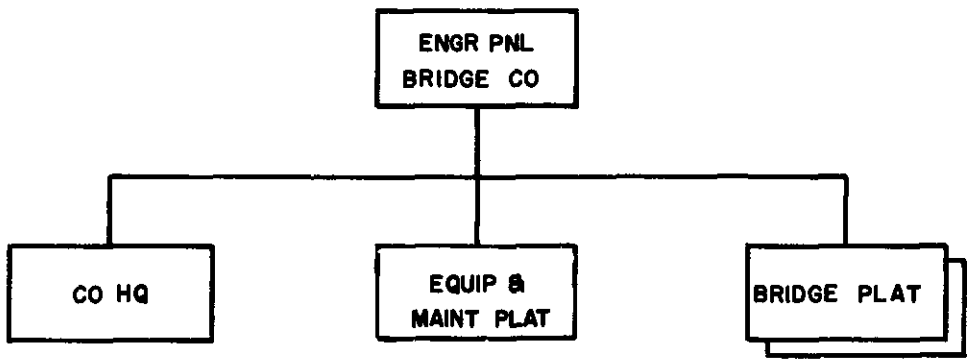
| | Qty |
|---|---|
| *Weapons* | |
| Launcher grenade 40mm | 3 |
| Machinegun 7.62mm lt flex | 3 |
| *Vehicles* | |
| Truck cargo ¾ T | 1 |
| Truck cargo 2½ T | 2 |
| Truck dump 2½ T | 3 |
| Truck tank water 1,000 gal 2½ T | 12 |
| Truck tractor 5 T | 4 |
| Truck utility ¼ T | 5 |
| Truck wrecker 5 T | 1 |

| | Qty |
|---|---|
| *Engineer Items* | |
| Demolition set explosive initiat | 1 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 1 |
| Gen set 3 KW DC 28V | 2 |
| Gen set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 12 |
| Hypochlorination unit water purif 100 GPM | 3 |
| Ion exch unit water purif trk mtd 3,000 GPH | 3 |
| Semitrlr tank water 2,000 gal | 4 |
| Tank fabric collapsible 3,000 gal | 27 |
| Water purif equip set trk mtd 3,000 GPH | 9 |

TOE 5–77G

# ENGINEER PANEL BRIDGE COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 3 | 1 | 125 | 129 |
| 2 | 3 | 1 | 117 | 121 |
| 3 | 3 | 1 | 103 | 107 |

*Figure B–13. Organizational chart, engineer panel bridge company.*

## Section B. GENERAL

### 1. Mission

*a.* To provide personnel and equipment to load, transport, maintain, and advise on erection of panel bridging equipage.

*b.* To provide dump trucks for earthmoving and general hauling, when required, by immobilizing bridge loads.

### 2. Assignment

To a field army or separate corps. Normally attached to an engineer combat group.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) One panel (Bailey) bridge set with sufficient components for the erection of the following bridges:

(*a*) Two 80-foot (24 meter) double truss, single story, or

(*b*) One 160-foot (48 meter) double truss, single story, or

(*c*) One 130-foot (39 meter) double truss, double story.

(2) Technical supervision to assist other engineer units in erecting panel bridges.

(3) Emergency construction of panel bridges with organic personnel at a reduced rate.

(4) Dump truck hauling capacity of 145 tons per lift when bridging is immobilized.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

Twelve to fifteen per field army.

## 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

## 6. Mobility

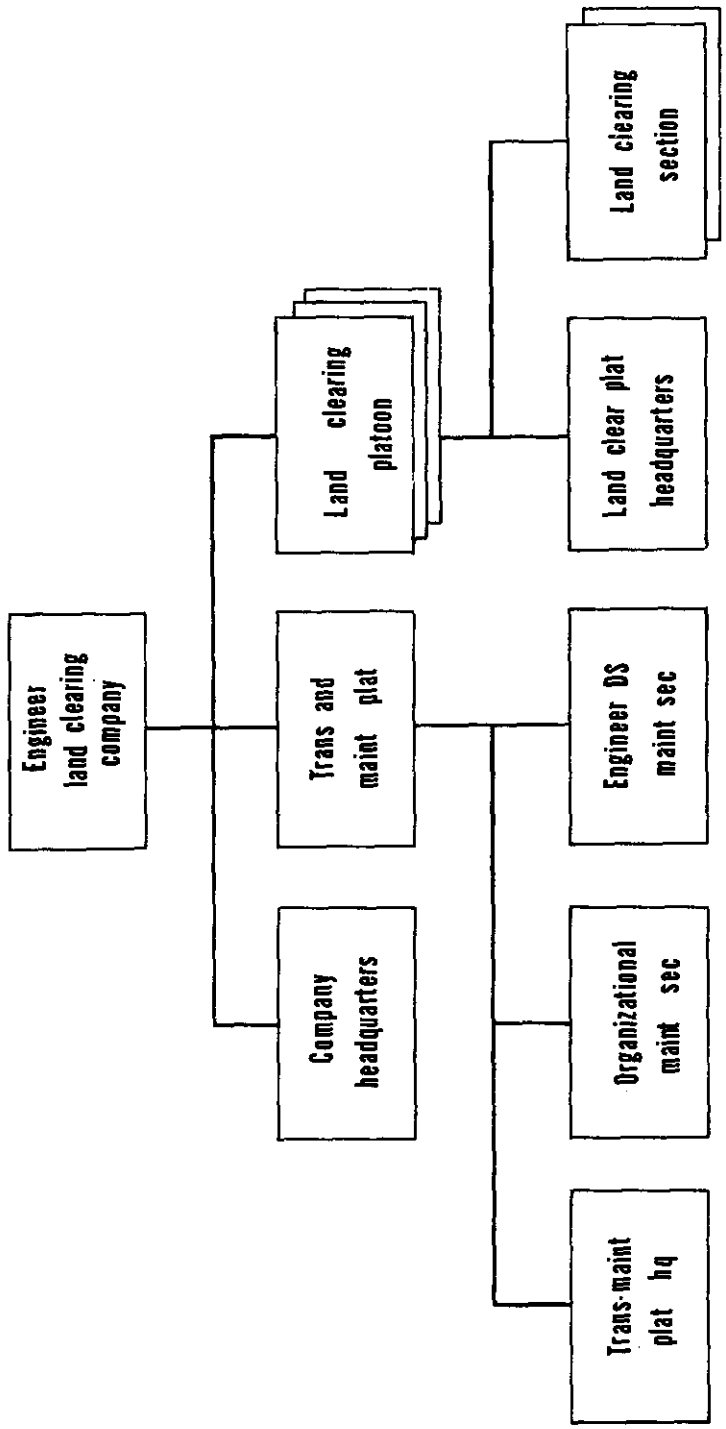
One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qtu |
|---|---|
| *Weapons* | |
| Launcher grenade 40mm | 9 |
| Machinegun 7.62mm lt flexible | 3 |
| *Vehicles* | |
| Truck cargo ¾ T | 2 |
| Truck cargo 2½ T | 4 |
| Truck dump 5 T | 29 |
| Truck tractor 10 T | 1 |
| Truck utility ¼ T | 3 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Bridge erection set Bailey type | 1 |
| Bridge fixed highway Bailey type | 1 |
| Crane shovel whl mtd 20 T ¾ cu yd rough terrain | 2 |
| Detecting set mine ptbl metallic | 3 |
| Detecting set mine AN/PRS–4 | 3 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 2 |
| Generator set 1.5 KW DC 28 V | 1 |
| Generator set 3 KW DC 28 V | 1 |
| Saw chain GED 18 in | 2 |
| Semitrailer low bed 25 T | 1 |
| Tractor full trkd DED hvy DBP | 1 |
| Trailer basic utility 2½ T | 12 |
| Welding set arc inert gas shielded DC 115 V | 1 |
| Welding shop trlr mtd 300 amp | 1 |
| *Signal Items* | |
| Radio set AN/PRC 25 | 4 |
| Radio set AN/VRC 47 | 4 |

# ENGINEER LAND CLEARING COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 1 | 171 | 177 |
| 2 | 5 | 1 | 148 | 154 |
| 3 | 5 | 1 | 129 | 135 |

★*Figure B–18.1. Organizational chart, engineer land clearing company.*

## Section B. GENERAL

### 1. Mission

*a.* To destroy or clear extensive dense vegetation in critical areas for the purpose of denying their use by the enemy as bases of operation; supply bases, marshaling areas, ambush sites, and cover and concealment.

*b.* To clear dense vegetation from areas adjacent to friendly installations for the purpose of improving installation security by providing observation and fields of fire, and to reduce ambush probability along land lines of communication.

### 2. Assignment

To army or corps for further assignment to an engineer (combat) brigade, TOE 5–101. Normally attached to an engineer combat group, TOE 5–52.

### 3. Capabilities

*a.* At level 1 this unit provides:

(1) 30 medium tracked tractors for mounting up to 30 treedozer blades or combinations of bulldozer and treedozer blades.

(2) Chain clearing technique in areas covered by widely spaced trees of uniform size with no major taproots, and for clearing underbrush from narrow wet gullies.

(3) Heavy disc harrows for clearing areas of small (2 to 3 inch) trees and underbrush, and for regrowth control.

(4) Two shifts of tractor operators for continuous land clearing operations during daylight hours.

(5) Command, control, and coordination for company, platoon, or section size land clearing operations.

(6) Technical advice on land clearing operations.

(7) Organizational maintenance for all equipment organic to the company.

(8) Direct support (DS) maintenance and maintains a mission load of repair parts for the following mission essential items organic to the company.

(*a*) Chain saws.
(*b*) Compressors.
(*c*) Grinding machines.
(*d*) Harrows.
(*e*) Tracked tractors and attachments.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at Level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

As required to provide land clearing support for corps or field army.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 310–25).

### 6. Mobility

*a.* For the purpose of tactical movement, this unit is approximately 30 percent mobile in organic vehicles.

*b.* The unit is approximately 60 percent mobile in organic vehicles when utilizing two (2) lifts in administrative movement.

*c.* Additional special purpose vehicles, by type and number listed below, are required for displacement of organic equipment.

(1) Truck tractor, 10 ton and semitrailer low bed, 25 ton, 22 each for 1 lift tactical movement.

(2) Truck tractor, 10 ton and semitrailer low bed, 25 ton, 6 each for 2 lift administrative movement.

## Section C. MAJOR ITEMS OF EQUIPMENT

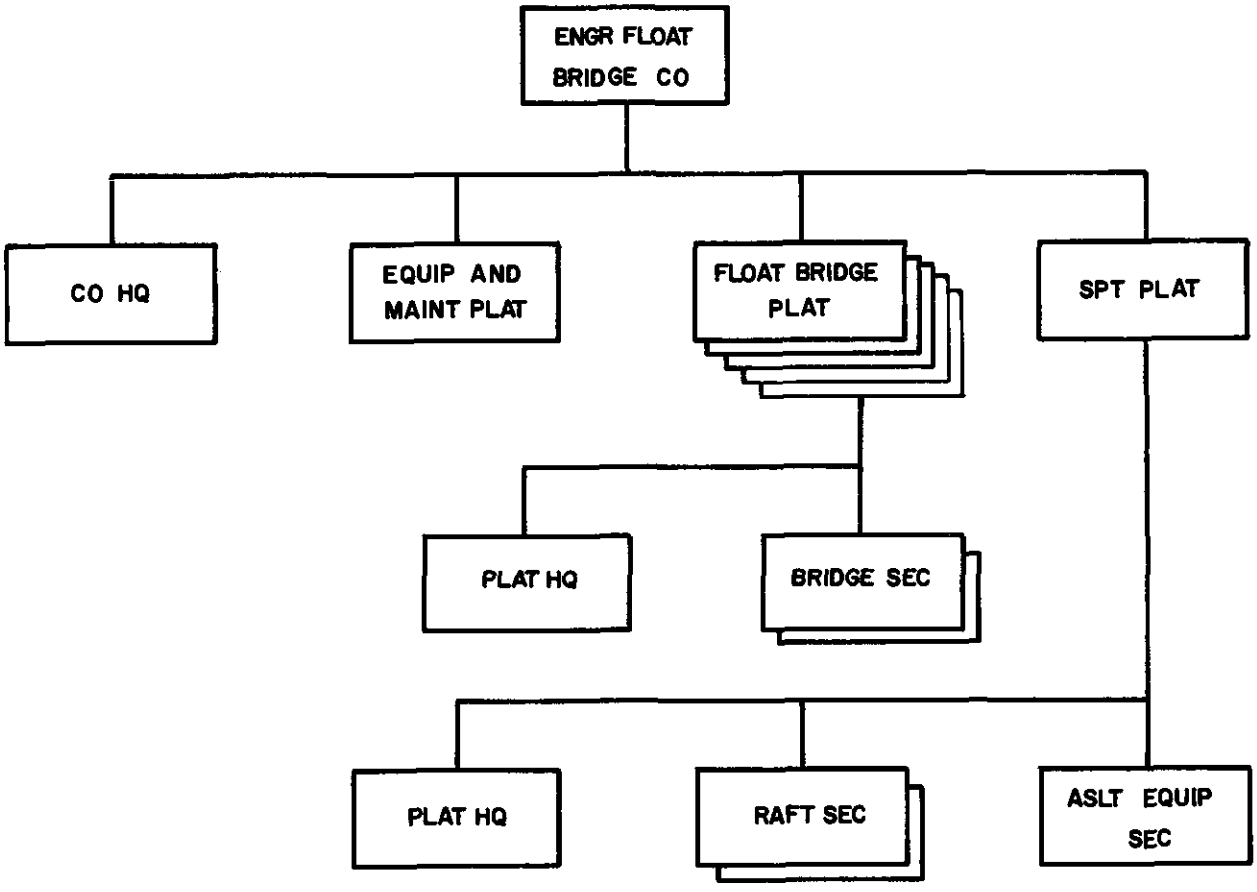
| *Weapons* | Qty |
|---|---|
| Launcher, grenade, 40mm | 24 |
| Machine gun, 50 caliber | 12 |
| *Vehicles* | |
| Carrier, cargo, full tracked 6T | 12 |
| Truck, cargo, ¾T | 2 |
| Truck, cargo, 2½T | 9 |
| Truck, utility, 1¼T | 2 |
| Truck, wrecker, 5T | 1 |
| Truck, tractor, 5T | 1 |
| Truck, tractor, 10T | 10 |
| *Engineer Equipment* | |
| Compressor, trlr, rotary, 250 CFM, 100 psi | 3 |
| Distributor, water, collapsible tank, 900 gal | 3 |
| Generator set, 1.5 kw, 60 cy, 1 ph, 120 v | 4 |
| Generator set, 5 kw, 60 cy, 1-3 ph, 120/240 v, 120/208 v | 2 |
| Generator set, 1.5 kw DC, 28 v | 1 |
| Generator set, 3 kw DC, 28 v | 2 |
| Harrow, disc, hydraulic lift control | 3 |
| Saw chain, gas drvn, 18 in | 6 |

| *Engineer Equipment*—Continued | Qty |
|---|---|
| Saw chain, pneu drvn, 24 in | 3 |
| Tractor, full tracked, med DBP w/buldoz w/scarif w/winch | 12 |
| Tractor, full tracked, med DBP | 18 |
| Treedozer, tractor mtg hyd opertd, 10 ft cut w/access | 30 |
| Torch outfit, cutting/welding | 1 |
| Welding shop, cargo, trlr mtd, 300 amp | 1 |
| *Signal Items* | |
| Radio set, AN/GRR–5 mtd in ¾T | 1 |
| Radio set, AN/VRC–46 mtd in carrier cargo | 4 |
| Radio set, AN/VRC–47 mtd in carrier personnel, ¼T or ¾T | 2 |
| Radio set, AN/GRC–125 | 9 |
| Radio set, AN/PRC–25 | 6 |

TOE 5–78G

# ENGINEER FLOAT BRIDGE COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 7 | 1 | 226 | 234 |
| 2 | 7 | 1 | 202 | 210 |
| 3 | 6 | 1 | 175 | 182 |

*Figure B–14. Organizational chart, engineer float bridge company.*

## Section B. GENERAL

### 1. Mission

*a.* To provide technical personnel and equipment to load, maintain, transport, and supervise erection of tactical stream-crossing equipment.

*b.* General cargo hauling in emergencies by immobilizing the bridge loads.

### 2. Assignment

Assigned to field army or separate corps.

Normally attached to an engineer combat group.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Approximately 700 feet of floating bridge or five 4-float and five 5-float rafts or combinations of bridges and rafts when issued the M4T6 bridge.

(2) Approximately 670 feet of floating bridge, or five rafts of varying capacities when issued the class 60 bridge.

(3) One light floating bridge approximately 250 feet long, with a maximum capacity of class 16, or a number of shorter bridges of similar capacity, or six class 12 ferries.

(4) Light stream-crossing equipage, consisting of assault boats and a footbridge, in support of tactical river-crossing operations.

(5) Technical supervision to assist other engineer units in bridge construction.

(6) Emergency construction of bridges or rafts with organic personnel at a reduced rate.

(7) Five-ton and 2½-ton vehicles for cargo hauling by immobilizing bridging.

(8) Two reconnaissance teams for selection of bridge sites, marking and assistance in river-crossing operations, to include underwater surveillance, rigging, repair, demolitions, and installation of antidebris and antimine booms.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Fifteen per field army.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Machinegun 7.62mm lt flexible | 15 |
| *Vehicles* | |
| Truck cargo ¾ T | 2 |
| Truck cargo 2½ T | 42 |
| Truck stake 5 T | 60 |
| Truck tractor 5 T | 1 |
| Truck tractor 10 T | 1 |
| Truck utility ¼ T | 8 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Boat assault inflatable 15-man | 70 |
| Boat bridge erection GED 27 ft lg | 10 |
| Bridge erection set for M4T6 or class 60 | 5 |
| Bridge floating foot | 1 |
| * Bridge floating highway M4T6 | 5 |
| * Bridge floating highway class 60 | 5 |
| Bridge floating light tactical raft | 6 |
| Compressed air facility | 1 |
| Crane whl mtd 20 T ¾ cu yd rough terrain | 2 |
| Demolition set explosive initiat | 5 |
| Detecting set mine ptbl metallic | 1 |
| Detecting set mine microwave | 1 |
| Diving equipment set 1 person open-circuit | 4 |
| Lubricating and servicing unit trlr mtd | 1 |
| Outboard motor 25 BHP | 24 |
| Pneu tool and compressor outfit 250 CFM trlr mtd | 2 |
| Semitrailer low bed 25 T | 1 |
| Semitrailer van 6 T | 1 |
| Shop equipment organizational repair lt trk mtd | 1 |
| Tractor full trkd hvy DBP | 1 |
| Trailer basic utility 2½ T | 28 |
| Welding set arc inert gas shield | 1 |

*May be issued either bridge.

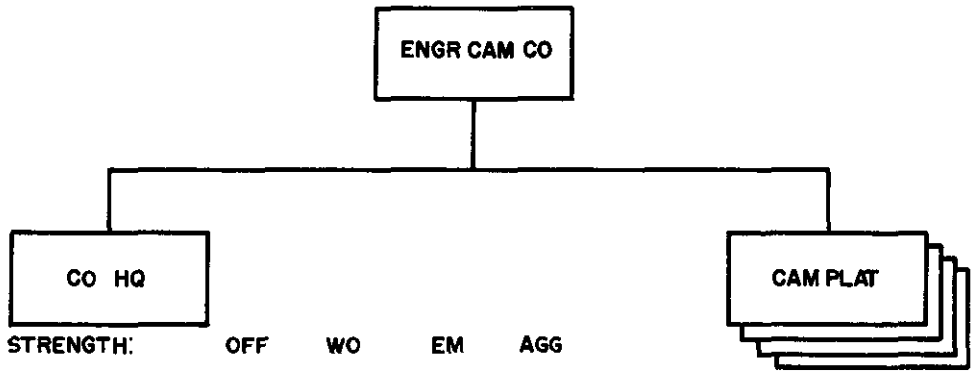
| | Qty |
|---|---|
| Welding shop trlr mtd 300 amp | 1 |

*Signal Items*

| | Qty |
|---|---|
| Radio set AN/PRC–25 | 19 |
| Radio set AN/VRC–47 | 9 |

# ENGINEER CAMOUFLAGE COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 69 | 74 |
| 2 | 5 | 0 | 62 | 67 |
| 3 | 5 | 0 | 54 | 59 |

*Figure B–15. Organizational chart, engineer camouflage company.*

## Section B. GENERAL

### 1. Mission

To plan, supervise, and inspect camouflage installations including deceptive devices. To supervise and inspect camouflage discipline and training.

### 2. Assignment

To corps with normal attachment to an engineer brigade.

### 3. Capabilities

*a.* At level 1, this unit—

(1) Provides instruction teams for camouflage training of units and organizations in assigned areas.

(2) Prepares signs, posters, and other camouflage instructional materials.

(3) Plans and constructs or supervises the construction of camouflage installations.

(4) Inspects camouflage installations in area of assignment.

(5) Advises units on camouflage and inspects camouflage discipline and training.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* This unit is dependent upon the headquarters to which assigned/attached for chaplain and medical services.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per corps.

### 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Eighty-five percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

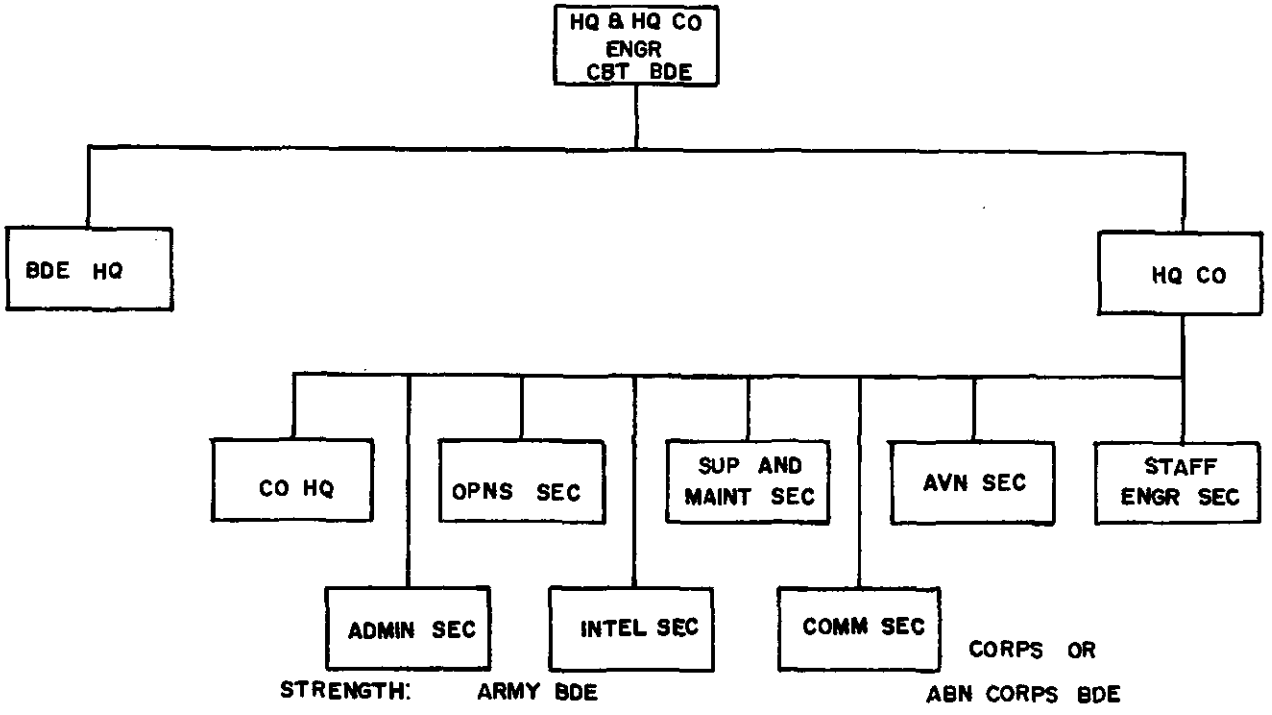
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Truck cargo ¾ T | 9 |
| Truck cargo 2½ T | 2 |
| Truck utility ¼ T | 5 |
| *Engineer Equipment* | |
| Camouflage training set company | 1 |
| Drafting equipment set bn | 1 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 1 |
| Generator set 3 KW 60 cy 1–3 ph 120/240 V 120/208 V | 1 |
| Generator set 3 KW DC 28 V | 1 |
| Pneu tool and comp outfit 210 cfm trlr mtd | 1 |
| Sign painting set | 1 |
| Stereoscope lens aerial photo interpr 4½ inch focal length | 8 |
| Tool outfit pioneer portable electric tools | 1 |
| *Signal* | |
| Photographic set picture taking and processing still pictures | 1 |

TOE 5–101G

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER COMBAT BRIGADE, ARMY, CORPS, OR AIRBORNE CORPS

## Section A. ORGANIZATION




STRENGTH:

| | ARMY BDE | | | | CORPS OR ABN CORPS BDE | | | |
|---|---|---|---|---|---|---|---|---|
| | OFF | WO | EM | AGG | | OFF | WO | EM | AGG |
| LEVEL I | 40 | 5 | 103 | 148 | LEVEL I | 28 | 4 | 87 | 119 |
| 2 | 38 | 5 | 92 | 135 | 2 | 27 | 4 | 78 | 109 |
| 3 | 35 | 5 | 81 | 121 | 3 | 27 | 4 | 66 | 97 |

*Figure B–16. Organizational chart, headquarters and headquarters company, engineer combat brigade, army, corps, or airborne corps.*

## Section B. GENERAL

### 1. Mission

*a.* To command assigned and attached units and coordinate the combat engineer activities within the appropriate command.

*b.* To provide an engineer staff section to either an army or corps headquarters.

### 2. Assignment

One per army; one per corps.

### 3. Capabilities

*a.* At Level 1, this unit—

(1) Provides staff planning and operational supervision of all assigned and attached units.

(2) Plans and supervises operations pertaining to topographic and terrain intelligence.

(3) Provides the engineer staff to an army or corps headquarters as appropriate.

(4) Supervises and coordinates planning for the preparation and firing of atomic demolition munitions (ADM).

(5) Provides rotary wing aircraft to facilitate the command, control, and coordination of engineer combat activities.

(6) Provides engineer staff representatives to the tactical operations center (TOC) on a 24-hour basis.

*b.* At levels 2 and 3 operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

*e.* This unit is dependent upon other supporting army or corps elements for personnel, legal, and medical services, and for communications facilities when requirements exceed organic capability.

*f.* When supported by Team IG (Topo Planning and Control), TOE 5–540, provides overall mapping and engineer intelligence planning, as well as the control, coordination, and supervision of topographic support to the field army.

### 4. Basis of Allocation

One per army and one per corps for the command of two or three engineer groups.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Fifty-three percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

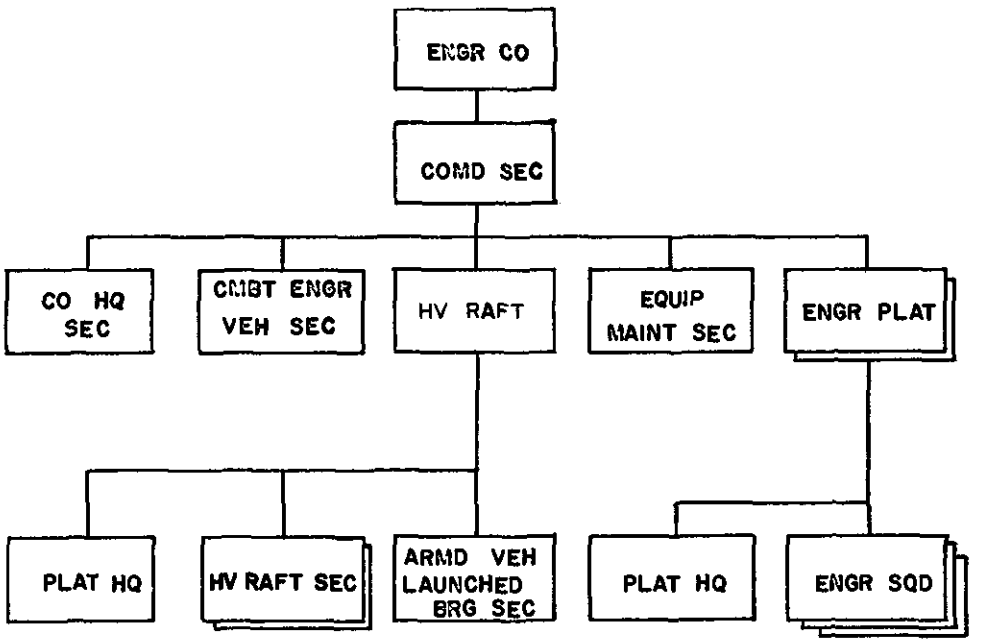
Equipment of all three versions of this unit is essentially the same as follows:

| | Qty |
|---|---|
| *Weapons* | |
| Launcher grenade 40mm | 1 |
| *Vehicles* | |
| Truck cargo ¾ T | 6 |
| Truck cargo 2½ T | 3 |
| Truck utility ¼ T | 9 |
| *Engineer Items* | |
| Book set field army engr sect | 2 |
| Drafting equip set bn | 4 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 2 |
| Generator set 1.5 KW DC 28 V | 2 |
| Generator set 3 KW DC 28 V | 1 |
| Generator set 3 KW 60 cy 1–3 ph 120/240 V 120/208 V | 1 |
| Interpretation kit photographic | 3 |
| Reproduction set diazotype mach | 1 |
| Test set soil trafficability | 1 |
| *Aircraft* | |
| Helicopter observation OH–6A | 2 |
| Helicopter utility UH–ID | 1 |
| *Signal Items* | |
| Camera set still picture general photo | 2 |
| Camera set still picture studio and general photo | 1 |
| Radio set AN/GRC–106 | 3 |
| Radio set AN/ARC–102 | 1 |
| Radio set AN/URC–10 | 3 |
| Teletypewriter set AN/GGC–3 | 1 |
| Teletypewriter set AN/PGC–1 | 1 |

# TOE 5–107G

## ENGINEER COMPANY, SEPARATE INFANTRY BRIGADE

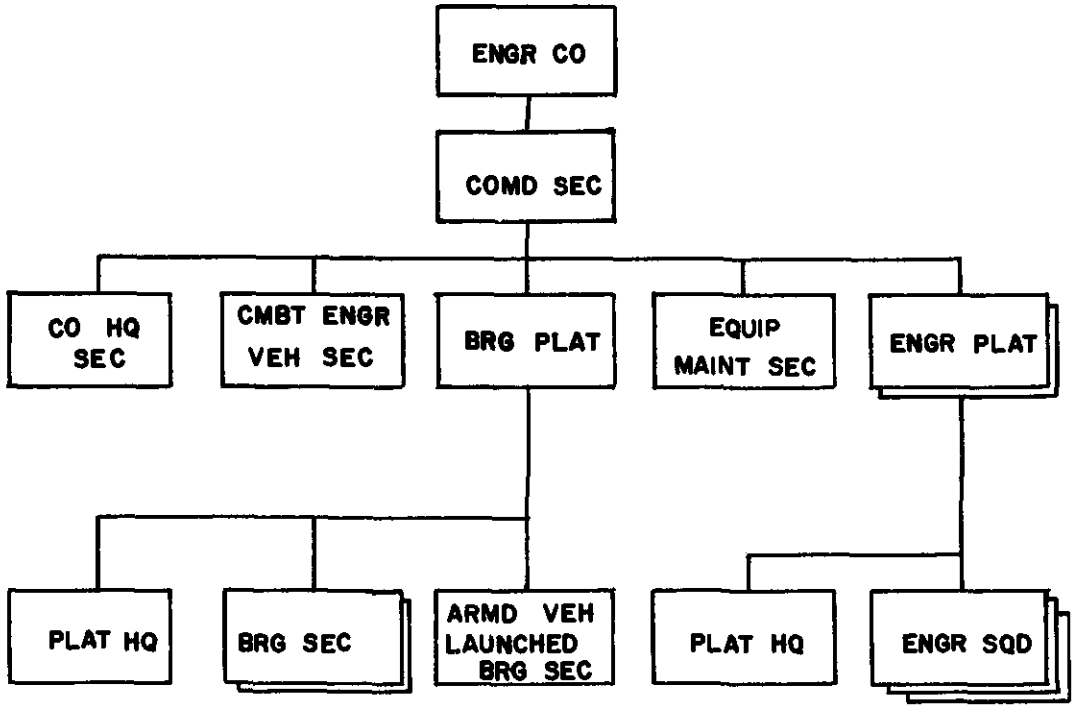
### Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 6 | 1 | 250 | 257 |
| 2 | 6 | 1 | 230 | 237 |
| 3 | 6 | 1 | 202 | 209 |

a. When equipped with mobile assault bridging equipment

*Figure B–17. Organizational chart, engineer company, separate infantry brigade.*




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 6 | 1 | 253 | 260 |
| | 2 | 6 | 1 | 229 | 236 |
| | 3 | 6 | 1 | 197 | 204 |

b. When equipped with M4T6 or class 60 bridging
*Figure B–17*—Continued.

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the separate infantry brigade by providing engineer combat support.

*b.* To undertake and carry out a limited infantry combat mission when required.

### 2. Assignment

Organic to Separate Infantry Brigade, TOE 7–100.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Capability for executing combat engineer tasks and, when reinforced with additional heavy equipment, can execute more complex engineer works.

(3) Engineer support for two combined

arms teams formed from separate brigade units.

(4) Atomic demolitions munitions (ADM) support, when reinforced with TOE 5–570 ADM units.

(5) Armored vehicle launched bridging equipment capable of passing class 60 loads over wet and dry gaps for two separate assault crossings 60 feet or less in width.

(6) Heavy float bridge equipment in support of river-crossing operations as follows:

(*a*) When equipped with mobile assault bridging equipment, provides equipment to erect 282 feet of class 60 mobile assault bridge, or two 132-foot (usable length) class 60 self-propelled ferries, or two 178-foot class 60 floating bridges.

(*b*) When equipped with the M4T6 bridge, provides approximately 280 feet of floating bridge or two 4-float and two 5-float rafts. Bridge components may be used to construct short fixed spans.

(*c*) When equipped with the class 60 bridge, provides approximately 270 feet of floating bridge or two 4-float (reinforced) rafts, or two 5-float rafts, or a combination of bridge and rafts. Bridge components may be used to construct short fixed spans.

(7) Light stream-crossing equipage to support river-crossing operations. Equipment includes—

(*a*) Assault boats (9) and reconnaissance boats (6) to carry one infantry company by waterborne assault.

(*b*) Light tactical bridge equipage to provide the following options:

1 One class 12 ferry, or

2 One class 12 bridge approximately 44 feet long, or

3 Four pontons powered by outboard motors to be used as storm boats.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective coordinated defense of the unit's area or installation.

*e.* This unit is dependent on headquarters and headquarters company of the brigade for unit level medical support and, on the Administration Company, TOE 12–177, for personnel and religious services.

### 4. Basis of Allocation

One per Separate Infantry Brigade, TOE 7–100.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

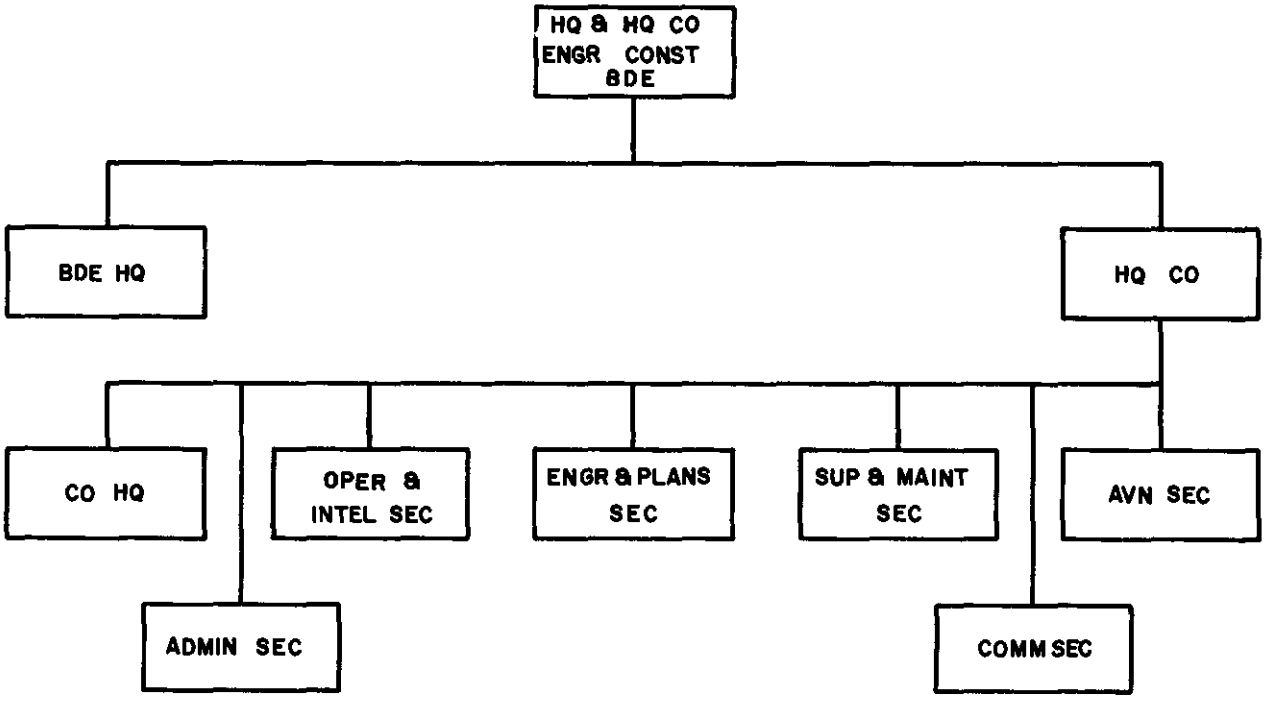
| | *When equipped with* MBA | Cl 60 or M4T6 |
|---|---|---|
| *Weapons* | | |
| Launcher grenade 40mm | 23 | 23 |
| Machinegun, 7.62mm light flexible | 5 | 5 |
| *Vehicles* | | |
| Combat engineer veh full trkd | 2 | 2 |
| Truck cargo ¾ T | 3 | 7 |
| Truck cargo 2½ T | 7 | 11 |
| Truck dump 5 T | 13 | 13 |
| Truck stake 5 T | 1 | 25 |
| Truck tractor 10 T | 3 | 3 |

| | When equipped with MBA | When equipped with Cl 60 or M4T6 |
|---|---|---|
| Truck utility ¼ T | 10 | 6 |
| Truck wrecker 5 T | 1 | 1 |
| *Engineer Equipment* | | |
| Boat assault inflatable 15-man | 9 | 9 |
| Boat bridge erection 27 ft lg | 0 | 4 |
| Bridge armored veh scissoring type | 3 | 3 |
| *Bridge floating highway alum deck balk superstructure M4T6 | 0 | 2 |
| *Bridge floating highway class 60 135 ft | 0 | 2 |
| Bridge floating raft sect lt tactical | 1 | 1 |
| Bridge erect set floating bridge | 0 | 2 |
| Bridge-ferry unit interior bay amphib mobile float assault | 8 | 0 |
| Bridge-ferry unit end bay amphib mobile float assault | 4 | 0 |
| Crane shovel whl mtd 20 T ¾ yd rough terrain | 1 | 1 |
| Detecting set mine ptbl metallic | 10 | 10 |
| Detector set mine microwave | 4 | 4 |
| Ferry conversion set raft inf spt | 1 | 1 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 1 | 1 |
| Gen set 1.5 KW DC 28V | 1 | 1 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 3 | 3 |
| Gen set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 3 | 3 |
| Grader road mtzd hvy | 1 | 1 |
| Ion exchange unit water purif trk mtd 3,000 GPH | 1 | 1 |
| Landing mat outfit | 2 | 2 |
| Launcher M60 series tank chassis transporting | 2 | 2 |
| Loader scoop 2½ cu yd | 3 | 3 |
| Outboard motor 25 BHP | 4 | 8 |
| Pneu tool & compressor outfit trlr mtd 250cfm | 1 | 2 |
| Saw chain 18 in | 3 | 3 |
| Semitrailer low bed 25T | 3 | 3 |
| Shop equip contact maint trk mtd | 1 | 1 |
| Tank and pump unit | 1 | 1 |
| Tank unit liquid disp for trlr mtg | 1 | 1 |
| Test set soil trafficability | 1 | 1 |
| Tool outfit pioneer ptbl elec tools | 3 | 3 |
| Tractor full tracked hvy DBP | 2 | 2 |
| Trailer basic utility 2½ T | 10 | 17 |
| Trailer flat bed 10 T | 1 | 1 |
| Water purif equip set trk mtd 1,500 GPH | 2 | 2 |
| Welding set arc inert gas shield | 1 | 1 |
| *Signal Items* | | |
| Radio set AN/GRR–5 | 1 | 1 |
| Radio set AN/GRC–125 | 30 | 24 |
| Radio set AN/VRC–46 | 9 | 9 |
| Radio set AN/VRC–47 | 4 | 4 |

*May be issued either bridge.

# HEADQUARTERS AND HEADQUARTERS COMPANY ENGINEER CONSTRUCTION BRIGADE

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 28 | 4 | 100 | 132 |
| 2 | 28 | 4 | 87 | 119 |
| 3 | 28 | 4 | 74 | 105 |

*Figure B–18. Organizational chart, headquarters and headquarters company, engineer construction brigade.*

## Section B. GENERAL

### 1. Mission

To command assigned and attached engineer units and coordinate the engineer construction activities within the appropriate command.

### 2. Assignment

To the theater army support command (TASCOM).

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command and supervision of two to four engineer construction groups and other attached or assigned units.

(2) Overall planning and direction of the engineer effort in the establishment of bases and lines of communications.

This includes airfields, ports, roads, depots, hospitals, troop camps, POW compounds, administrative facilities, and POL storage and distribution facilities.

(3) Preparation of operational plans, project plans, designs, and construction directives; allocation of troops and materiel to projects; technical direction and supervision of units engaged in the brigade construction program.

(4) A control headquarters for a separate task force to plan, design, supervise, and coordinate major construction projects.

(5) Rotary wing aircraft to facilitate reconnaissance and construction support activities.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except medical personnel and the chaplain, can engage in effective, coordinated defense of the unit's area or installation.

*e.* This unit is dependent upon other supporting theater army support command elements for personnel, legal, and medical services, and communications facilities when requirements exceed organic capability.

*f.* When supported by TOE 5–530 Team HG can design large pipelines and installations for the distribution and storage of POL.

## 4. Basis of Allocation

One per two to four engineer construction groups.

## 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

## 6. Mobility

Approximately 66 percent mobile in organic transportation.

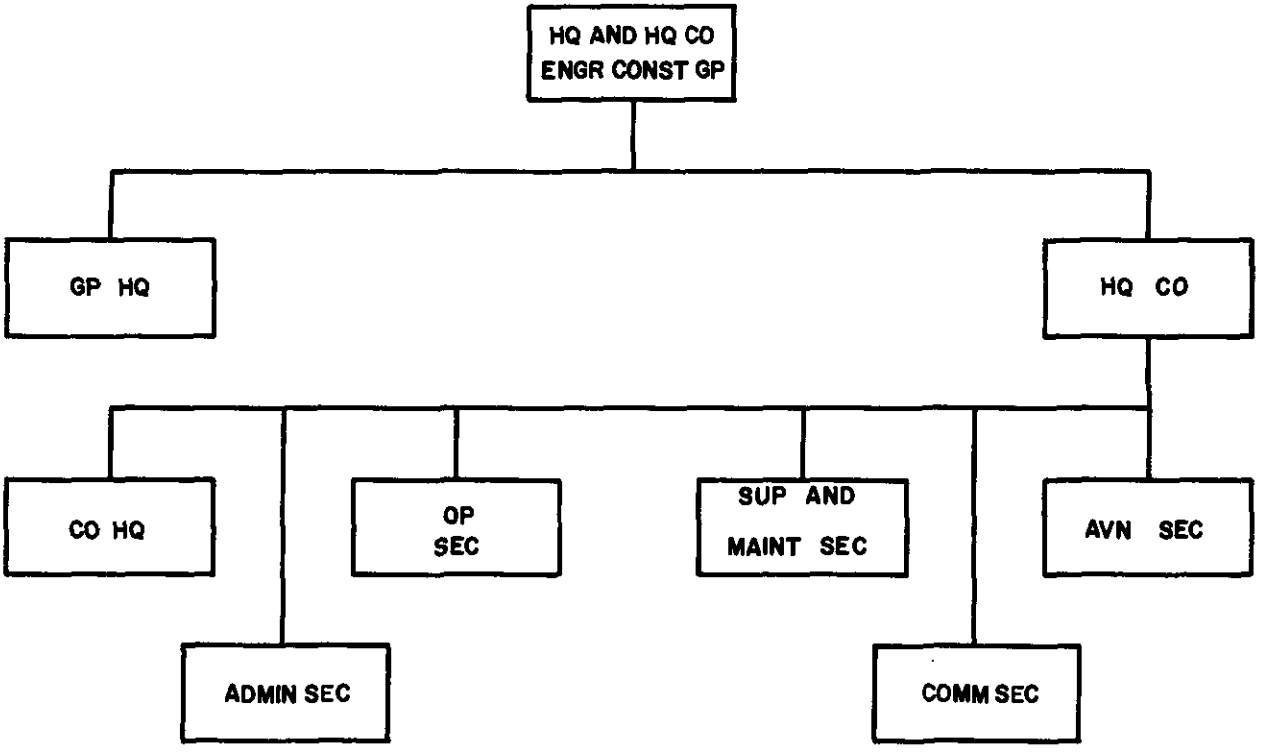
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Truck cargo ¾ T | 8 |
| Truck cargo 2½ T | 3 |
| Truck utility ¼ T | 13 |
| *Engineer Equipment* | |
| Book set const gp | 1 |
| Book set fld army engr sec | 1 |
| Drafting equip set bn | 1 |
| Gen set 1.5 KW DC 28V | 2 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 2 |
| Gen set 3 KW DC 28V | 1 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 2 |
| Gen set 15 KW 60 cy 3ph 120/208V 240/416V | 2 |
| Sketching set survey | 1 |
| Survey set gen purp | 1 |
| *Signal Items* | |
| Camera set still pict for general photo | 1 |
| Camera set still pict for studio and general photo | 1 |
| Electronic teletypewriter security equip TSEC/KW–7 | 2 |
| Radio set AN/URC–10 | 3 |
| Radio set AN/ARC–102 | 1 |
| Radio set AN/GRC–106 | 3 |
| Teletypewriter set AN/GGC–3 | 1 |
| Teletypewriter set AN/PGC–1 | 1 |
| *Aircraft* | |
| Helicopter observation | 2 |
| Helicopter utility | 1 |

TOE 5-112G

# HEADQUARTERS AND HEADQUARTERS COMPANY ENGINEER CONSTRUCTION GROUP

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 15 | 6 | 83 | 104 |
| 2 | 15 | 6 | 76 | 97 |
| 3 | 15 | 5 | 65 | 85 |

*Figure B-19. Organizational chart, headquarters and headquarters company, engineer construction group.*

## Section B. GENERAL

### 1. Mission

*a.* To command, control, and supervise assigned and attached units.

*b.* To perform engineer planning and design functions required in support of field construction.

*c.* To plan and coordinate the operations of a group consisting of construction and other

units engaged in field construction, rehabilitation, or maintenance of facilities in support of Army or Air Force operations.

## 2. Assignment

Normally assigned to an engineer command, engineer construction brigade, or theater army support command (TASCOM).

## 3. Capabilities

*a.* At level 1, this unit provides—

(1) Control of from three to five engineer construction battalions and supporting engineer service units.

(2) Design, planning, and supervision required for the construction or rehabilitation of routes of communications, buildings and installations, forward cargo and tactical airfields, heliports, limited petroleum storage and distribution facilities, and limited port and railroad facilities.

(3) Project assignment to subordinate units, allocation of troops, and the distribution and coordination of construction equipment and materials.

(4) Rotary wing aircraft for support of reconnaissance and construction activities.

(5) Organizational maintenance for equipment of the unit.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is dependent upon the medical detachment of higher headquarters or the medical detachments of assigned battalions for its unit medical support.

*d.* This unit is not adaptable to a type B organization.

*e.* Individuals of this organization, except chaplain, can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

Normally one per three to five Engineer Construction Battalions, TOE 5–115.

## 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

## 6. Mobility

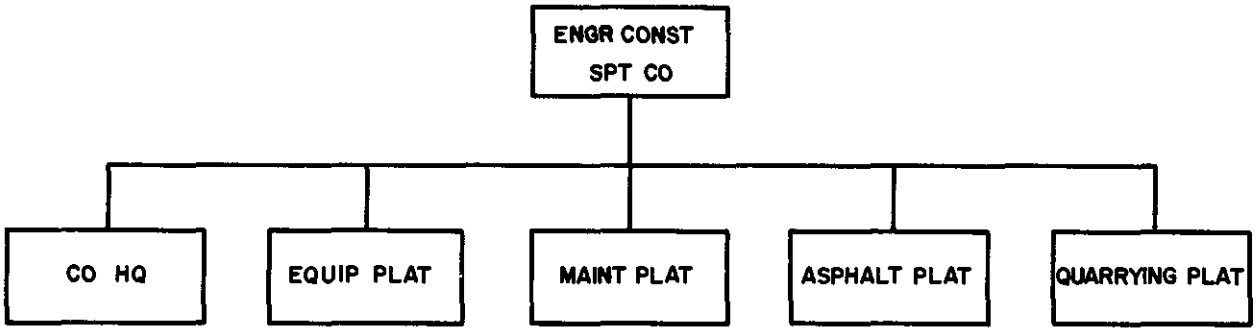
Seventy-five percent mobile in organic equipment and one hundred percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

| *Vehicles* | Qty |
|---|---|
| Truck cargo ¾ T | 8 |
| Truck cargo 2½ T | 6 |
| Truck utility ¼ T | 7 |
| *Engineer Equipment* | |
| Book set combat gp | 1 |
| Book set const gp | 1 |
| Book set fld army engr sec | 1 |
| Book set forestry opns | 1 |
| Detecting set mine ptbl metallic | 1 |
| Detector set mine AN/PRS–4 | 1 |
| Drafting equip set bn | 5 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 2 |
| Gen set 1.5 KW DC 28V | 1 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 1 |
| Gen set 3 KW DC 28V | 2 |
| Gen set 5 KW 60 cy 1–3 ph 120/240V 120/208V | 2 |
| Gen set 7.5 KW DC 28V | 1 |
| Gen set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 1 |
| Reproduction set diazo mach | 1 |
| Survey set gen purp | 2 |
| Test set asphalt | 1 |
| Test set concrete | 1 |
| Test set soil | 1 |
| *Signal Items* | |
| Camera set still pict gen photo | 1 |
| Camera set still pict studio-gen photo | 1 |
| Electronic teletype security equip T/SEC/KW–7 | 1 |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/URC–10 | 5 |
| Radio set AN/VRC–46 | 1 |
| Radio set AN/GRC–106 | 5 |
| Teletypewriter set AN/GGC–3 | 1 |
| Teletypewriter set AN/PGC–1 | 1 |
| *Aircraft* | |
| Helicopter observation | 4 |
| Helicopter utility | 1 |

# ENGINEER CONSTRUCTION SUPPORT COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 4 | 2 | 167 | 173 |
| 2 | 4 | 2 | 150 | 156 |
| 3 | 4 | 2 | 128 | 134 |

*Figure B–20. Organizational chart, engineer construction support company.*

## Section B. GENERAL

### 1. Mission

To provide rock crushing, bituminous mixing, paving, and other construction support equipment with operators, to increase the capabilities of the construction group in major horizontal construction projects, such as roads and airfields.

### 2. Assignment

Normally assigned to TASCOM for further assignment to the engineer command. Normally attached to an engineer construction group.

### 3. Capabilities

*a.* At level 1, this unit provides—

(1) Support to one engineer group engaged in construction projects.

(2) Seventy-five tons per hour of crushed rock and sand from rock quarries and gravel pits.

(3) Seventy-five tons per hour of washed and sized precrushed rock.

(4) One hundred and twenty tons per hour of bituminous mixes and blends for paving projects.

(5) Equipment with operators to support construction operations (less bituminous) on a two shift basis.

(6) Equipment and personnel to conduct quarrying operations on a two shift basis.

(7) Equipment and personnel for one shift bituminous paving operations.

(8) Organizational maintenance for all organic equipment and direct support maintenance for organic engineer equipment.

*b.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

One per Engineer Construction Group, TOE 5–112.

## 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

## 6. Mobility

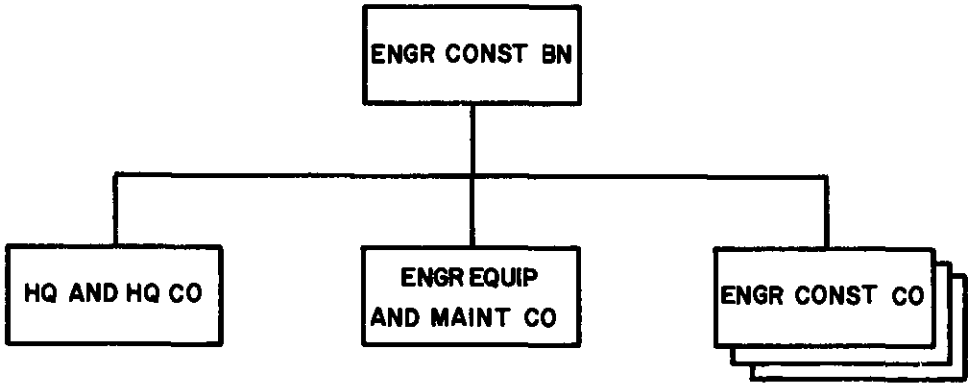
Fifty percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Gun mach 7.62mm lt flex | 1 |
| *Vehicles* | |
| Truck cargo ¾ T | 1 |
| Truck cargo 2½ T | 4 |
| Truck dump 5 T | 5 |
| Truck dump off road 20 T | 5 |
| Truck tank fuel servicing 2½ T | 1 |
| Truck tank water 2½ T 1,000 gal | 1 |
| Truck tractor 5 T | 4 |
| Truck tractor 10 T | 4 |
| Truck utility ¼ T | 5 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Asphalt mixing and paving set 120 TPH | 1 |
| Bin storage aggregate ptbl 1-comp 60 T | 2 |
| Blasting machine 50 cap capacity | 2 |
| Book set combat group | 1 |
| Chassis trlr gen purp 3½ T | 4 |
| Compressor whl mtd 600 cfm 100 psi | 3 |
| Compressor skid mtd 125 cfm 100 psi | 1 |
| Crane shovel crlr mtd 40 T 2 cu yd | 4 |
| Crane shovel trk mtd 20 T ¾ cu yd | 1 |
| Crushing and screening plant whl mtd 75 TPH | 1 |
| Demolition set explosive initiating | 4 |
| Distributor bitumin trk mtd 800 gal | 1 |
| Distributor water trk mtd 1,000 gal | 1 |
| Ditching mach whl mtd ladder | 1 |
| Dolly trlr converter 18 T | 2 |
| Drafting equip set bn | 1 |
| Floodlight set ptbl 6 floodlights | 4 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 1 |
| Generator set 1.5 KW DC 28 V | 1 |
| Generator set 3 KW DC 28 V | 1 |
| Generator set 5 KW 60 cy 1–3 ph 120/240 V 120/208 V | 4 |
| Generator set 100 KW 60 cy 3 ph 120/208 V 240/416 V | 4 |
| Hammer, pile driver self pwrd dsl driven 7500 ft lb | 1 |
| Hammer pile driver self pwrd dsl drvn 22400 ft lb | 1 |
| Lub and service unit trlr mtd | 1 |
| Paving mach bitumin mtl crwlr mtd | 1 |
| Pneu tool outfit for 600 cfm compressor | 2 |
| Pump centrifugal whl mtd 1,500 gpm 60 ft hd | 1 |
| Rock drilling equip | 1 |
| Roller mtzd 2 rolls 5–8 T | 2 |
| Roller mtzd 3 rolls 9–14 T | 1 |
| Roller towed pneu tire 13 tire 9 T | 2 |
| Semitrailer low bed 60 T | 4 |
| Semitrailer low bed 25 T | 2 |
| Semitrailer tank fuel 5,000 gal 12 T | 1 |
| Semitrailer van 6 T | 1 |
| Shop equip contact maint trk mtd | 1 |
| Shop equip gen purp repair strlr mtd | 1 |
| Spreader aggregate towed | 2 |
| Sweeper rotary towed | 2 |
| Test set asphalt | 1 |
| Tractor full trckd med DBP | 2 |
| Tractor whld ind med DBP | 2 |
| Trailer flat bed 10 T | 4 |
| Washing and screening plant 75 TPH | 1 |
| Welding shop trlr mtd | 1 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/VRC 47 | 2 |

# ENGINEER CONSTRUCTION BATTALION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 31 | 7 | 897 | 935 |
| | 2 | 30 | 7 | 806 | 843 |
| | 3 | 27 | 7 | 713 | 747 |

*Figure B–21. Organizational chart, engineer construction battalion.*

## Section B. GENERAL

### 1. Mission

To construct and rehabilitate roads, airfields, pipeline systems, structures, and utilities for the Army and the Air Force in the communications zone and rear areas of the combat zone; and to assist in emergency recovery operations.

### 2. Assignment

To the TASCOM for further assignment to the engineer command. Normally attached to an engineer construction group.

### 3. Capabilities

*a.* At level 1:

(1) *With organic units* the battalion provides—

(*a*) Construction or rehabilitation of routes of communications, bridges, forward tactical and forward cargo airfields, and heliports.

(*b*) General construction of buildings, structures, and related facilities.

(*c*) Limited reconstruction of railroads, railroad bridges, and ports.

(*d*) Limited bituminous paving.

(*e*) Minor protective construction.

(*f*) Medical service for the battalion to include emergency medical treatment, operation of battalion aid station, evacuation of sick and injured personnel when practicable,

and supervision of sanitation in the battalion.

(2) *With attachments.* When supported by attachments of specialized personnel and equipment the battalion provides—

(*a*) Large-scale bituminous and portland cement paving operations.

(*b*) Large-scale quarrying and crushing operations.

(*c*) Major reconstruction of railroads and railroad bridges.

(*d*) Major rehabilitation of ports.

(*e*) Major protective construction.

(*f*) Construction of pipelines and storage tanks.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization except chaplain and medical personnel can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Two to four per engineer construction group.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Eighty-seven percent mobile in organic transportation. One hundred percent air transportable in heavy transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

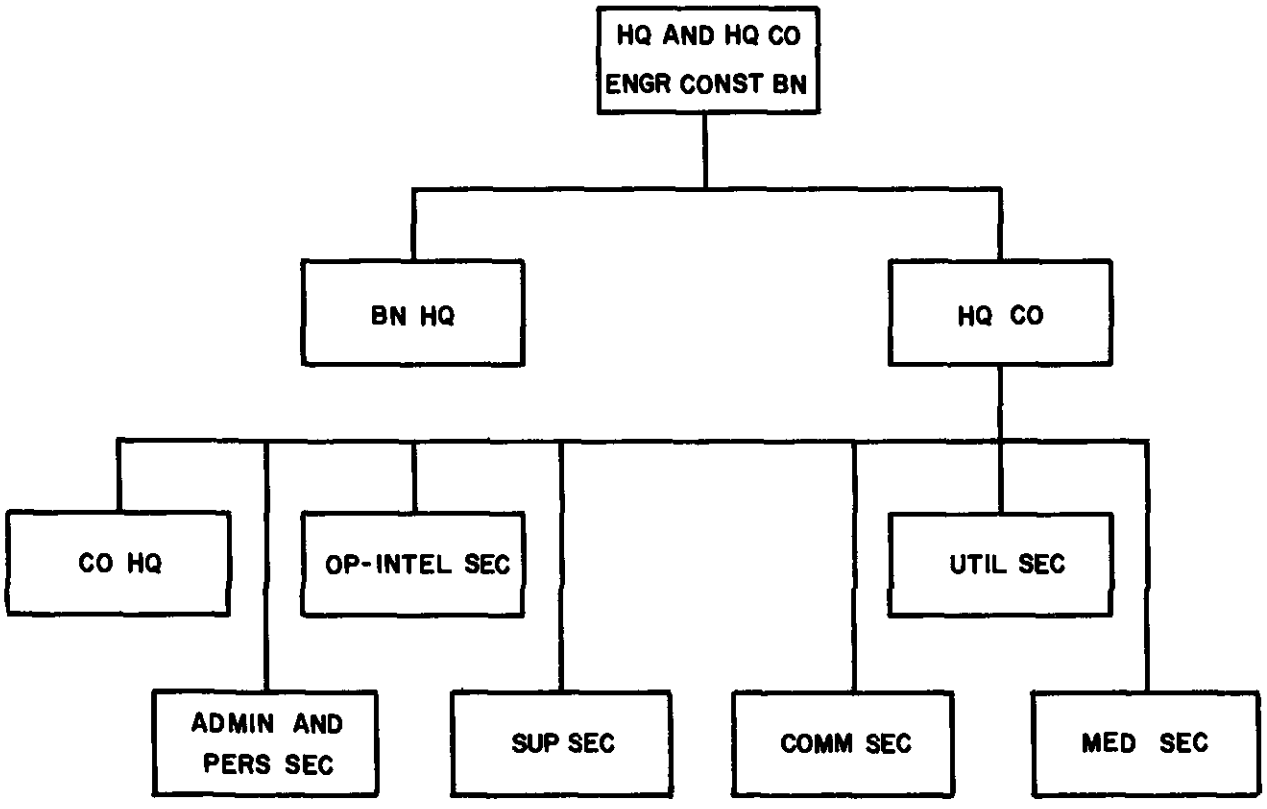
| | Aggr breakdown within organic units 5–115G | 5–116G | 5–117G | 5–118G (3ea) |
|---|---|---|---|---|
| *Vehicles* | | | | |
| Truck ambulance ¾ T | 1 | 1 | 0 | 0 |
| Truck cargo ¾ T | 33 | 10 | 5 | 6 |
| Truck cargo 2½ T | 40 | 8 | 11 | 7 |
| Truck dump 5 T | 48 | 0 | 12 | 12 |
| Truck pipeline const 2½ T | 2 | 0 | 2 | 0 |
| Truck tractor 5 T | 3 | 0 | 3 | 0 |
| Truck tractor 10 T | 26 | 0 | 8 | 6 |
| Truck utility ¼ T | 24 | 9 | 3 | 4 |
| Truck wrecker 5 T | 2 | 0 | 2 | 0 |
| *Engineer Items* | | | | |
| Auger earth skid mtd | 1 | 0 | 1 | 0 |
| Bin storage aggregate 1 comp 60 T | 1 | 0 | 1 | 0 |
| Blasting mach 50 cap | 1 | 0 | 1 | 0 |
| Book set combat group | 5 | 1 | 1 | 1 |
| Book set const group | 1 | 1 | 0 | 0 |
| Chassis trlr gen purp 3½ T | 2 | 0 | 2 | 0 |
| Compressor rotary wheel mtd 600 cfm 100 psi | 1 | 0 | 1 | 0 |
| Crane shovel crwlr mtd 12½ T ¾ cu yd | 2 | 0 | 2 | 0 |
| Crane shovel trk mtd 20 T ¾ cu yd | 6 | 0 | 0 | 2 |
| Crush and screen plant whl mtd 75 TPH | 1 | 0 | 1 | 0 |
| Demolition set exp initiating | 14 | 0 | 2 | 4 |
| Distributor bitumin material trk mtd 800 gal | 2 | 0 | 2 | 0 |
| Distributor water trk mtd 1,000 gal | 6 | 0 | 0 | 2 |
| Ditching mach whl mtd ladder | 2 | 0 | 2 | 0 |
| Draft equip set bn | 1 | 1 | 0 | 0 |
| Drier-mixer bitumin-conc mtrl whl mtd 3 TPH | 1 | 0 | 1 | 0 |
| Floodlight set elec ptbl 6 floodlights | 2 | 0 | 2 | 0 |
| Fork lift rough terrain 6,000 lb | 1 | 0 | 1 | 0 |
| Gen set 1.5 KW 60 cy 1 ph 120 V | 6 | 2 | 1 | 1 |
| Gen set 3 KW 60 cy 1–3 ph 120/240 V 120/208 V | 7 | 0 | 1 | 2 |
| Gen set 3 KW DC 28 V | 2 | 0 | 2 | 0 |
| Gen set 5 KW 60 cy 1–3 ph 120/240 V 120/208 V | 3 | 0 | 3 | 0 |
| Gen set 10 KW 60 cy 1–3 ph 120/240 V 120/208 V | 10 | 4 | 0 | 2 |
| Gen set 15 KW 60 cy 3 ph 120/208 V 240/416 V | 1 | 0 | 1 | 0 |
| Gen set 100 KW 60 cy 3 ph 120/208 V 240/416 V | 2 | 0 | 2 | 0 |
| Grader road mtzd hvy | 9 | 0 | 0 | 3 |
| Hammer pile driver drop 3,000 lb | 3 | 0 | 0 | 1 |
| Hammer pile driver self powered 7,500 ft lb | 4 | 0 | 1 | 1 |
| Heater hot oil strlr mtd 2,100,000 BTU | 1 | 0 | 1 | 0 |

| *Engineer Items*—Continued | Aggr breakdown within organic units 5-115G | 5-116G | 5-117G | 5-118G (Sea) |
|---|---|---|---|---|
| Interpretation kit photo | 1 | 1 | 0 | 0 |
| Ion exch unit water purif trk mtd | 1 | 1 | 0 | 0 |
| Kettle heating bitumen trlr mtd 165 gal | 1 | 0 | 1 | 0 |
| Level survey dumpy | 1 | 1 | 0 | 0 |
| Loader scoop 2½ cu yd | 9 | 0 | 3 | 2 |
| Lubricat-serv unit trlr mtd | 5 | 0 | 2 | 1 |
| Melter asphalt skid mtd 900 GPH | 1 | 0 | 1 | 0 |
| Mixer conc trlr mtd 16 cu ft | 6 | 0 | 0 | 2 |
| Mixer rotary tiller self propel | 1 | 0 | 1 | 0 |
| Pneu tool and comp outfit 250 cfm trlr mtd | 7 | 0 | 1 | 2 |
| Reproduction set diazotype mach | 1 | 1 | 0 | 0 |
| Rock drilling equip | 1 | 0 | 1 | 0 |
| Roller mtzd 2 rolls med | 1 | 0 | 1 | 0 |
| Roller mtzd 3 wheel 10 T | 3 | 0 | 0 | 1 |
| Roller towed 4 pneu tires 7½ to 50 T | 2 | 0 | 2 | 0 |
| Roller towed 13 pneu tires 9 T | 3 | 0 | 0 | 1 |
| Roller towed sheepsfoot 2 dr | 6 | 0 | 0 | 2 |
| Saw chain 18 in | 6 | 0 | 0 | 2 |
| Scraper towed 18 cu yd | 12 | 0 | 0 | 4 |
| Semitrailer low bed 25 T | 24 | 0 | 6 | 6 |
| Semitrailer stake 12 T | 1 | 0 | 1 | 0 |
| Semitrailer van 6 T | 3 | 0 | 3 | 0 |
| Shop equip contact maint trk mtd | 6 | 0 | 3 | 1 |
| Shop equip gen purp rep strlr mtd | 1 | 0 | 1 | 0 |
| Shop equip organzl rep trk mtd | 1 | 0 | 1 | 0 |
| Shop equip woodworking base maint trlr mtd | 6 | 0 | 0 | 2 |
| Spreader aggregate towed 8 ft spread | 4 | 0 | 4 | 0 |
| Supplementary equip maint co | 1 | 0 | 1 | 0 |
| Survey set gen purp | 2 | 2 | 0 | 0 |
| Sweeper rotary towed | 1 | 0 | 1 | 0 |
| Test set asphalt | 1 | 1 | 0 | 0 |
| Test set concrete | 1 | 1 | 0 | 0 |
| Test set soil | 1 | 1 | 0 | 0 |
| Tool outfit pioneer ptbl elec tools | 6 | 0 | 0 | 2 |
| Torch outfit cutting and welding set No. 2 | 3 | 0 | 0 | 1 |
| Tractor full trckd hvy DBP | 8 | 0 | 2 | 2 |
| Tractor full trckd med DBP | 6 | 0 | 0 | 2 |
| Tractor whl ind med DBP | 21 | 0 | 0 | 7 |
| Trailer flat bed 10 T | 7 | 0 | 1 | 2 |
| Water purif equip set trk mtd 1,500 gph | 2 | 2 | 0 | 0 |
| Welding set arc inert gas shielded DC 115 V | 7 | 0 | 4 | 1 |
| Welding shop trlr mtd 300 amp | 6 | 0 | 3 | 1 |
| *Signal Items* | | | | |
| Camera set still picture studio and general photo | 1 | 1 | 0 | 0 |
| Radio set AN/VRC-46 | 14 | 4 | 1 | 3 |
| Radio set AN/VRC-47 | 6 | 0 | 0 | 2 |
| Radio set AN/VRC-49 | 1 | 1 | 0 | 0 |
| Radio set AN/GRC-106 | 2 | 2 | 0 | 0 |

TOE 5-116G

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER CONSTRUCTION BATTALION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 13 | 2 | 110 | 125 |
| | 2 | 12 | 2 | 102 | 116 |
| | 3 | 12 | 2 | 92 | 106 |

*Figure B-22. Organizational chart, headquarters and headquarters company, engineer construction battalion.*

## Section B. GENERAL

### 1. Mission

To provide command, construction planning, direction, coordination, and control of the engineer construction battalion and attached units.

### 2. Assignment

Organic to the Engineer Construction Battalion, TOE 5–115.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command and staff functions for the battalion.

(2) Administrative, supply and medical services to units in the battalion.

(3) Ground reconnaissance and preliminary and final surveys for battalion projects.

(4) Design and detailed plans, construction layouts, site adaptations, and bills of materials.

(5) Technical advice, direction, and overall supervision for construction projects.

(6) Battalion communications and wire communications for subordinate units.

(7) Engineer intelligence for the battalion.

(8) Guidance in determining the equipment requirements of the companies and effecting temporary interchanges when operational requirements so dictate.

(9) Construction and utility personnel support for special projects, and supervision of the construction forces of the battalion, contract labor, or indigenous personnel.

(10) Two water points for supplying potable and nonpotable water in support of battalion construction operations and potable water for other units as required.

(11) Administration, supply, organizational maintenance, and mess for the company; also provides personnel administration for attached units.

*b.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization except chaplain and medical personnel can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Construction Battalion, TOE 5–115.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Eighty-nine percent mobile in organic transportation. One hundred percent air transportable in heavy transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE–115G)

TOE 5–117G

# ENGINEER EQUIPMENT AND MAINTENANCE COMPANY, ENGINEER CONSTRUCTION BATTALION

## Section A. ORGANIZATION

## Section B. GENERAL

### 1. Mission

To support the engineer construction battalion with engineer direct support maintenance and to reinforce the construction capability of the battalion by providing construction specialists and equipment with operators.

### 2. Assignment

Organic to the Engineer Construction Battalion, TOE 5–115.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Battalion level organizational and direct support maintenance for engineer equipment organic to the engineer construction battalion.

(2) Contact maintenance teams for job site repair of engineer equipment.

(3) Repair parts required to support the battalion maintenance mission.

(4) Machine shop facilities.

(5) Bituminous dust palliation and limited asphalt paving.

(6) Support to specialized construction projects by maintaining and operating engineer heavy equipment to reinforce the construction companies.

(7) Its own administration, supply, mess, and organizational maintenance.

*b.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Construction Battalion, TOE 5–115.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Eighty-four percent mobile in organic transportation. One hundred percent air transportable in heavy transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–115G)

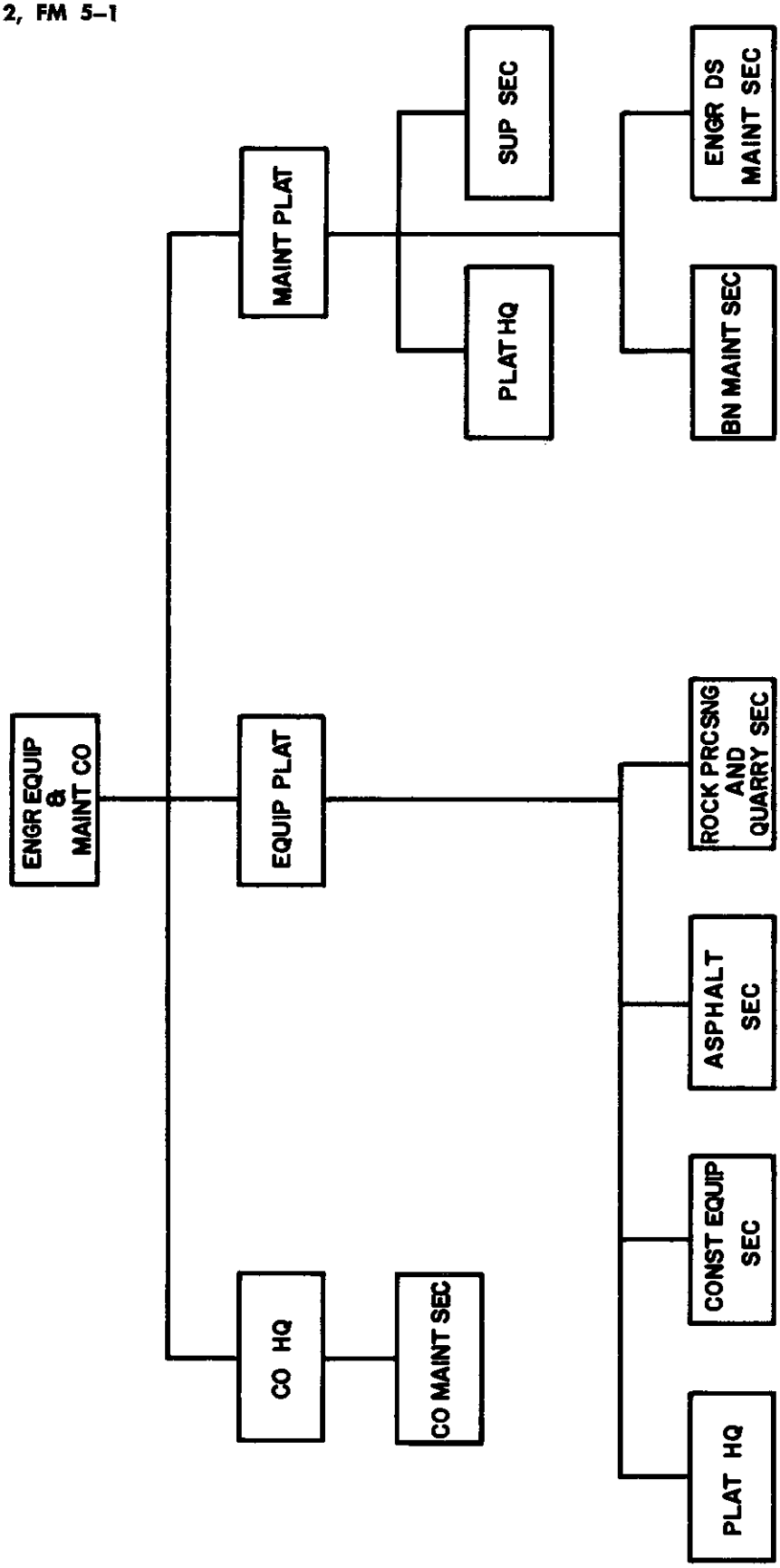
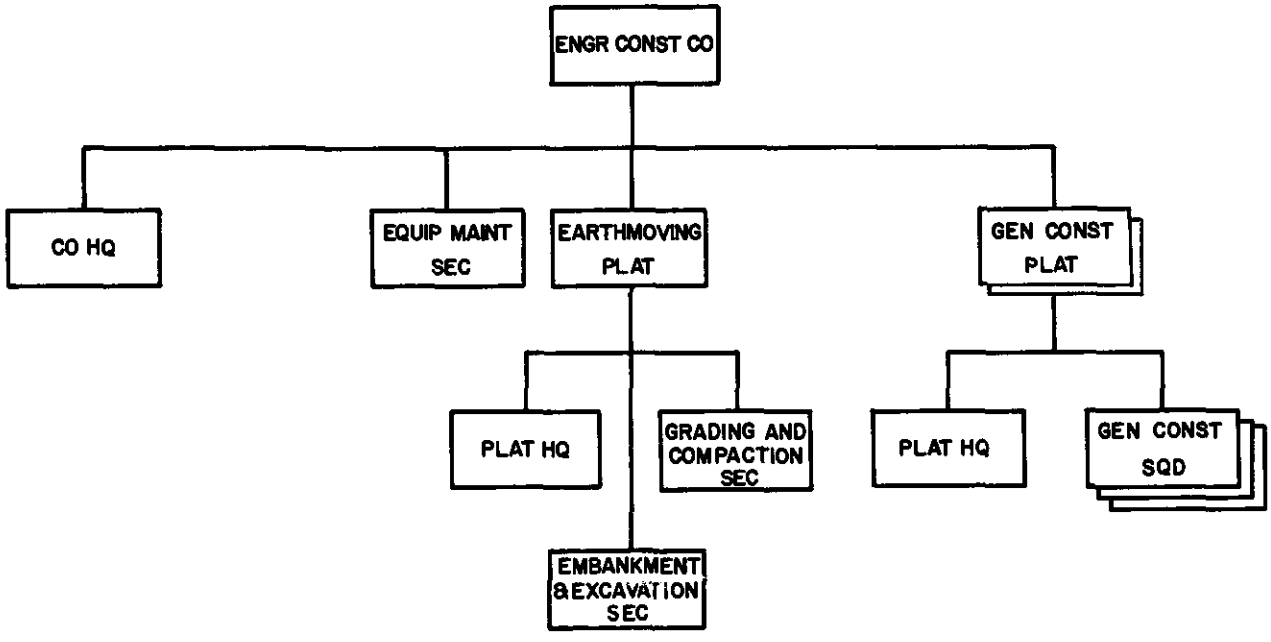



*Figure B-28. Organizational chart, engineer equipment and maintenance company, engineer construction battalion.*

TOE 5–118G

# ENGINEER CONSTRUCTION COMPANY, ENGINEER CONSTRUCTION BATTALION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 5 | 1 | 201 | 207 |
| | 2 | 5 | 1 | 176 | 182 |
| | 3 | 4 | 1 | 158 | 163 |

*Figure B–24. Organizational chart, engineer construction company, engineer construction battalion.*

## Section B. GENERAL

### 1. Mission

*a.* To excavate, haul, compact, and grade earth and to provide stabilized earth subgrades for airfields, roads, railroads, levees, supply storage areas, and similar projects.

*b.* To construct and rehabilitate buildings, port facilities, bridges and drainage structures, pipelines and storage tanks plus related facilities; and to install and repair utilities.

### 2. Assignment

Organic to the Engineer Construction Battalion, TOE 5–115.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Operates borrow pits and hauls borrow pit material; performs cut and fill; compacts natural or fill material

to provide subgrades of specified bearing strength; and levels natural or fill materials to desired grades.

(2) Constructs or rehabilitates theater-of-operation buildings, shelters, pipeline systems, and operational facilities; and erects prefabricated structures.

(3) Installs electrical, water, and sewage facilities for theater-of-operation installations.

(4) Performs heavy general construction when supported with additional construction personnel and heavy equipment.

(5) Provides construction effort for bomb-damage recovery operations.

(6) Provides its own administration, supply, mess, and organizational maintenance.

(7) Operates on a two-shift basis.

*b.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Three per Engineer Construction Battalion, TOE 5–115.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Eighty-seven percent mobile in organic transportation. One hundred percent air transportable in heavy transport aircraft.

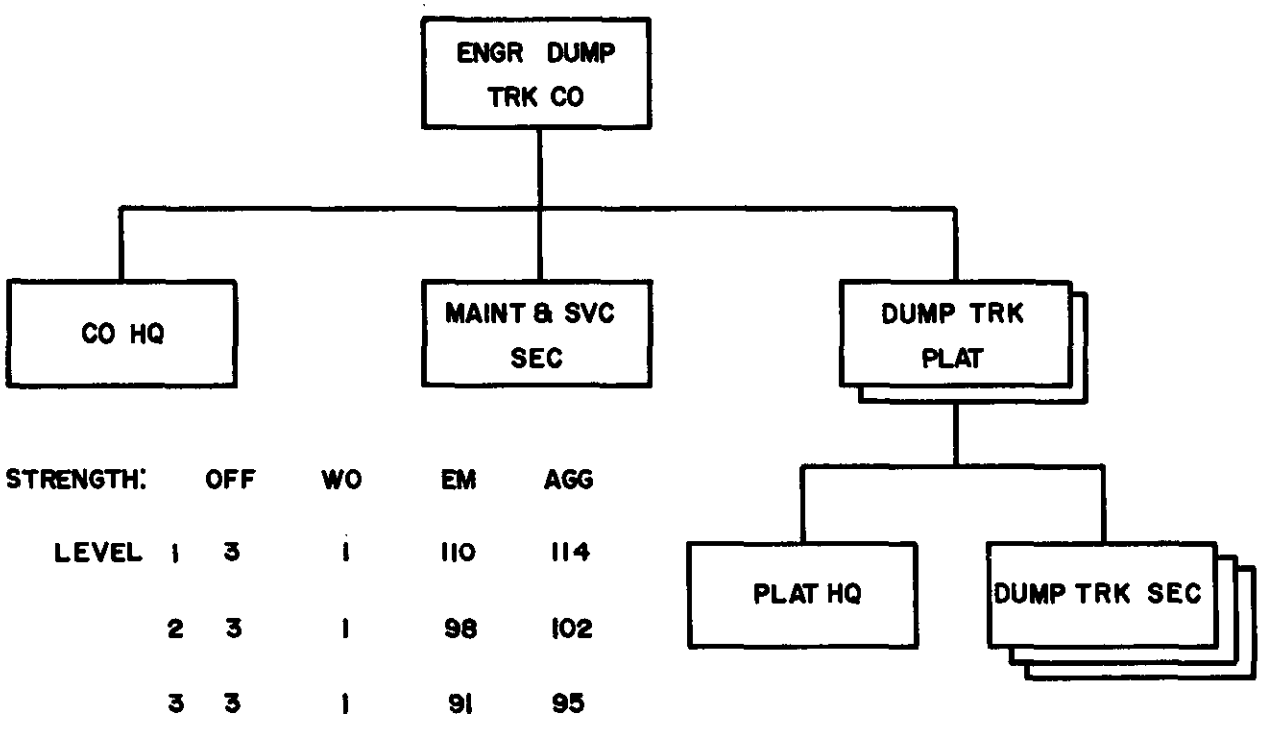
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–115G)

TOE 5-124G

# ENGINEER DUMP TRUCK COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 3 | 1 | 110 | 114 |
| 2 | 3 | 1 | 98 | 102 |
| 3 | 3 | 1 | 91 | 95 |

*Figure B-25. Organizational chart, engineer dump truck company.*

## Section B. GENERAL

### 1. Mission

Operation of dump trucks for movement of bulk materials in support of other engineer units.

### 2. Assignment

To army, corps, or engineer command; normally attached to an engineer group.

### 3. Capabilities

*a.* At level 1 this unit can move between 240 cubic yards (struck load) and 312 cubic yards (heaped load) of bulk materials (gravel, earthfill, cruhed stone, etc.) per trip; or between 240 short tons (cross-country) and 480 short tons (improved roads) of supplies and materials per trip. The amount of material that the unit can haul in one day will depend on the weather conditions, distance of haul, type of haul route, type of material being hauled, and loading-unloading facilities.

*b.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per engineer combat group or engineer construction group.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

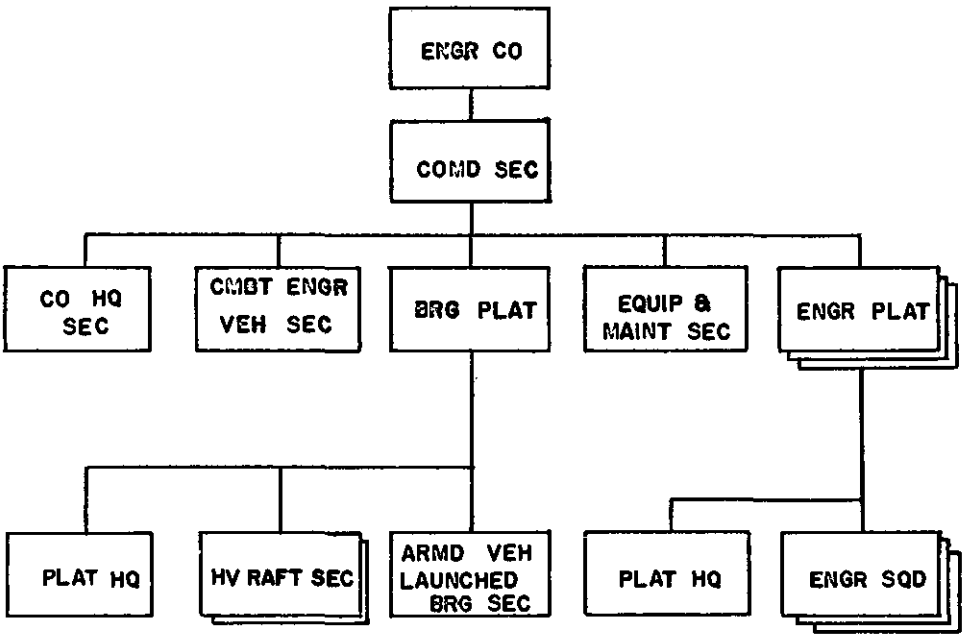
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Truck utility ¼ T | 3 |
| Truck cargo ¾ T | 1 |
| Truck cargo 2½ T | 4 |
| Truck dump 5 T | 48 |
| Truck wrecker 5 T | 1 |
| *Engineer Items* | |
| Gen set 1.5 KW DC 28 V | 1 |
| Lubricat-serv unit trlr mtd | 1 |
| Tank and pump unit | 1 |
| Welding set arc inert gas shielded DC 115 V | 1 |
| Welding shop trlr mtd 300 amp | 1 |
| *Signal Items* | |
| Radio set AN/VRC 46 | 2 |
| Radio set AN/VRC 47 | 1 |

TOE 5–127G

# ENGINEER COMPANY, SEPARATE ARMORED BRIGADE
# OR
# ENGINEER COMPANY, SEPARATE INFANTRY BRIGADE
# (MECHANIZED)

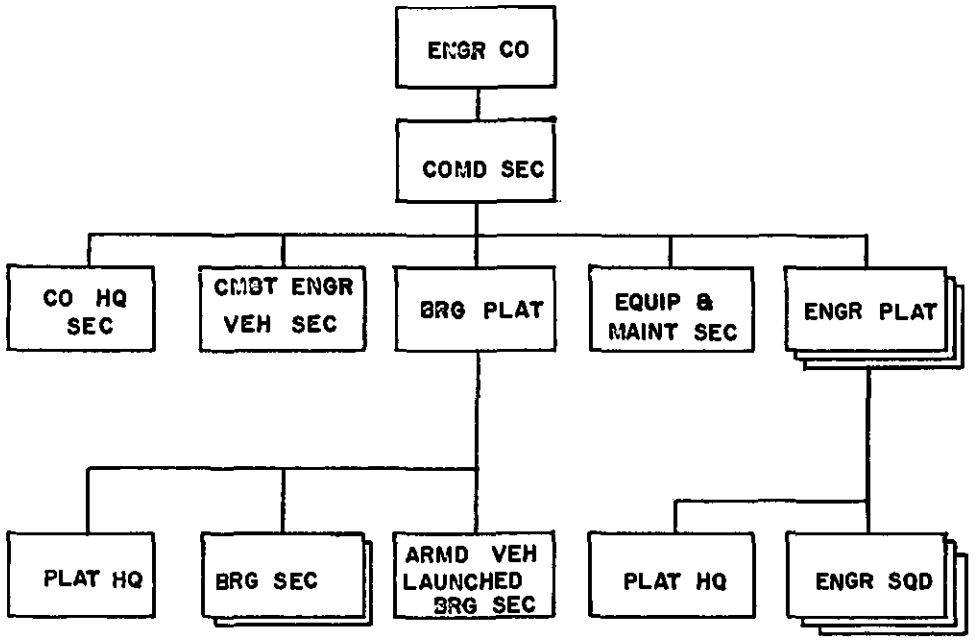
## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 6 | 1 | 253 | 260 |
| 2 | 6 | 1 | 229 | 236 |
| 3 | 6 | 1 | 204 | 211 |

*a.* When equipped with mobile assault bridging equipment.

*Figure B–26. Organizational chart, engineer company, separate armored or mechanized infantry brigade.*




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 6 | 1 | 256 | 263 |
| | 2 | 6 | 1 | 228 | 235 |
| | 3 | 6 | 1 | 201 | 208 |

*b.* When equipped with M4T6 or class 60 bridging equipment.
*Figure B–26*—Continued.

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the separate armored or infantry (mechanized) brigade by providing engineer combat support.

*b.* To undertake and carry out a limited infantry combat mission when required.

### 2. Assignment

Organic to Separate Armored Brigade, TOE 17–100, or Separate Infantry Brigade (Mechanized), TOE 37–100.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Capability to accomplish engineer combat tasks, and when reinforced with additional heavy equipment can execute more complex engineer works.

(3) Engineer reconnaissance and produces engineer intelligence for the brigade.

(4) Atomic demolition munitions (ADM) support, when reinforced with TOE 5–570 ADM teams.

(5) Armored vehicle launched bridging equipment capable of passing class 60 loads over wet and dry gaps up to

60 feet wide for two separate assault crossings.

(6) A limited unit capability for infantry combat when required.

(7) Heavy float bridge equipment in support of river-crossing operations as follows:

(*a*) When equipped with mobile assault bridging equipment, provides equipment to erect 282 feet of class 60 mobile assault bridge, or two 132-foot (usable length) class 60 self-propelled ferries, or two 178-foot class 60 floating bridges.

(*b*) When equipped with the M4T6 bridge, provides approximately 280 feet of floating bridge or two 4-float and two 5-float rafts. Bridge components may be used to construct short fixed spans.

(*c*) When equipped with the class 60 bridge, provides approximately 270 feet of floating bridge, or two 4-float (reinforced) rafts, or two 5-float rafts, or a combination of bridge and rafts. Bridge components may be used to construct short fixed spans.

(8) Light stream-crossing equipage to support river-crossing operations. Equipment includes—

(*a*) Assault boats (9) and reconnaissance boats (6) to carry one infantry company by waterborne assault.

(*b*) Light tactical bridge equipage to provide the following options:

*1.* One class 12 ferry, or

*2.* One class 12 bridge approximately 44 feet long or

*3.* Four pontons powered by outboard motors to be used as storm boats.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

*e.* This unit is dependent on headquarters and headquarters company, armored or infantry (mechanized) brigade for unit level medical support, and on the Administration Company, TOE 12–177, for personnel and religious services.

### 4. Basis of Allocation

One per Separate Armored Brigade, TOE 17–100, or Infantry Brigade (Mechanized), TOE 37–100.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | *When equipped with* MAB | Cl 60 or M4T6 |
|---|---|---|
| *Weapons* | | |
| Launcher grenade 40mm | 25 | 25 |
| Machinegun 7.62mm light flexible | 5 | 5 |
| *Vehicles* | | |
| Carrier personnel full tracked | 10 | 10 |
| Combat engineer vehicle full tracked | 2 | 2 |
| Truck cargo ¾ T | 2 | 5 |
| Truck cargo 2½ T | 8 | 12 |
| Truck dump 5 T | 4 | 4 |
| Truck stake 5 T bridge transptg | 1 | 25 |
| Truck tractor 10 T | 3 | 3 |
| Truck utility ¼ T | 10 | 7 |
| Truck wrecker 5 T | 1 | 1 |
| *Engineer Items* | | |
| Boat bridge erection 27 ft lg | 0 | 4 |
| Boat landing inflat assault nylon 15-man | 9 | 9 |
| Bridge armored vehicle launcher 60 ft | 3 | 3 |

*Engineer Items*—Continued

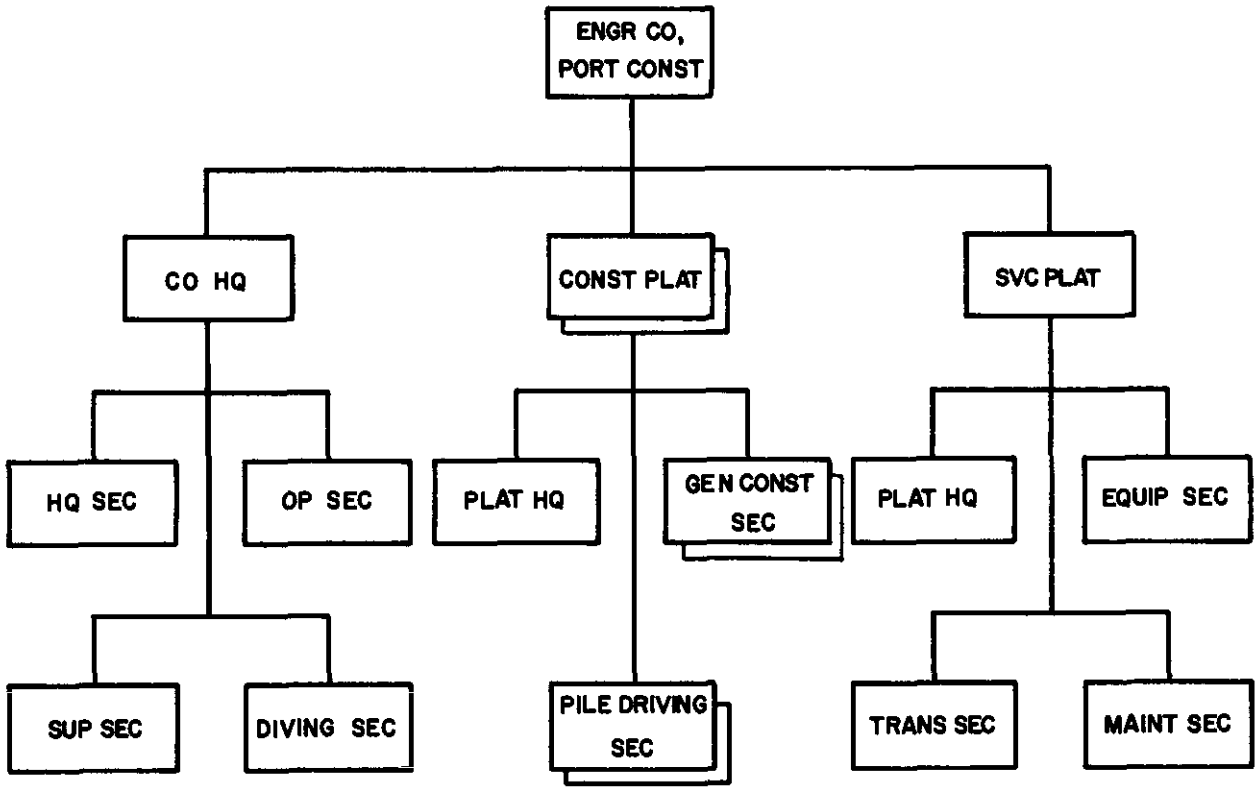
| | When equipped with MAB | When equipped with Cl 60 or M4T6 |
|---|---|---|
| Bridge erection set floating bridge M4T6 or cl 60 | 0 | 2 |
| Bridge ferry unit interior bay amphib mobile float assault | 8 | 0 |
| Bridge ferry unit end bay amphib mobile float assault | 4 | 0 |
| *Bridge floating highway M4T6 | 0 | 2 |
| *Bridge floating highway cl 60 | 0 | 2 |
| Bridge floating raft section lt tactical | 1 | 1 |
| Crane shovel whl mtd 20 T ¾ cu yd rough terrain | 1 | 1 |
| Detecting set mine AN/PRS–4 | 4 | 4 |
| Detecting set mine ptbl metallic | 10 | 10 |
| Ferry conversion set | 1 | 1 |
| Generator set 3 KW 60 cy 1–3 ph 120/240 V 120/208 V | 3 | 3 |
| Generator set 1.5 KW DC 28 V | 1 | 1 |
| Generator set 10 KW 60 cy 1–3 ph 120/240 V 120/208 V | 3 | 3 |
| Grader road mtzd hvy | 1 | 1 |
| Ion exch unit water purif trk mtd 3,000 GPH | 1 | 1 |
| Landing mat outfit | 2 | 2 |
| Launcher M60 series for 60 ft bridge | 2 | 2 |
| Loader scoop 2½ cu yd | 3 | 3 |
| Outboard motor 25 bhp | 4 | 4 |
| Pneu tool and compressor outfit 250 cfm trlr mtd | 1 | 2 |
| Saw chain 18 in | 3 | 3 |
| Semitrailer low bed 25 T | 3 | 3 |
| Shop equip contact maint trk mtd | 1 | 1 |
| Tool outfit pioneer port elect tools | 3 | 3 |
| Tractor full trckd DED hvy DBP | 2 | 2 |
| Trailer basic utility 2½ T | 1 | 6 |
| Trailer flat bed 10 T | 1 | 1 |
| Water purification equip set trk mtd 1,500 GPH | 2 | 2 |
| *Signal Items* | | |
| Radio set AN/GRR–5 | 1 | 1 |
| Radio set AN/VRC–53 | 1 | 1 |
| Radio set AN/GRC–125 | 30 | 24 |
| Radio set AN/VRC–46 | 9 | 9 |
| Radio set AN/VRC–47 | 4 | 4 |

*May be issued either bridge.

TOE 5-129G

# ENGINEER COMPANY, PORT CONSTRUCTION

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 12 | 1 | 227 | 240 |
| 2 | 12 | 1 | 208 | 221 |
| 3 | 12 | 1 | 175 | 188 |

*Figure B-27. Organizational chart, engineer company, port construction.*

## Section B. GENERAL

### 1. Mission

To perform special engineering work involved in providing port, beach, and POL facilities in support of military operations.

### 2. Assignment

Normally assigned to TASCOM for further assignment to the engineer command or an engineer construction brigade.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Operates in conjunction with other engineer units performing specialized

tasks in the construction and complete rehabilitation of port facilities and construction of beach facilities.

(2) Operates in conjunction with other engineer units in the installation and/or rehabilitation of tanker unloading facilities to include submarine pipeline and limited construction and/or rehabilitation of on-shore POL storage facilities.

(3) Performs organizational and direct support maintenance of organic engineer equipment.

(4) Performs two-shift operations.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area of installation.

### 4. Basis of Allocation

One per Engineer Construction Brigade, TOE 5–111 or one per Engineer Construction Group, TOE 5–112.

### 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Fifty percent mobile in organic vehicles when LCM's and cube barges are excluded. One hundred percent mobile in organic equipment under conditions permitting concurrent land and water movement.

## Section C. MAJOR ITEMS OF EQUIPMENT

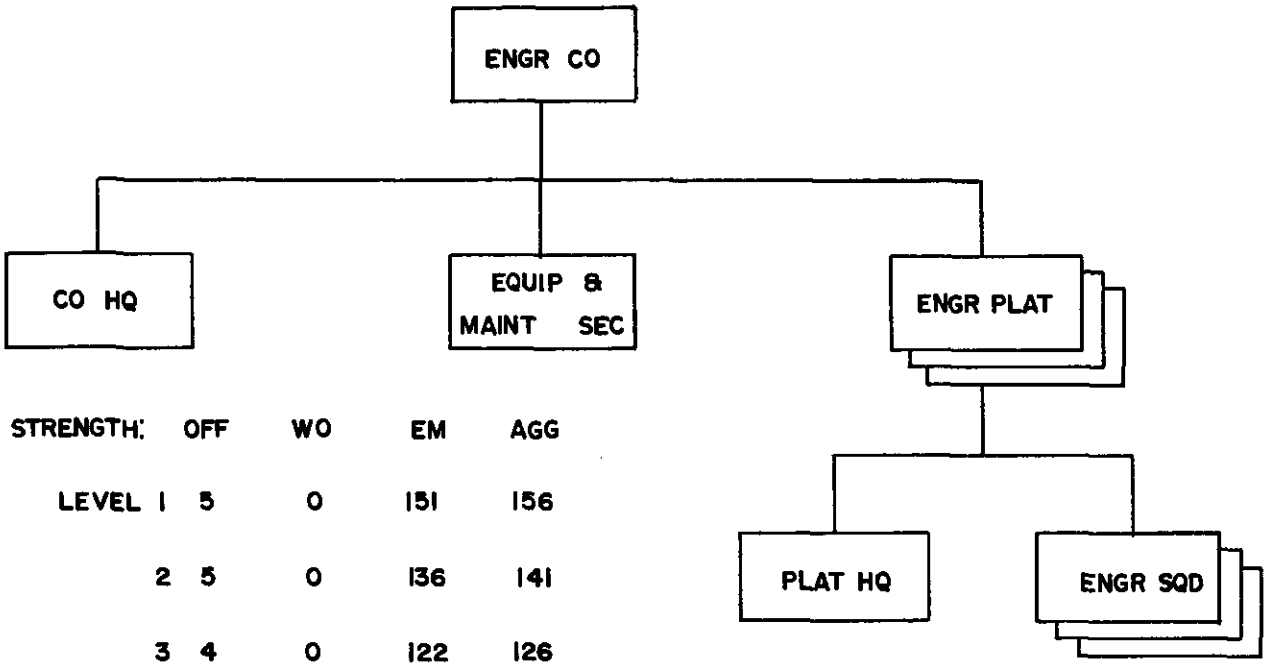
| | Qty |
|---|---|
| *Vehicles* | |
| Truck bolster 2½ T | 2 |
| Truck bolster 5 T | 2 |
| Truck cargo ¾ T | 3 |
| Truck cargo 2½ T | 13 |
| Truck dump 5 T | 4 |
| Truck tank fuel servicing | 1 |
| Truck tractor 5 T | 1 |
| Truck tractor 10 T | 4 |
| Truck utility ¼ T | 7 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Boat bridge erection 27 ft | 2 |
| Compressed air facility | 1 |
| Compressor reciproc 55cfm 100psi | 3 |
| Compressor reciproc 15cfm 3,500psi | 1 |
| Compressor rotary 600cfm 100psi | 4 |
| Crane shovel crwlr mtd 40T 2 cu yd | 2 |
| Crane shovel crwlr mtd 12½ T ¾ cu yd | 1 |
| Crane shovel trk mtd 20 T ¾ cu yd | 2 |
| Demolition set explosive initiat | 2 |
| Diving equip set 1 pers SCUBA open circuit | 6 |
| Diving equip set 2 pers 100 ft depth | 3 |
| Diving equip set 2 pers 200 ft depth | 3 |
| Drafting equip set bn | 4 |
| Erection outfit high bolted steel storage tanks | 2 |
| Erection outfit low bolted steel storage tanks | 1 |
| Extractor pile 40 T | 2 |
| Floodlight set elec ptbl 6 floodlights | 3 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 5 |
| Gen set 3 KW DC 28V | 2 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 3 |
| Gen set 5 KW 60 cy 1–3 ph 120/240V 120/208V | 4 |
| Hammer piledriver air-steam 8,750 ft lb | 2 |
| Hammer piledriver drop 3000 lb | 4 |
| Hammer piledriver self pwrd dsl 7,500 ft lb | 4 |
| Hammer piledriver self pwrd dsl 22,400 ft lb | 2 |
| Jetting set ptbl piledriver oper | 2 |
| Loader scoop 2½ cu yd | 1 |
| Lubricat serv unit trlr mtd | 1 |
| Mixer concrete trlr mtd 10 cu ft | 2 |
| Pile driving rig skid mtd 65 ft | 2 |
| Pneu tool & comp outfit trlr mtd 250cfm | 3 |
| Pneu tool outfit for 600cfm comp | 4 |
| Reproduction set diazo mach | 1 |
| Resuscitator military model | 1 |
| Saw arc table type 16 in blade | 2 |
| Saw power hack ptbl | 2 |
| Semitrailer low bed 25 T | 4 |
| Semitrailer low bed 60 T | 1 |
| Semitrailer van 6 T | 1 |
| Shop equip contact maint trk mtd | 1 |
| Shop equip gen purp repair strlr mtd | 1 |
| Survey set gen purp | 1 |
| Tool oufit pioneer ptbl elec tools | 3 |
| Torch outfit cut & weld set 2 | 4 |
| Torch outfit cut & weld set 3 | 3 |
| Tractor full trckd hvy DBP | 3 |
| Trailer basic utility 2½ T | 3 |
| Trailer bolster 2½ T | 2 |

| | Qty |
|---|---|
| Trailer bolster 9 T | 2 |
| Trailer flat bed 10 T | 5 |
| Welding shop trlr mtd 300 amp | 5 |
| Winch drum diesel driven 5¾ T | 4 |
| Winch drum pneu driven 1 T | 8 |
| *Transportation Equipment* | |
| Barge assembly set 3 by 7 | 1 |
| Barge assembly set 5 by 12 | 4 |
| Barge assembly set 6 by 18 | 2 |
| Landing craft mechanized 69 ft | 2 |
| Propelling nut outboard 165 BHP | 13 |
| Ramp ponton landing 30 T | 4 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/PRC–25 | 4 |
| Radio set AN/GRC–125 | 1 |

TOE 5–137G

# ENGINEER COMPANY, SEPARATE AIRBORNE BRIGADE

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 151 | 156 |
| 2 | 5 | 0 | 136 | 141 |
| 3 | 4 | 0 | 122 | 126 |

*Figure B–28. Organizational chart, engineer company, separate airborne brigade.*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the separate airborne brigade by providing engineer combat support.

*b.* To undertake and carry out an infantry combat mission when required.

### 2. Assignment

Organic to Separate Airborne Brigade, TOE 57–100.

### 3. Capabilities

*a.* At level 1, this unit provides—

(1) Engineer planning for organic and attached engineer troops.

(2) Engineer reconnaissance and produces engineer intelligence for the brigade.

(3) Limited construction, maintenance, and repair of roads, bridges, fords, and culverts to facilitate the movement of the brigade.

(4) Limited general construction works including construction of assault landing strips.

(5) Atomic demolitions munitions (ADM) support, when reinforced with ADM teams from TOE 5–570.

(6) Personnel and equipment for the purification and supply of potable water.

(7) Close engineer combat support by personnel and equipment landed by parachute and aircraft, and when required can carry out infantry combat missions.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* When the brigade structure includes more than three maneuver battalions, additional engineer platoons, on the basis of one per maneuver battalion over three, may be provided by a Modification Table of Organization and Equipment (MTOE) under the provisions of AR 310–31.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

*f.* This unit is dependent upon the administration company, separate airborne brigade, for personnel administration services and upon brigade headquarters for unit level medical support.

## 4. Basis of Allocation

One per Separate Airborne Brigade, TOE 57–100.

## 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

## 6. Mobility

One hundred percent mobile in organic transportation; one hundred percent air transportable in medium transport aircraft; and air droppable.

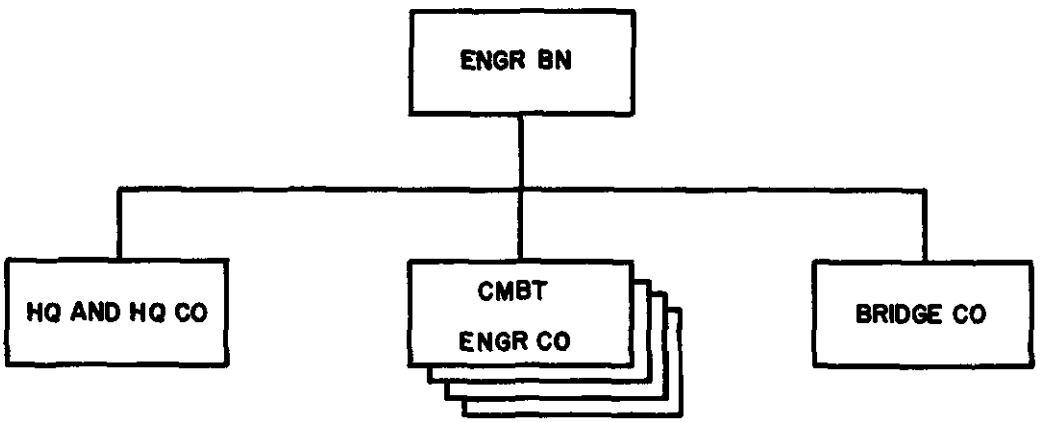
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Launcher grenade 40mm | 21 |
| Machinegun 7.62mm light flexible | 4 |
| *Vehicles* | |
| Truck cargo ¾ T | 12 |
| Truck cargo 2½ T | 1 |
| Truck dump 2½ T | 7 |
| Truck platform utility ½ T | 9 |
| Truck utility ¼ T | 6 |
| *Engineer Items* | |
| Braker paving-drill sinker comb | 5 |
| Demolition set expl initiat | 9 |
| Detecting set mine AN/PRS–4 | 4 |
| Detecting set mine ptbl metallic | 10 |
| Generator set 1.5 KW DC 28 V | 1 |
| Generator set 3 KW 60 cy 1–3 ph 120/240 V 120/208 V | 2 |
| Grader road mtzd 12-ft blade | 2 |
| Grader scraper attachment | 1 |
| Loader scoop 1½ cu yd | 1 |
| Pump centrif 1½ in 65 gpm | 2 |
| Saw chain 18 in | 9 |
| Tool outfit pioneer portable electric tools | 1 |
| Tractor full tracked light DBP | 2 |
| Trailer basic utility 2½ T | 3 |
| Transporter airmobile | 2 |
| Water purification set ptbl 600 gph | 1 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/PRC–25 | 13 |
| Radio set AN/VRC–46 | 4 |
| Radio set AN/VRC–47 | 2 |
| Radio set AN/GRC–125 | 1 |

TOE 5-145G

# ENGINEER BATTALION, ARMORED DIVISION
# OR
# ENGINEER BATTALION, INFANTRY DIVISION (MECHANIZED)

## Section A. ORGANIZATION




| | WITH M4T6 OR CL 60 | | | | WITH MAB | | | |
|---|---|---|---|---|---|---|---|---|
| STRENGTH: | OFF | WO | EM | AGG | OFF | WO | EM | AGG |
| LEVEL 1 | 44 | 2 | 973 | 1019 | 44 | 2 | 971 | 1017 |
| 2 | 42 | 2 | 869 | 913 | 42 | 2 | 868 | 912 |
| 3 | 37 | 2 | 774 | 813 | 37 | 2 | 776 | 815 |

*Figure B-29. Organizational chart, engineer battalion, armored division or engineer battalion, infantry division (mechanized).*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the armored and infantry (mechanized) divisions by means of engineer combat support.

*b.* To undertake and carry out an infantry combat mission when required.

### 2. Assignment

Organic to Armored Division, TOE 17, and Infantry Division (Mechanized), TOE 37.

### 3. Capabilities

*a.* At level 1 this unit furnishes combat

support for the armored and infantry (mechanized) division by providing—

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Construction, repair, and maintenance of roads, bridges, fords, and culverts.

(3) Support of hasty stream-crossing operations with boats, rafts, and bridges; coordination of organic and attached engineer troops in support of deliberate stream-crossings.

(4) Fixed bridging for passage of short gaps.

(5) Assistance in the emplacement of obstacles, including mines and booby-traps.

(6) Planning for, preparation, and the execution of firing of atomic demolitions munitions (ADM). When required, this capability is increased by the attachment of TOE 570 cellular-type ADM teams.

(7) Technical assistance to other troops in preparation of fortifications and camouflage.

(8) Engineer reconnaissance and producing engineer intelligence.

(9) Construction works including construction of landing strips.

(10) Construction and placement of deceptive devices, and technical assistance in camouflage operations.

(11) Organizational maintenance, engineer, ordnance, and signal repair service for equipment organic to the battalion.

(12) Personnel and equipment for water purification and the supply of potable water.

(13) Technical advice to supported units on engineering matters, including recommendations for employment of engineer troops.

(14) Assistance in the assault of fortified positions.

(15) Locally available materials for construction, fortifications, and camouflage.

(16) A unit to undertake and carry out an infantry combat mission, when required.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent respectively, of those provided at level 1.

*c.* This unit is not adaptable to type B organization.

### 4. Basis of Allocation

One per Armored Division, TOE 17, and one per Infantry Division (Mechanized), TOE 37.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

*When Equipped With Mobile Assault Bridging Equipment.*

| | Aggr | Aggr breakdown within organic units 5–145G | 5–146G | 5–147G | 5–148G (4 ea) |
|---|---|---|---|---|---|
| *Weapons* | | | | | |
| Gun machine 7.62mm lt flex | 15 | 3 | 3 | 0 | |
| Launcher grenade 40mm | 89 | 9 | 18 | 8 | |
| *Vehicles* | | | | | |
| Carrier personnel full trckd | 44 | 4 | 10 | 0 | |
| Combat engineer veh full trckd | 8 | 0 | 2 | 0 | |
| Recovery vehicle full tracked med | 2 | 2 | 0 | 0 | |
| Truck amb ¼ T | 1 | 1 | 0 | 0 | |
| Truck cargo ¾ T | 18 | 11 | 1 | 3 | |
| Truck cargo 2½ T | 42 | 18 | 3 | 12 | |
| Truck dump 5 T | 22 | 6 | 4 | 0 | |
| Truck stake 5 T | 2 | 0 | 0 | 2 | |
| Truck tractor 5 T | 1 | 1 | 0 | 0 | |
| Truck tractor 10 T | 10 | 3 | 1 | 3 | |
| Truck utility ¼ T | 39 | 11 | 5 | 8 | |
| Truck van shop 2½ T | 1 | 1 | 0 | 0 | |
| Truck wrecker 5 T | 1 | 1 | 0 | 0 | |
| *Engineer Items* | | | | | |
| Blasting mach 50 cap | 3 | 3 | 0 | 0 | |

| *Engineer Items*—Continued | Aggr breakdown within organic units 5-145G (4 ea) | 5-146G | 5-147G | 5-148G |
|---|---|---|---|---|
| Boat landing inflat assault 15 man | 18 | 0 | 0 | 18 |
| Bridge armored veh sciss ty cl 60 | 6 | 0 | 0 | 6 |
| Bridge floating raft sec light tact | 2 | 0 | 0 | 2 |
| Bridge mobile assault | 16 | 0 | 0 | 16 |
| Coder transmitter set XM3 XM4 | 4 | 4 | 0 | 0 |
| Crane whl mtd 20 T | 3 | 2 | 0 | 1 |
| Demolition set explosive initiat | 52 | 2 | 12 | 2 |
| Detecting set mine AN/PRS-4 | 49 | 6 | 10 | 3 |
| Detecting set mine ptbl metallic | 49 | 6 | 10 | 3 |
| Ferry conversion set raft | 2 | 0 | 0 | 2 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 1 | 1 | 0 | 0 |
| Generator set 1.5 KW DC 28V | 9 | 4 | 1 | 1 |
| Generator set 3 KW 60 cy 1-3 ph 120/240V 120/208V | 13 | 1 | 3 | 0 |
| Generator set 3 KW DC 28 V | 1 | 1 | 0 | 0 |
| Generator set 10 KW 60 cy 1-3 ph 120/240V 120/208V | 5 | 5 | 0 | 0 |
| Grader road hvy | 4 | 4 | 0 | 0 |
| Launcher M60 tank chassis | 4 | 0 | 0 | 4 |
| Loader scoop 2½ cu yd | 12 | 0 | 3 | 0 |
| Lubricat and serv unit trlr mtd | 1 | 1 | 0 | 0 |
| Outboard motor gas 25 BHP | 8 | 0 | 0 | 8 |
| Pneu tool compress outfit 250 cfm trlr mtd | 5 | 1 | 1 | 0 |
| Ramp load veh mob asslt brg | 8 | 0 | 0 | 8 |
| Saw chain 18 in | 12 | 0 | 3 | 0 |
| Semitrailer low bed 25 T | 10 | 3 | 1 | 3 |
| Semitrailer van 6 T | 1 | 1 | 0 | 0 |
| Shop equip contact maint trk mtd | 1 | 1 | 0 | 0 |
| Shop equip organzl rep light trk mtd | 1 | 1 | 0 | 0 |
| Survey set gen purp | 1 | 1 | 0 | 0 |
| Tool outfit pioneer ptbl elect tool | 12 | 0 | 3 | 0 |
| Torch outfit cutting and welding set 2 | 4 | 0 | 1 | 0 |
| Torch set cutting and welding med duty | 1 | 0 | 0 | 1 |
| Tractor full trckd med DBP | 8 | 3 | 1 | 1 |
| Trailer basic util 2½ T | 2 | 0 | 0 | 2 |
| Trailer flat bed 10 T | 1 | 1 | 0 | 0 |
| Water purif equip set trk mtd 1,500 gph | 5 | 5 | 0 | 0 |
| Welding set arc inert gas shield | 1 | 1 | 0 | 0 |
| Welding shop trlr mtd 300 amp | 1 | 1 | 0 | 0 |
| *Signal Items* | | | | |
| Camera set still picture general photo | 3 | 3 | 0 | 0 |
| Camera set still picture studio and gen photo | 1 | 1 | 0 | 0 |
| Electronic teletypewriter sec equip TSEC/KW-7 | 1 | 1 | 0 | 0 |
| Radio set AN/GRR-5 | 6 | 1 | 1 | 1 |
| Radio set AN/GRC-106 | 11 | 6 | 1 | 1 |
| Radio set AN/GRC-125 | 93 | 3 | 15 | 30 |
| Radio set AN/PRC-25 | 2 | 2 | 0 | 0 |
| Radio set AN/VRC-46 | 24 | 3 | 4 | 5 |
| Radio set AN/VRC-47 | 14 | 5 | 1 | 5 |
| Radio teletypewriter set AN/GRC-46 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/GGC-3 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/PGC-1 | 1 | 1 | 0 | 0 |

*When Equipped With M4T6 or Class 60 Bridging Equipment.*

| | Aggr breakdown within organic units 5-145G (4 ea) | 5-146G | 5-147G | 5-148G |
|---|---|---|---|---|
| *Weapons* | | | | |
| Gun machine 7.62mm lt flex | 15 | 3 | 3 | 0 |
| Launcher grenade 40mm | 89 | 9 | 18 | 8 |
| *Vehicles* | | | | |
| Carrier personnel full trckd | 44 | 4 | 10 | 0 |
| Combat engineer veh full trckd | 8 | 0 | 2 | 0 |
| Recovery vehicle full trckd med | 2 | 2 | 0 | 0 |
| Truck amb ¼ T | 1 | 1 | 0 | 0 |
| Truck cargo ¾ T | 18 | 11 | 1 | 3 |
| Truck cargo 2½ T | 46 | 18 | 3 | 16 |
| Truck dump 5 T | 22 | 6 | 4 | 0 |
| Truck stake 5 T | 50 | 0 | 0 | 50 |
| Truck tractor 5 T | 1 | 1 | 0 | 0 |
| Truck tractor 10 T | 10 | 3 | 1 | 3 |
| Truck utility ¼ T | 39 | 11 | 5 | 8 |
| Truck van shop 2½ T | 1 | 1 | 0 | 0 |
| Truck wrecker 5 T | 1 | 1 | 0 | 0 |
| *Engineer Items* | | | | |
| Blasting mach 50 cap | 3 | 3 | 0 | 0 |
| Boat bridge erect 27 ft lg | 8 | 0 | 0 | 8 |
| Boat landing inflat assault 15 man | 18 | 0 | 0 | 18 |
| Bridge armored veh launch sciss ty cl 60 | 6 | 0 | 0 | 6 |
| *Bridge floating highway alum superstructure | 4 | 0 | 0 | 4 |
| *Bridge floating highway cl 60 135 ft | 4 | 0 | 0 | 4 |
| Bridge floating raft sect light tactical | 2 | 0 | 0 | 2 |
| Bridge erect set float bridge cl 60 | 4 | 0 | 0 | 4 |
| Coder transmitter XM3, XM4 | 4 | 4 | 0 | 0 |
| Crane whl mtd 20 T | 3 | 2 | 0 | 1 |
| Demolition set explosive initiat | 52 | 2 | 12 | 2 |
| Detecting set mine AN/PRS-4 | 49 | 6 | 10 | 3 |
| Detecting set mine ptbl metallic | 49 | 6 | 10 | 3 |
| Ferry conversion set raft | 2 | 0 | 0 | 2 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 1 | 1 | 0 | 0 |
| Generator set 1.5 KW DC 28 V | 9 | 4 | 1 | 1 |

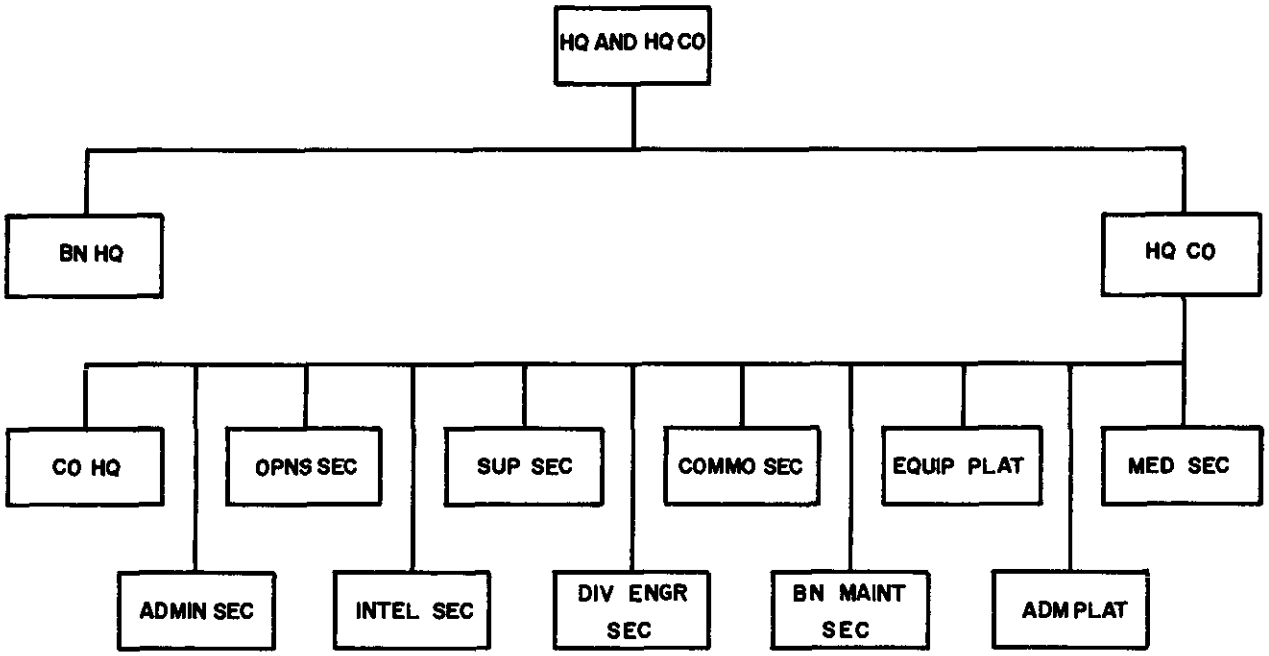
| | | Aggr breakdown within organic units 5-145G (4 ea) | 5-146G | 5-147G | 5-148G |
|---|---|---|---|---|---|
| Generator set 3 KW 60 cy 1-3 ph 120/240 V 120/208 V | 13 | 1 | 3 | 0 |
| Generator set 3 KW DC 28 V | 1 | 1 | 0 | 0 |
| Generator set 10 KW 60 cy 1-3 ph 120/240 V 120/208 V | 5 | 5 | 0 | 0 |
| Grader road mtd hvy | 4 | 4 | 0 | 0 |
| Launcher M60 tank chassis | 4 | 0 | 0 | 4 |
| Loader scoop cu yd | 12 | 0 | 3 | 0 |
| Lubricat and serv unit trlr mtd | 1 | 1 | 0 | 0 |
| Outboard mtr gas 25 BHP | 8 | 0 | 0 | 8 |
| Pneu tool compressor outfit trlr mtd 250 cfm | 7 | 1 | 1 | 2 |
| Saw diam 18 in | 12 | 0 | 3 | 0 |
| Semitrailer low bed 25 T | 10 | 3 | 1 | 3 |
| Semitrailer van 6 T | 1 | 1 | 0 | 0 |
| Shop equip contact maint trk mtd | 1 | 1 | 0 | 0 |
| Shop equip organzl rep light trk mtd | 1 | 1 | 0 | 0 |
| Survey set gen purp | 1 | 1 | 0 | 0 |
| Tool outfit pioneer ptbl elect tool | 12 | 0 | 3 | 0 |
| Torch outfit cutting and welding set-2 | 4 | 0 | 1 | 0 |
| Torch set cutting and welding med duty | 1 | 0 | 0 | 1 |
| Tractor full trckd med DBP | 8 | 3 | 1 | 1 |
| Trailer basic util 2½ T | 10 | 0 | 0 | 10 |
| Trailer flat bed 10 T | 1 | 1 | 0 | 0 |
| Water purif equip set trk mtd 1,500 gph | 5 | 5 | 0 | 0 |
| Welding set arc inert gas shield | 1 | 1 | 0 | 0 |
| Welding shop trlr mtd 300 amp | 1 | 1 | 0 | 0 |
| *Signal Items* | | | | |
| Camera set still picture gen photo | 3 | 3 | 0 | 0 |
| Camera set still picture studio and gen photo | 1 | 1 | 0 | 0 |
| Electronic teletypewriter sec equip TSEC/KW-7 | 1 | 1 | 0 | 0 |
| Radio set AN/GRR-5 | 6 | 1 | 1 | 1 |
| Radio set AN/GRC-106 | 11 | 6 | 1 | 1 |
| Radio set AN/GRC-125 | 69 | 3 | 15 | 6 |
| Radio set AN/PRC-25 | 10 | 2 | 0 | 8 |
| Radio set AN/VRC-46 | 24 | 3 | 4 | 5 |
| Radio set AN/VRC-47 | 14 | 5 | 1 | 5 |
| Radio teletypewriter set AN/GRC-46 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/GGC-3 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/PGC-1 | 1 | 1 | 0 | 0 |

*May be issued either bridge.

TOE 5–146G

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER BATTALION, ARMORED DIVISION OR HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER BATTALION, INFANTRY DIVISION (MECHANIZED)

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 19 | 2 | 206 | 227 |
| 2 | 17 | 2 | 186 | 205 |
| 3 | 17 | 2 | 170 | 189 |

*Figure B–80. Organizational chart, headquarters and headquarters company, engineer battalion, armored division, or engineer battalion, infantry division (mechanized).*

## Section B. GENERAL

### 1. Mission

*a. Headquarters.* To provide an engineer special staff section for the division and to provide command and staff for the engineer battalion, armored division, or engineer battalion, infantry division (mechanized).

*b. Headquarters Company.* To provide an alternate CP, administration, operations control, communications, reconnaissance and engineer intelligence, supply, organizational maintenance support, supplemental engineer and ordnance construction equipment, and medical service for the battalion. To provide for the production and supply of potable water for the division, and for combat support by the planning and preparation for employment and firing of atomic demolitions munitions (ADM).

*c.* To undertake and carry out infantry combat missions, when required.

### 2. Assignment

Organic to the Engineer Battalion, Armored Division, or Engineer Battalion, Infantry Division (Mechanized) TOE 5–145.

### 3. Capabilities

*a.* At full strength this unit provides—

(1) Staff planning and supervision of division engineer operations, including attached engineer troops.

(2) Water purification and supply with five water points.

(3) Engineer reconnaissance and intelligence for the engineer battalion and for the division.

(4) Limited atomic demolitions munitions (ADM) support to the division. This capability may be increased as required by the attachment of TOE 5–570 cellular-type ADM teams.

(5) Unit level medical service for the battalion, to include medical care and evacuation, establishment of an aid station, and furnishing company aid men.

(6) Organizational maintenance and repair service for equipment of the battalion.

(7) Radio and wire communications for the battalion when performing a normal engineer mission and when reorganized for combat as infantry.

(8) Additional construction equipment for subordinate units.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* Individuals of this organization, except medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

*d.* This unit is not adaptable to type B organization.

### 4. Basis of Allocation

One per Engineer Battalion, Armored Division, or Engineer Battalion, Infantry Division (Mechanized), TOE 5–145.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

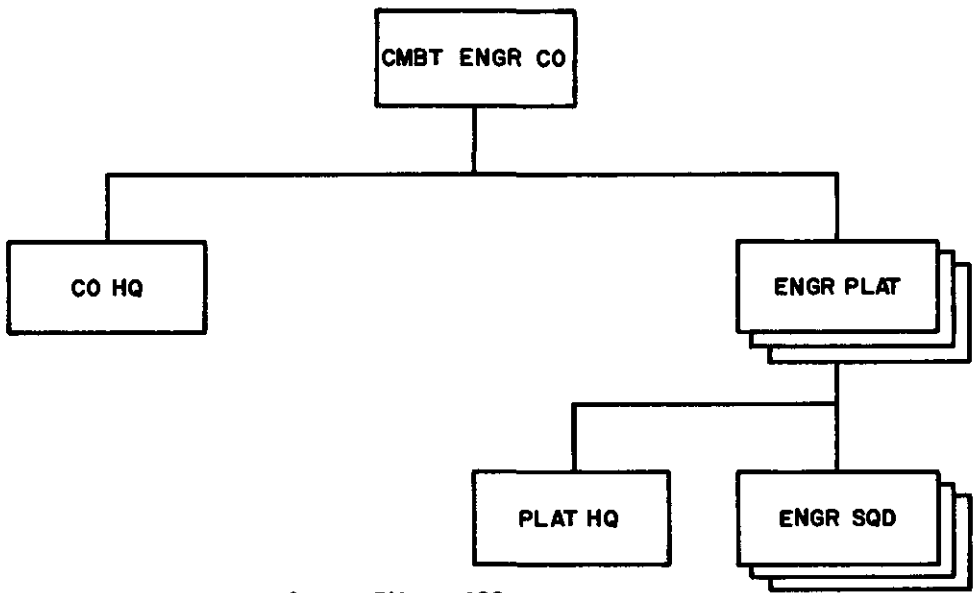
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–145G.)

TOE 5–147G

# COMBAT ENGINEER COMPANY, ENGINEER BATTALION, ARMORED DIVISION OR COMBAT ENGINEER COMPANY, ENGINEER BATTALION, INFANTRY DIVISION (MECHANIZED)

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 152 | 157 |
| 2 | 5 | 0 | 135 | 140 |
| 3 | 4 | 0 | 120 | 124 |

*Figure B–31. Organizational chart, combat engineer company, engineer battalion, armored division, or engineer battalion, infantry division (mechanized).*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the engineer battation, armored division and infantry division (mechanized) by providing engineer combat support.

*b.* To undertake and carry out infantry combat missions when required.

### 2. Assignment

Organic to Engineer Battalion, Armored

Division or Infantry Division (Mechanized) TOE 5–145.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Performs combat engineer tasks and when reinforced with additional heavy equipment can execute more complex engineer works.

(2) Provides engineer support for combined arms teams of the armored and infantry (mechanized) divisions.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Four per Engineer Battalion, Armored Division or Infantry Division or Infantry Division (Mechanized), TOE 5–145.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

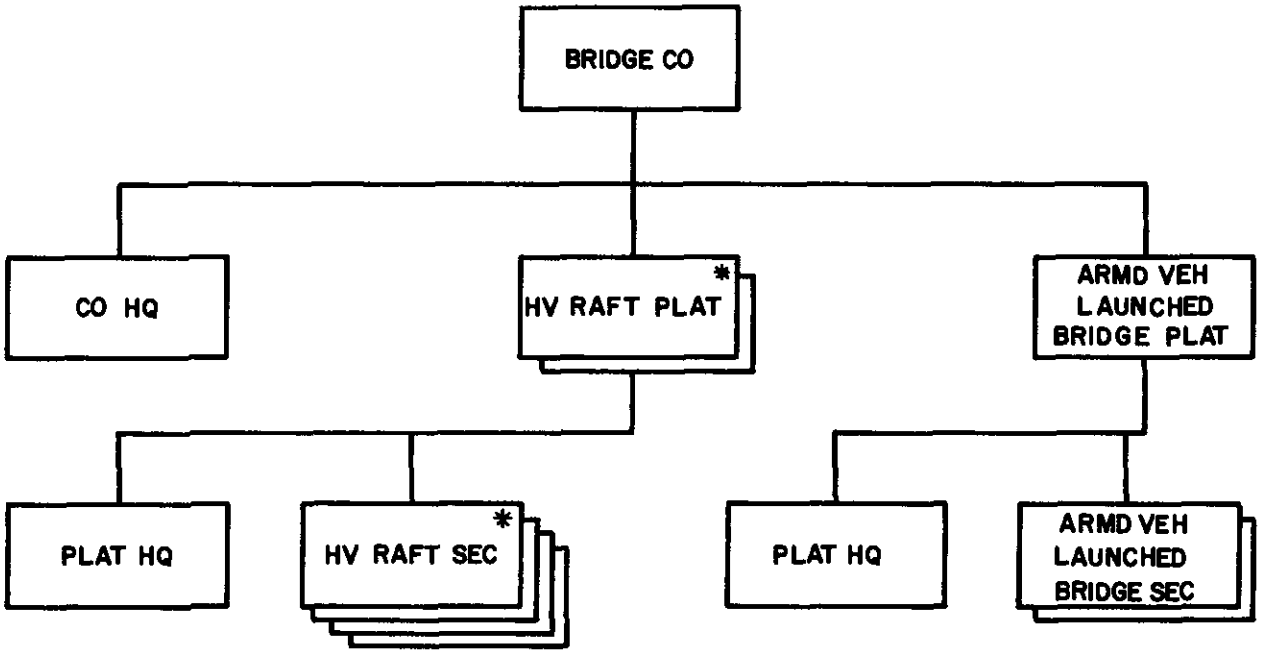
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–145G.)

TOE 5–148G

# BRIDGE COMPANY,
# ENGINEER BATTALION, ARMORED DIVISION
# OR
# BRIDGE COMPANY,
# ENGINEER BATTALION, INFANTRY DIVISION
# OR
# BRIDGE COMPANY,
# ENGINEER BATTALION, INFANTRY DIVISION (MECHANIZED)

## Section A. ORGANIZATION




| STRENGTH: | WITH M4T6 OR CL 60 OFF | WO | EM | AGG | WITH MAB OFF | WO | EM | AGG |
|---|---|---|---|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 159 | 164 | 5 | 0 | 157 | 162 |
| 2 | 5 | 0 | 143 | 148 | 5 | 0 | 142 | 147 |
| 3 | 4 | 0 | 124 | 128 | 4 | 0 | 126 | 130 |

*TITLE CHANGED TO "BRIDGE PLAT" AND "BRIDGE SEC" WHEN EQUIPPED WITH M4T6 OR CL 60 BRIDGE EQUIPMENT.

*Figure B–32. Organizational chart, bridge company, engineer battalion, armored division, or engineer battalion, infantry division, or engineer battalion, infantry division (mechanized).*

## Section B. GENERAL

### 1. Mission

*a.* To provide technical personnel and equipment to maintain, load, transport, erect, operate, and disassemble tactical assault stream-crossing equipment.

*b.* To accomplish in nontactical situations independent bridging or ferry missions as required.

### 2. Assignment

Organic to Engineer Battalion, Armored Division or Infantry Division (Mechanized), TOE 5–145, and Engineer Battalion, Infantry Division, TOE 5–155.

### 3. Capabilities

*a.* At level 1 this unit—

(1) When equipped with mobile assault bridging equipment—

(*a*) Can erect up to 472 feet of mobile assault amphibious bridge or 4 self-propelled Class 60 ferries. May construct floating bridges or ferries from amphibious bridge components in the flowing combinations: One 472-foot Class 60 floating bridge, or, two 262-foot Class 60 floating bridges, or four 157-foot Class 60 ferries.

(*b*) When equipped with M4T6 or Class 60 bridging equipment—

*1.* Can erect the M4T6 which provides up to 560 feet of 50-ton floating bridge or eight 50-ton rafts. Bridge components may also be used to construct short fixed spans.

*2.* Can erect the Class 60 bridge which provides up to 540 feet of 60-ton floating bridge, or four 4-float (reinforced) rafts, or four 5-float rafts, or combinations of bridge and rafts.

(2) Provides armored vehicle launched bridging equipment capable of passing Class 60 loads over wet or dry gaps up to 60 feet in width for four assault crossing sites.

(3) Provides light stream-crossing equipage to support an infantry battalion in a river crossing when amphibious vehicles cannot be used, are not available, or river conditions preclude use of mobile amphibious bridge or ferry vehicles, as follows:

(*a*) Assault boats (18) and reconnaissance boats (12) to carry one infantry company by waterborne assault.

(*b*) Light tactical bridge equipage with the following options:

*1.* Two Class 12 ferries, or

*2.* One Class 12 bridge 103 feet long, or

*3.* Eight pontons powered by outboard motors to be used as storm boats for assault crossings of infantry companies.

(4) Provides organizational maintenance for organic vehicles and engineer equipment.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

*a.* One per Engineer Battalion, Armored Division or Infantry Division (Mechanized, TOE 5–145.

*b.* One per Engineer Battalion, Infantry Division, TOE 5–155.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

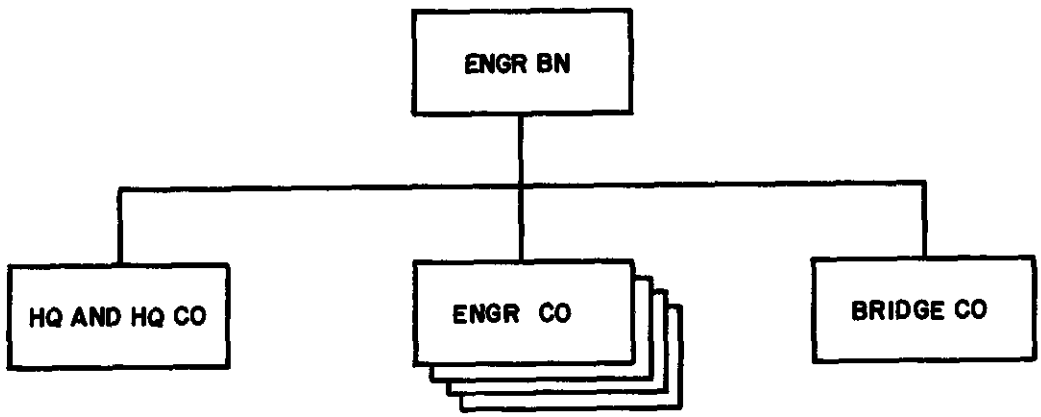
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–145G.)

TOE 5-155G

# ENGINEER BATTALION, INFANTRY DIVISION

## Section A. Organization




| STRENGTH: | | WITH M4T6 OR CL 60 OFF | WO | EM | AGG | WITH MAB OFF | WO | EM | AGG |
|---|---|---|---|---|---|---|---|---|---|
| LEVEL | 1 | 44 | 2 | 953 | 999 | 44 | 2 | 951 | 997 |
| | 2 | 42 | 2 | 847 | 891 | 42 | 2 | 846 | 890 |
| | 3 | 37 | 2 | 762 | 801 | 37 | 2 | 764 | 803 |

*Figure B-33. Organizational chart, engineer battalion, infantry division.*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the infantry division by means of engineer combat support.

*b.* To undertake and carry out an infantry combat mission when required.

### 2. Assignment

Organic to Infantry Division, TOE 7.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Engineer staff planning and supervision of organic and attached engineer troops.

(2) Construction, repair, and maintenance of roads, bridges, fords, and culverts.

(3) Support of hasty stream-crossing operations with boats, rafts, and bridges; coordination of organic and attached engineer troops in support of deliberate stream crossings.

(4) Fixed bridging for passage of short gaps.

(5) Assistance in the emplacement of obstacles, including mines and booby-traps.

(6) Planning, preparation for and the execution of firing of atomic demolitions munitions (ADM). When required this capability is increased by the attachment of TOE 5–570 cellular type ADM teams.

(7) Technical assistance to other troops in preparation of fortifications and camouflage.

(8) Engineer reconnaissance and produces engineer intelligence.

(9) General construction works, including construction of landing strips.

(10) Construction and placement of deceptive devices, and technical assistance in camouflage operations.

(11) Organizational maintenance for engineer, ordnance, and signal equipment organic to the battalion.

(12) Personnel and equipment for water purification and the supply of potable water.

(13) Technical advice to supported units on engineering matters, including recommendations for employment of engineer troops.

(14) Assistance in the assault of fortified positions.

(15) Exploitation of locally available materials for construction, fortifications, and camouflage.

(16) A unit to undertake and carry out an infantry combat mission when required.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Infantry Division, TOE 7.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

*When Equipped With Mobile Assault Bridging Equipment*

| | Aggr | Aggr breakdown within organic units (4 ea) | | |
|---|---|---|---|---|
| | | 5–155G | 5–156G | 5–157G 5–148G |
| *Weapons* | | | | |
| Gun machine 7.62mm lt flex | 15 | 3 | 3 | 0 |
| Launcher grenade 40mm | 92 | 12 | 18 | 8 |
| *Vehicles* | | | | |
| Combat engineer veh full trckd | 4 | 0 | 1 | 0 |
| Recovery veh full tracked med | 1 | 1 | 0 | 0 |
| Truck amb ¼ T | 1 | 1 | 0 | 0 |
| Truck cargo ¾ T | 23 | 12 | 2 | 3 |
| Truck cargo 2½ T | 45 | 21 | 3 | 12 |
| Truck dump 5 T | 58 | 6 | 13 | 0 |
| Truck stake 5 T | 2 | 0 | 0 | 2 |
| Truck tractor 5 T | 1 | 1 | 0 | 0 |
| Truck tractor 10 T | 14 | 3 | 2 | 3 |
| Truck utility ¼ T | 39 | 11 | 5 | 8 |
| Truck van shop 2½ T | 1 | 1 | 0 | 0 |
| Truck wrecker med 5 T | 1 | 1 | 0 | 0 |
| *Engineer Items* | | | | |
| Blasting mach 50 cap | 2 | 2 | 0 | 0 |
| Boat landing inflat assault 15-man | 18 | 0 | 0 | 18 |
| Bridge armored veh sciss ty cl 60 | 6 | 0 | 0 | 6 |
| Bridge floating mobile assault | 16 | 0 | 0 | 16 |
| Bridge floating raft sect light tactical | 2 | 0 | 0 | 2 |
| Coder transmitter set XM3, XM4 | 4 | 4 | 0 | 0 |
| Crane whl mtd 20 T ¾ cu yd rough terrain | 3 | 2 | 0 | 1 |
| Demolition set explosive initiating | 52 | 2 | 12 | 2 |
| Detecting set mine AN/PRS–4 | 44 | 5 | 9 | 3 |
| Detecting set mine ptbl metallic | 45 | 6 | 9 | 3 |

| | Aggr breakdown within organic units 5-155G | 5-156G | 5-157G | 5-148G (4 ea) |
|---|---|---|---|---|
| Ferry conversion set raft | 2 | 0 | 0 | 2 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 1 | 1 | 0 | 0 |
| Generator set 1.5 KW DC 28 V | 9 | 4 | 1 | 1 |
| Generator set 3 KW 60 cy 1-3 ph 120/240 V 120/208 V | 12 | 0 | 3 | 0 |
| Generator set 5 KW 60 cy 1-3 ph 120/240 V 120/208 V | 1 | 1 | 0 | 0 |
| Generator set 10 KW 60 cy 1-3 ph 120/240 V 120/208 V | 5 | 5 | 0 | 0 |
| Grader road mrtzd hvy | 4 | 4 | 0 | 0 |
| Launcher M60 series tank chassis transpt | 4 | 0 | 0 | 4 |
| Loader scoop ty 2½ cu yd | 12 | 0 | 3 | 0 |
| Lubricat and serv unit trlr mtd | 1 | 1 | 0 | 0 |
| Outboard mtr gas 25 BHP | 8 | 0 | 0 | 8 |
| Pneu tool compressor 250 cfm trlr mtd | 5 | 1 | 1 | 0 |
| Ramp load veh mob assit brg | 8 | 0 | 0 | 8 |
| Saw chain 18 in | 36 | 0 | 9 | 0 |
| Semitrailer low bed 25 T | 14 | 3 | 2 | 3 |
| Semitrailer van 6 T | 1 | 1 | 0 | 0 |
| Shop equip contact maint trk mtd | 1 | 1 | 0 | 0 |
| Shop equip organzl rep light trk mtd | 1 | 1 | 0 | 0 |
| Survey set gen purp | 1 | 1 | 0 | 0 |
| Tool outfit pioneer ptbl elect tool | 12 | 0 | 3 | 0 |
| Torch outfit cutting and welding set 2 | 4 | 0 | 1 | 0 |
| Torch set cutting and welding med duty | 1 | 0 | 0 | 1 |
| Tractor full trckd med DBP | 12 | 3 | 2 | 1 |
| Trailer basic util 2½ T | 38 | 0 | 9 | 2 |
| Trailer flat bed 10 T | 1 | 1 | 0 | 0 |
| Water purif equip set trk mtd 1,500 gph | 5 | 5 | 0 | 0 |
| Welding set arc inert gas shield | 1 | 1 | 0 | 0 |
| Welding shop trlr mtd 300 amp | 1 | 1 | 0 | 0 |
| *Signal Items* | | | | |
| Camera set still picture general photo | 3 | 3 | 0 | 0 |
| Camera set still picture studio and gen photo | 1 | 1 | 0 | 0 |
| Electronic teletypewriter sec equip TSEC/KW-7 | 1 | 1 | 0 | 0 |
| Radio set AN/GRR-5 | 6 | 1 | 1 | 1 |
| Radio set AN/GRC-125 | 89 | 3 | 14 | 30 |
| Radio set AN/PRC-25 | 3 | 3 | 0 | 0 |
| Radio set AN/VRC-46 | 21 | 4 | 3 | 5 |
| Radio set AN/VRC-47 | 17 | 4 | 2 | 5 |
| Radio set AN/GRC-106 | 11 | 6 | 1 | 1 |
| Radio teletypewriter set AN/GRC-46 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/GGC-3 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/PGC-1 | 1 | 1 | 0 | 0 |

*When Equipped With M4T6 or Class 60 Bridging Equipment*

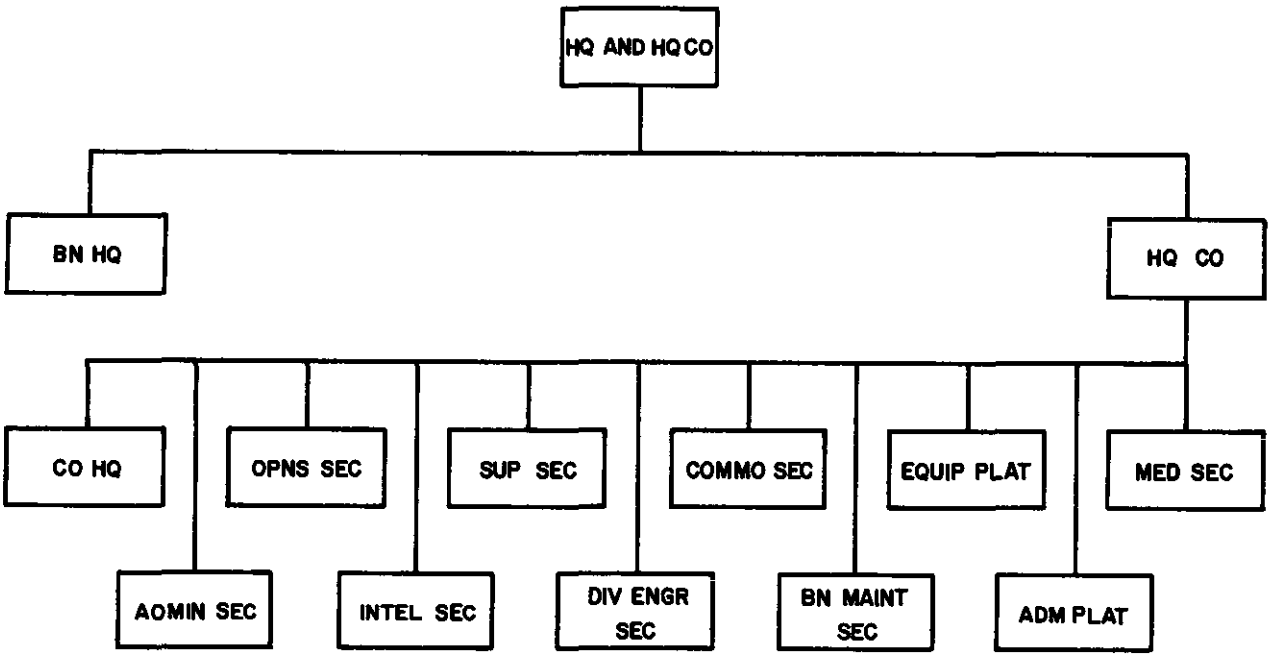
| | Aggr breakdown within organic units 5-155G | 5-156G | 5-157G | 5-148G (4 ea) |
|---|---|---|---|---|
| *Weapons* | | | | |
| Gun machine 7.62mm light flex | 15 | 3 | 3 | 0 |
| Launcher grenade 40mm | 92 | 12 | 18 | 8 |
| *Vehicles* | | | | |
| Combat engineer veh full trckd | 4 | 0 | 1 | 0 |
| Recovery veh full tracked medium | 1 | 1 | 0 | 0 |
| Truck amb ¼ T | 1 | 1 | 0 | 0 |
| Truck cargo ¾ T | 23 | 12 | 2 | 3 |
| Truck cargo 2½ T | 49 | 21 | 3 | 16 |
| Truck dump 5 T | 58 | 6 | 13 | 0 |
| Truck stake 5 T | 50 | 0 | 0 | 50 |
| Truck tractor 5 T | 1 | 1 | 0 | 0 |
| Truck tractor 10 T | 14 | 3 | 2 | 3 |
| Truck utility ¼ T | 39 | 11 | 5 | 8 |
| Truck van shop 2½ T | 1 | 1 | 0 | 0 |
| Truck wrecker med 5 T | 1 | 1 | 0 | 0 |
| *Engineer Items* | | | | |
| Blasting mach 50 cap | 2 | 2 | 0 | 0 |
| Boat bridge erection inboard 27 ft lg | 8 | 0 | 0 | 8 |
| Boat landing inflat assault 15-man | 18 | 0 | 0 | 18 |
| Bridge armored veh launch sciss ty cl 60 | 6 | 0 | 0 | 6 |
| Bridge erect set floating bridge | 4 | 0 | 0 | 4 |
| *Bridge floating highway alum deck balk | 4 | 0 | 0 | 4 |
| *Bridge floating highway cl 60 135 ft | 4 | 0 | 0 | 4 |
| Bridge floating raft sect light tactical | 2 | 0 | 0 | 2 |
| Coder transmitter set XM3 XM4 | 4 | 4 | 0 | 0 |
| Crane whl mtd 20 T ¾ cu yd rough terrain | 3 | 2 | 0 | 1 |
| Demolition set explosive initiating | 52 | 2 | 12 | 2 |
| Detecting set mine AN/PRS-4 | 44 | 5 | 9 | 3 |
| Detecting set mine ptbl metallic | 45 | 6 | 9 | 3 |
| Ferry conversion set raft | 2 | 0 | 0 | 2 |
| Generator set 1.5 KW 60 cy 1 ph 120 V | 1 | 1 | 0 | 0 |
| Generator set 1.5 KW DC 28 V | 9 | 4 | 1 | 1 |
| Generator set 3 KW 60 cy 1-3 ph 120/240 V 120/208 V | 12 | 0 | 3 | 0 |
| Generator set 5 KW 60 cy 1-3 ph 120/240 V 120/208 V | 1 | 1 | 0 | 0 |
| Generator set 10 KW 60 cy 1-3 ph 120/240 V 120/208 V | 5 | 5 | 0 | 0 |
| Grader road mrtzd hvy | 4 | 4 | 0 | 0 |
| Launcher M60 series tank chassis transpt | 4 | 0 | 0 | 4 |
| Loader scoop ty 2½ cu yd | 12 | 0 | 3 | 0 |
| Lubricat and serv unit trlr mtd | 1 | 1 | 0 | 0 |
| Outboard motor gas 25 BHP | 8 | 0 | 0 | 8 |

| | Aggr breakdown within organic units | | | |
|---|---|---|---|---|
| | 5-155G | 5-156G | 5-157G (4 ea) | 5-148G |
| Pneu tool compressor outfit 250 cfm trlr mtd | 7 | 1 | 1 | 2 |
| Saw chain 18 in | 36 | 0 | 9 | 0 |
| Semitrailer low bed 25 T | 14 | 3 | 2 | 3 |
| Semitrailer van 6 T | 1 | 1 | 0 | 0 |
| Shop equip contact maint trk mtd | 1 | 1 | 0 | 0 |
| Shop equip organzl rep light trk mtd | 1 | 1 | 0 | 0 |
| Survey set gen purp | 1 | 1 | 0 | 0 |
| Tool outfit pioneer ptbl elect tool trlr mtd | 12 | 0 | 3 | 0 |
| Torch outfit cutting and welding set 2 | 4 | 0 | 1 | 0 |
| Torch set cutting and welding med duty | 1 | 0 | 0 | 1 |
| Tractor full trckd med DBP | 12 | 3 | 2 | 1 |
| Trailer basic utility 2½ T | 46 | 0 | 9 | 10 |
| Trailer flat bed 10 T | 1 | 1 | 0 | 0 |
| Water purif equip set trk mtd 1,500 gph | 5 | 5 | 0 | 0 |
| Welding set arc inert gas shield | 1 | 1 | 0 | 0 |
| Welding shop trlr mtd 300 amp | 1 | 1 | 0 | 0 |
| *Signal Items* | | | | |
| Camera set still picture general photo | 3 | 3 | 0 | 0 |
| Camera set still picture studio and gen photo | 1 | 1 | 0 | 0 |
| Electronic teletypewriter sec equip T/SECKW-7 | 1 | 1 | 0 | 0 |
| Radio set AN/GRC-106 | 11 | 6 | 1 | 1 |
| Radio set AN/GRR-5 | 6 | 1 | 1 | 1 |
| Radio set AN/GRC-125 | 65 | 3 | 14 | 6 |
| Radio set AN/PRC-25 | 11 | 3 | 0 | 8 |
| Radio set AN/VRC-46 | 21 | 4 | 3 | 5 |
| Radio set AN/VRC-47 | 17 | 4 | 2 | 5 |
| Radio teletypewriter set AN/GRC-46 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/GGC-3 | 1 | 1 | 0 | 0 |
| Teletypewriter set AN/PGC-1 | 1 | 1 | 0 | 0 |

*May be issued either bridge.

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER BATTALION, INFANTRY DIVISION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 19 | 2 | 198 | 219 |
| | 2 | 17 | 2 | 180 | 199 |
| | 3 | 17 | 2 | 162 | 181 |

*Figure B–34. Organizational chart, headquarters and headquarters company, engineer battalion, infantry division.*

## Section B. GENERAL

### 1. Mission

*a. Headquarters.* To provide an engineer special staff section for the division and to provide command and staff for the engineer battalion, infantry division.

*b. Headquarters Company.* To provide an alternate CP, administration, operations control, communications, reconnaissance and engineer intelligence, supply, organizational maintenance support, supplemental engineer and ordnance construction equipment, and medical service for the battalion. To provide for the production and supply of potable water for the division, and for combat support by the planning and preparation for employment and firing of atomic demolitions munitions (ADM).

*c.* To undertake and carry out the infantry

combat missions of a Headquarters and Headquarters Company when required.

### 2. Assignment

Organic to the Engineer Battalion, Infantry Division, TOE 5–155.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Staff planning and supervision of division engineer operations, including attached engineer troops.

(2) Water purification and supply with five water points.

(3) Engineer reconnaissance and intelligence for the engineer battalion and for the division.

(4) Limited atomic demolitions munitions (ADM) support to the division. This capability may be increased as required by the attachment of TOE 5–570 cellular-type ADM teams.

(5) Unit level medical service for the battalion, to include medical care and evacuation, establishment of an aid station, and furnishing company aid men.

(6) Organizational maintenance and repair service for equipment of the battalion.

(7) Radio and wire communications for the battalion when performing a normal engineer mission and when reorganized for combat as infantry.

(8) Additional construction equipment for subordinate units.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Battalion, Infantry Division, TOE 5–155.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

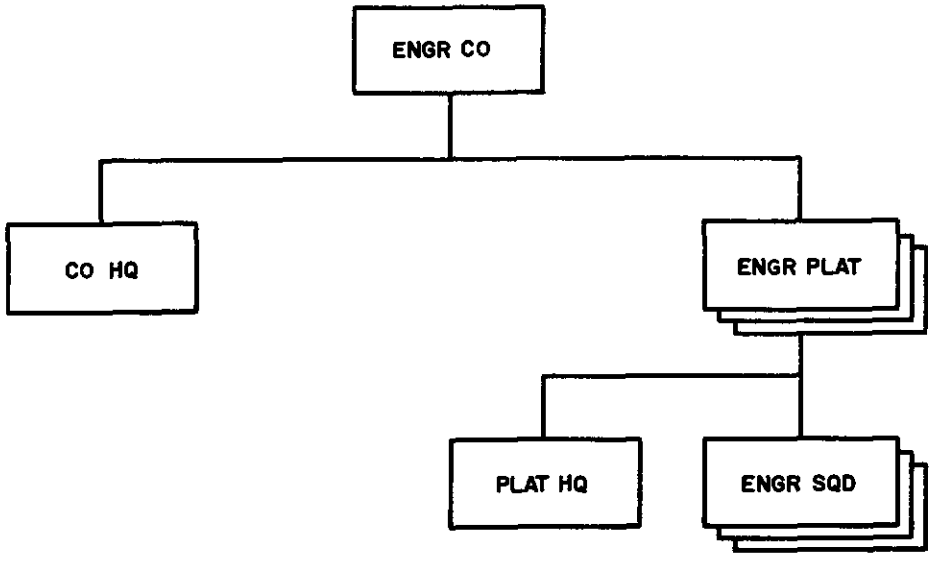
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–155G)

TOE 5–157G

# COMBAT ENGINEER COMPANY, ENGINEER BATTALION, INFANTRY DIVISION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 5 | 0 | 149 | 154 |
| | 2 | 5 | 0 | 131 | 136 |
| | 3 | 4 | 0 | 119 | 123 |

*Figure B–35. Organizational chart, engineer company, engineer battalion, infantry division.*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the engineer battalion, infantry division by providing engineer combat support.

*b.* To undertake and carry out infantry combat missions when required.

### 2. Assignment

Organic to Engineer Battalion, Infantry Division, TOE 5–155.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Performs combat engineer tasks and when reinforced with additional heavy equipment can execute more complex engineer works.

(2) Provides engineer support for combined arms teams of the infantry division.

(3) Undertakes and carries out infantry combat mssions when required.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

**4. Basis of Allocation**

Four per Engineer Battalion, Infantry Division, TOE 5–155.

**5. Category**

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

**6. Mobility**

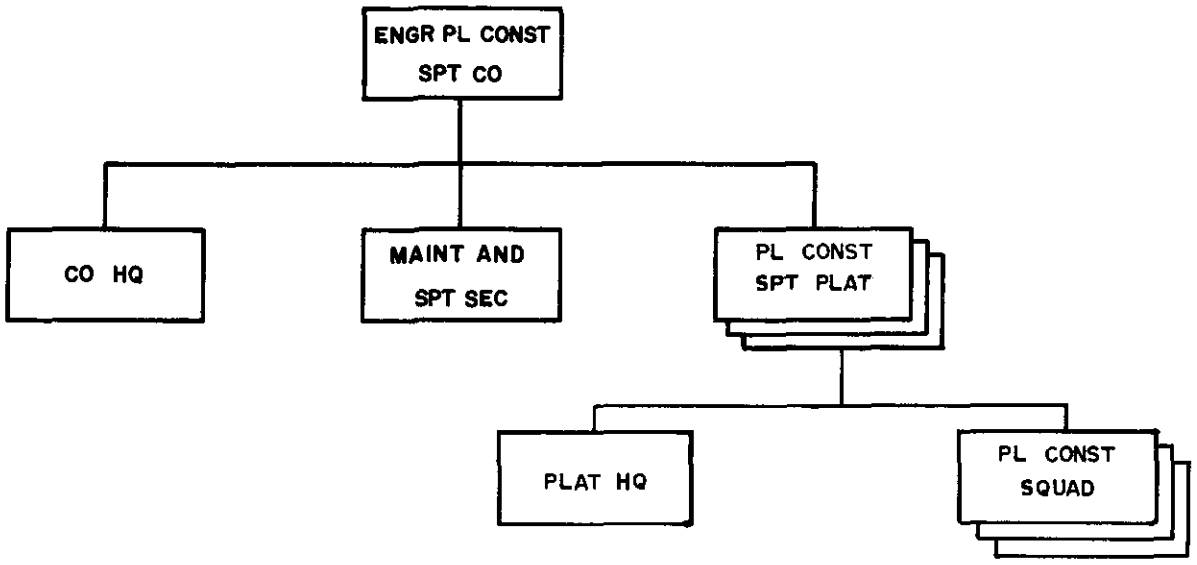
One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–155G)

# ENGINEER PIPELINE CONSTRUCTION SUPPORT COMPANY

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 183 | 188 |
| 2 | 5 | 0 | 169 | 174 |
| 3 | 5 | 0 | 149 | 154 |

*Figure B–36. Organizational chart, engineer pipeline construction support company.*

## Section B. GENERAL

### 1. Mission

To provide technical personnel and specialized equipment to assist construction and combat engineer units in the construction, rehabilitation, and maintenance (except organizational maintenance) of pipeline systems; to provide a limited independent capability for the construction, rehabilitation, and maintenance of pipeline systems; and to assist using units in specialized repairs.

### 2. Assignment

To an engineer command or an engineer construction brigade. Normally attached to an engineer construction group but may be attached to an engineer combat group.

### 3. Capabilities

*a.* At level 1 this unit is capable of—

(1) Providing advisory personnel to three engineer companies engaged in pipeline construction for pipe-stringing, pipe-coupling, storage tank erection, and pump station and dispensing facility construction; providing specialized tools and equipment for the above functions on a two-shift basis.

(2) Transporting in one lift, over unimproved roads:

(*a*) 21,600 linear feet of 6-inch pipe, or

(*b*) 16,200 linear feet of 8-inch pipe, or

(*c*) 9,000 linear feet of 12-inch pipe.

(3) To a limited degree, constructing and rehabilitating pipeline systems, including the erection of storage tanks, when construction units are not available.

(4) Performing organizational maintenance on all organic equipment.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Normally one per Engineer Construction Group, TOE 5–112, as required.

### 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hunderd percent mobile in organic transportation.

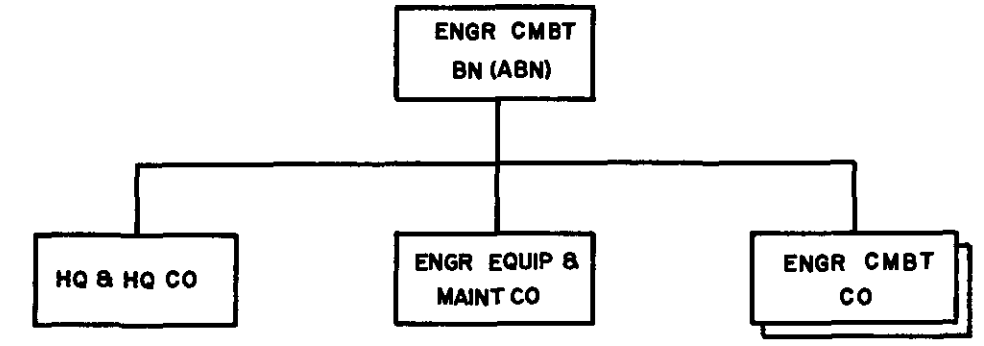
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Gun machine 7.62mm lt flex | 5 |
| *Vehicles* | |
| Truck bolster 2½ T | 18 |
| Truck cargo ¾ T | 4 |
| Truck cargo 2½ T | 20 |
| Truck tractor 10 T | 1 |
| Truck utility ¼ T | 5 |
| Truck wrecker 5 T | 1 |
| *Engineer Equipment* | |
| Crane whl mtd 5 T ⅜ cu yd rough terrain air transp | 3 |
| Crane whl mtd 20 T ¾ cu yd rough terrain | 1 |
| Detecting set mine AN/PRS–4 | 1 |
| Detecting set mine ptbl metallic | 1 |
| Erection outfit high bolted steel storage tanks | 1 |
| Erection outfit low bolted steel storage tanks | 3 |
| Floodlight set elec ptbl 6 floodlights | 6 |
| Gen set 1.5 KW 60 cy 1ph 120V | 7 |
| Gen set 1.5 KW DC 28V | 1 |
| Gen set 3 KW DC 28V | 2 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 3 |
| Gen set 5 KW 60 cy 1–3 ph 120/240V 120/208V | 6 |
| Loader scoop 2½ cu yd | 1 |
| Lubricat-serv unit trlr mtd | 1 |
| Pneu tool & comp outfit 250cfm trlr mtd | 1 |
| Saw power hack ptbl | 1 |
| Semitrailer low bed 25 T | 1 |
| Shop equip contact maint trk mtd | 1 |
| Shop equip organzl rep lt trk mtd | 1 |
| Tank & pump unit | 1 |
| Tank unit liquid disp for trlr mtg | 1 |
| Tool outfit pioneer ptbl elec tools | 3 |
| Torch outfit cutting & welding set 2 | 9 |
| Tractor full trckd hvy DBP | 1 |
| Trailer bolster 2½ T | 18 |
| Welding shop trlr mtd 300 amp | 10 |
| *Signal Items* | |
| Radio set AN/VRC–46 | 3 |
| Radio set AN/VRC–47 | 2 |
| Radio set AN/GRC–125 | 3 |

TOE 5–195G

# ENGINEER COMBAT BATTALION, AIRBORNE

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 32 | 4 | 673 | 709 |
| | 2 | 32 | 4 | 603 | 639 |
| | 3 | 31 | 4 | 534 | 569 |

*Figure B–87. Organizational chart, engineer combat battalion, airborne.*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of joint task force or tactical air force operations by constructing Stage I airbase facilities, accomplishing expedient major repairs or modification of existing facilities, and by performing general combat engineer construction tasks to support air operations.

*b.* To provide engineer support to divisional engineer airborne battalions engaged in combat construction activities.

### 2. Assignment

*a.* To USCONARC or theater army for attachment to a major tactical air force.

*b.* To an airborne corps.

*c.* To the army element of a joint task force.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) A staff to plan the engineer missions in support of AFSTRIKE, the army element of a joint task force, or U.S. Army airborne operations.

(2) Engineer reconnaissance for the selection, design, and construction of air-landing zones and related facilities.

(3) A capability to construct simultaneously two, Stage I, Type III, C–130 airfields in 72 hours, or two, Stage I, Type III, F4C airfields in 96 hours, where a low degree of difficulty of construction exists.

(4) Airfield construction by earth-clearing operations; installation of landing mats or membranes; and ap-

plication of dust palliatives and waterproofing or soil stabilizing agents.

(5) A capability to make expedient repairs or modifications to existing airfield facilities and to make expedient repairs to bomb-damaged runways.

(6) A capability for limited bituminous patching of pavement.

(7) A capability for vertical construction to include installation of power generation and distribution facilities, and the installation and temporary operation of fly-by-extraction and arresting equipment.

(8) Personnel and equipment for the purification and supply of potable water.

(9) Direct support maintenance for organic engineer and ordnance equipment.

(10) Personnel for two shift operation.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals, of this organization, except chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

*e.* This unit is dependent on other organizations for—

(1) Parachute packaging and maintenance teams.

(2) Communications support from Air Force elements when operating in isolated areas.

(3) Area security during the construction phase of assigned missions.

(4) Reinforcements from conventional construction units when heavy construction (Stage II and III criteria) is required.

## 4. Basis of Allocation

As required for support of tactical Air Force and Army airborne operations.

## 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

## 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

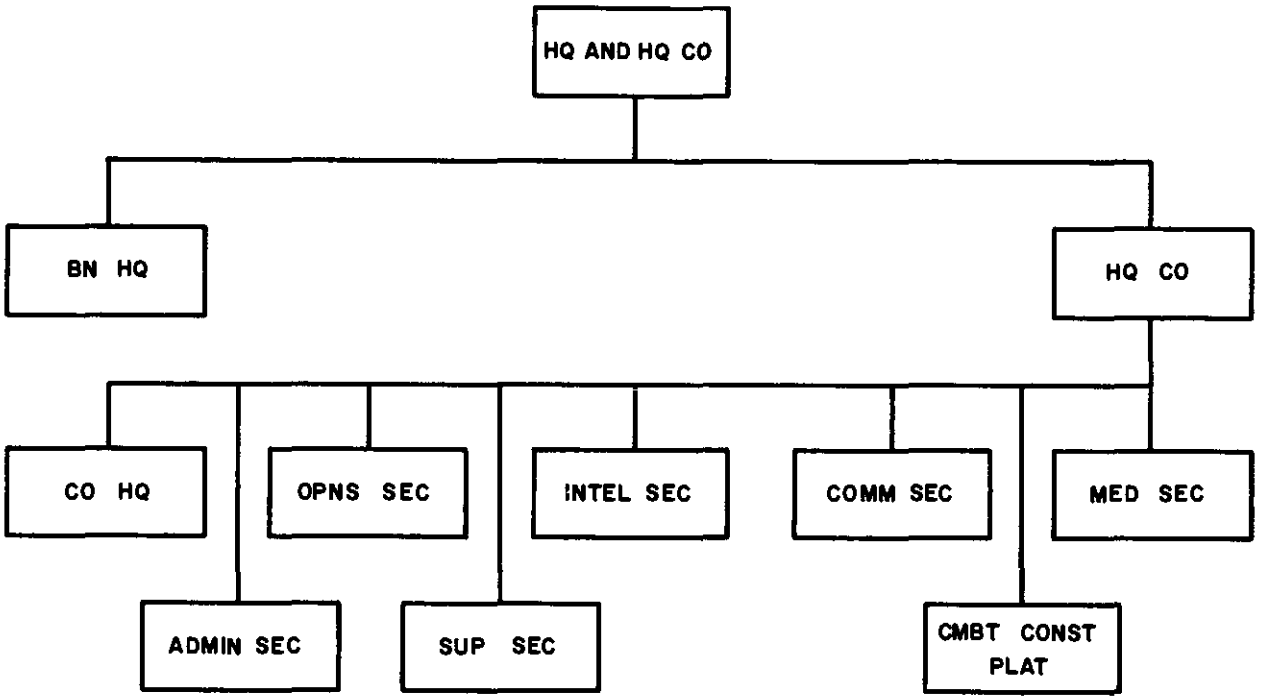
| | *Aggr breakdown within organic units* | | | |
|---|---|---|---|---|
| | *5–195G* | *5–196G* | *5–197G* | *5–198G (2 ea)* |
| *Weapons* | | | | |
| Gun machine 7.62mm lt flex | 6 | 0 | 0 | 3 |
| Launcher grenade 40mm | 37 | 1 | 0 | 18 |
| *Vehicles* | | | | |
| Truck ambulance ¼ T | 1 | 1 | 0 | 0 |
| Truck cargo ¾ T | 22 | 9 | 9 | 2 |
| Truck cargo 2½ T | 23 | 8 | 11 | 2 |
| Truck dump 2½ T | 42 | 4 | 12 | 13 |
| Truck dump 5 T | 16 | 0 | 16 | 0 |
| Truck tractor 5 T | 2 | 0 | 2 | 0 |
| Truck utility ¼ T | 15 | 6 | 1 | 4 |
| Truck wrecker 5 T | 1 | 0 | 1 | 0 |
| *Engineer Items* | | | | |
| Brazing and soldering set | 2 | 2 | 0 | 0 |
| Breaker paving-drill sinker comb | 9 | 0 | 3 | 3 |
| Crane shovel whl mtd 7 T ½ cu yd | 2 | 0 | 2 | 0 |
| Crusher jaw whl mtd 15 TPH | 1 | 0 | 1 | 0 |
| Demolition set explosive initiat | 24 | 0 | 0 | 12 |
| Detecting set mine AN/PRS–4 | 1 | 0 | 1 | 0 |
| Detecting set mine ptbl metallic | 21 | 2 | 1 | 9 |
| Distributor bitum matl trk mtd 800 gal | 2 | 0 | 2 | 0 |
| Distributor water collapsible tank 900 gal | 10 | 0 | 10 | 0 |
| Dolly set lift transportable shelter | 1 | 0 | 1 | 0 |
| Drafting equip set bn | 3 | 3 | 0 | 0 |
| Floodlight set elec ptbl 6 floodlights | 3 | 0 | 3 | 0 |
| Fork lift rough terrain 6,000 lb | 2 | 0 | 2 | 0 |
| Generator set 1.5 KW DC 28V | 3 | 1 | 0 | 1 |
| Generator set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 10 | 3 | 1 | 3 |

| | Aggr breakdown within organic units 5–195G (2 ea) | 5–196G | 5–197G | 5–198G |
|---|---|---|---|---|
| Generator set 3 KW DC 28V | 2 | 0 | 2 | 0 |
| Generator set 5 KW 60 cy 1–3 ph 120/240V 120/208V | 4 | 1 | 3 | 0 |
| Generator set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 2 | 1 | 1 | 0 |
| Grader road mtzd sectionalized | 8 | 0 | 8 | 0 |
| Kettle heating bitumen 175 gal | 2 | 0 | 2 | 0 |
| Loader scoop 1½ cu yd | 10 | 0 | 4 | 3 |
| Loader scoop 2½ cu yd | 2 | 0 | 2 | 0 |
| Lubricat serv unit trlr mtd | 2 | 0 | 2 | 0 |
| Mixer concrete 16 cu ft | 1 | 0 | 1 | 0 |
| Penetrometer soil airfield cone | 8 | 2 | 0 | 3 |
| Pneu tool and compressor outfit trlr mtd 250 cfm | 6 | 0 | 4 | 1 |
| Roller airmobility vibrating | 3 | 0 | 3 | 0 |
| Roller towed 13 pneu tires 9 T | 2 | 0 | 2 | 0 |
| Roller towed sheepsfoot 2 dr | 3 | 0 | 3 | 0 |
| Saw chain 18 in | 6 | 0 | 0 | 3 |
| Scraper towed 7½ cu yd | 6 | 0 | 6 | 0 |
| Semitrailer van 6 T | 2 | 0 | 2 | 0 |
| Shop equip contact maint trk mtd | 3 | 0 | 3 | 0 |
| Shop equip organzl rep lt trk mtd | 1 | 0 | 1 | 0 |
| Shop equip machine shop shelter mtd | 1 | 0 | 1 | 0 |
| Shop equip woodworking base maint trlr mtd | 1 | 1 | 0 | 0 |
| Spreader aggregate towed 8 ft sprd | 1 | 0 | 1 | 0 |
| Survey set gen purp | 2 | 2 | 0 | 0 |
| Tool outfit pioneer ptbl elec tools | 6 | 0 | 0 | 3 |
| Torch outfit cutting and welding set 2 | 2 | 2 | 0 | 0 |
| Trailer basic utility 2½ T | 18 | 0 | 0 | 9 |
| Trailer tilt bed 12 T | 10 | 0 | 8 | 1 |
| Tractor airmobile sectionalized | 8 | 0 | 8 | 0 |
| Tractor full trckd light DBP | 2 | 0 | 0 | 1 |
| Tractor whld ind light DBP | 8 | 0 | 6 | 1 |
| Water purif equip trlr mtd 600 gph | 3 | 3 | 0 | 0 |
| Welding set arc inert gas shield | 4 | 2 | 2 | 0 |
| Welding shop trlr mtd 300 amp | 4 | 2 | 2 | 0 |
| *Signal Items* | | | | |
| Radio set AN/GRR–5 | 1 | 1 | 0 | 0 |
| Radio set AN/PRC–25 | 8 | 0 | 6 | 1 |
| Radio set AN/VRC–46 | 6 | 4 | 0 | 1 |
| Radio set AN/VRC–47 | 15 | 3 | 2 | 5 |
| Radio set AN/VRC–53 | 3 | 0 | 3 | 0 |
| Radio set AN/GRC–125 | 19 | 0 | 1 | 9 |

TOE 5–196G

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER COMBAT BATTALION, AIRBORNE

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 16 | 3 | 137 | 156 |
| | 2 | 16 | 3 | 122 | 141 |
| | 3 | 15 | 3 | 108 | 126 |

*Figure B–38. Organizational chart, headquarters and headquarters company, engineer combat battalion, airborne.*

## Section B. GENERAL

### 1. Mission

To provide the command and staff, administration, supply, communications, and medical service for the engineer combat battalion, airborne.

### 2. Assignment

Organic to the engineer combat battalion, airborne.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) A staff to plan the engineer missions in support of AFSTRIKE, the Army element of a Joint Task Force, or U.S. Army airborne operations.

(2) Engineer reconnaissance for the selection, design, and construction of air-landing zones and related facilities.

(3) Specialized skills to support the vertical construction mission of the battalion, to include support for the installation of power generation and distribution facilities and for the installation of fly-by-extraction and arresting equipment.

(4) Battalion level supervision of the construction of runways, taxiways, and aprons; installation of portable runways lighting devices; limited patching of bituminous pavement; expedient repairs to bomb-damaged runways; expedient repairs or modifications to existing airbase facilities; earth clearing; installation of landing mats and membranes; and application of dust palliatives and waterproofing or soil stabilizing agents.

(5) Personnel and equipment for the purification and supply of potable water.

(6) Organizational maintenance of organic equipment.

(7) Battalion administration and supply services.

(8) Unit level medical service to include emergency medical treatment and evacuation, operation of a battalion aid station, supervision of sanitation, and furnishing of company aid men.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Combat Battalion, Airborne, TOE 5–195.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

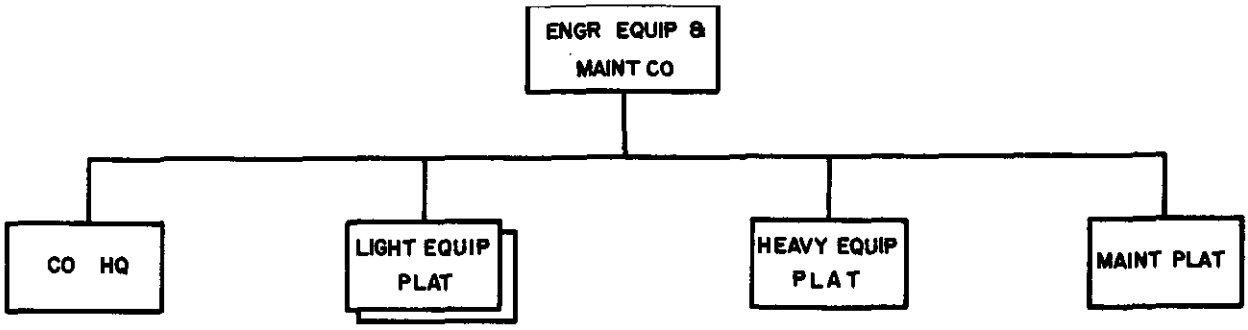
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–195G)

TOE 5-197G

# ENGINEER EQUIPMENT AND MAINTENANCE COMPANY ENGINEER COMBAT BATTALION, AIRBORNE

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 6 | 1 | 240 | 247 |
| | 2 | 6 | 1 | 215 | 222 |
| | 3 | 6 | 1 | 190 | 197 |

*Figure B-39. Organizational chart, engineer equipment and maintenance company, engineer combat battalion, airborne.*

## Section B. GENERAL

### 1. Mission

To reinforce the construction capabilities of the engineer combat battalion, airborne by providing air transportable engineer construction equipment with operators, and to enhance the overall capability of the battalion by performing battalion level organizational maintenance for all equipment, and direct support maintenance for engineer and ordnance equipment organic to the battalion.

### 2. Assignment

Organic to the engineer combat battalion, airborne.

### 3. Capabilities

*a.* At level 1, this unit provides—

(1) Battalion level organizational maintenance, and direct support maintenance of engineer and ordnance equipment organic to the engineer combat battalion, airborne.

(2) Contact maintenance teams for job-site repair of engineer and ordnance equipment.

(3) Engineer and ordnance repair parts support commensurate with the organization's direct support maintenance mission.

(4) Machine shop facilities.
(5) Engineer and ordnance equipment support for two-shift operation.
(6) Equipment for earthmoving, and for concrete and asphalt repair.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Combat Battalion, Airborne, TOE 5–195G.

### 5. Category

This unit is designated a category I Unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and 100 percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

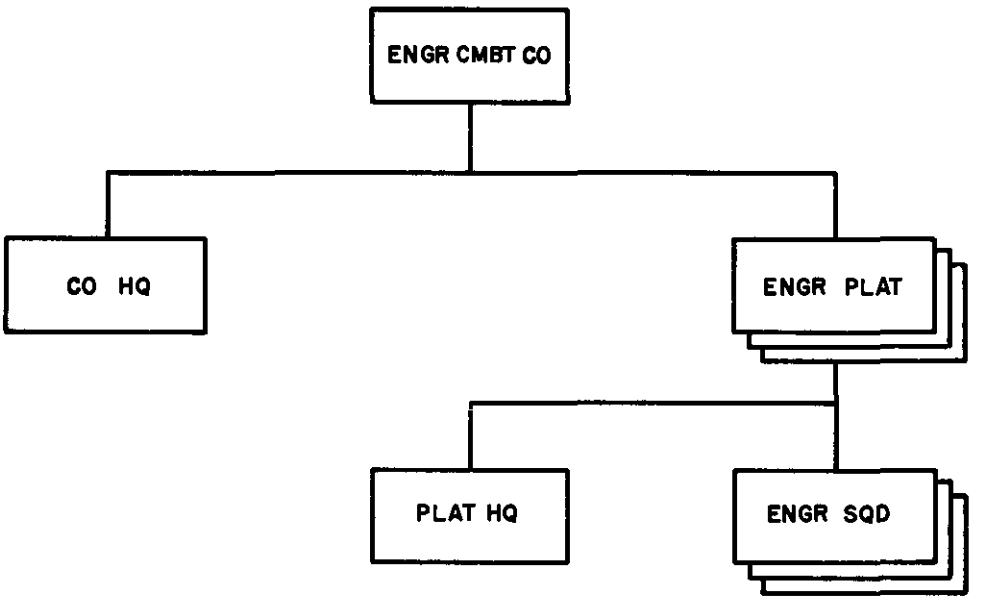
(See Section C, TOE 5–195G)

TOE 5-198G

# ENGINEER COMBAT COMPANY,

# ENGINEER COMBAT BATTALION, AIRBORNE

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 5 | 0 | 148 | 153 |
| | 2 | 5 | 0 | 133 | 138 |
| | 3 | 5 | 0 | 118 | 123 |

*Figure B-40. Organizational chart, engineer combat company, engineer combat battalion, airborne.*

## Section B. GENERAL

### 1. Mission

To provide an operating component of the engineer combat battalion, airborne to perform general engineer work facilitating and contributing to the combat construction effort of the battalion in support of STRICOM/AFSTRIKE, or in support of the operations or other forces as directed.

### 2. Assignment

Organic to the engineer combat battalion, airborne.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Performs combat and general construction tasks and when reinforced

with additional heavy engineer equipment and skills can execute more complex engineer work to include—

(*a*) Erection of portable hangars and other portable buildings and structures.

(*b*) Installation of runway lighting devices.

(*c*) Installation of arresting equipment and provision of personnel to operate and maintain the equipment.

(*d*) Installation and temporary operation of "fly-by-extraction" equipment.

(2) Performs expedient repairs to bomb-damaged runways.

(3) Provides local security for worksites until relieved by Air Force or other units.

(4) Is capable of being parachute or air delivered to worksites without modification of equipment.

(5) Is capable of operating on a two shift basis.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Two per Engineer Combat Battalion, Airborne, TOE 5–195G.

### 5. Category

This unit is designated a category I Unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

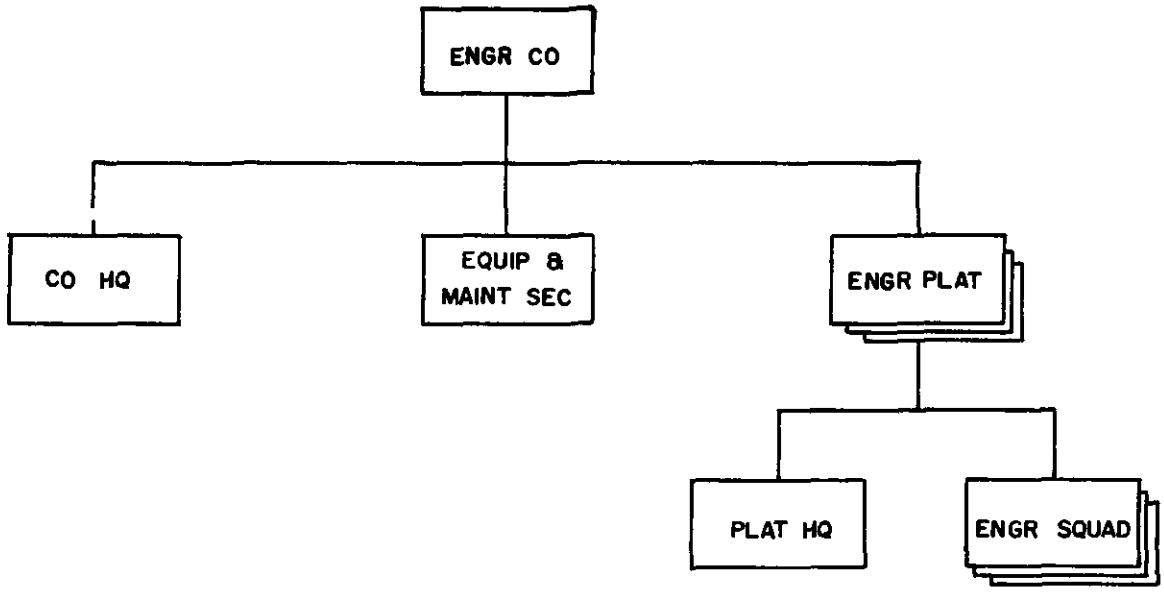
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–195G.)

TOE 5–207G

# ENGINEER COMPANY, SEPARATE LIGHT INFANTRY BRIGADE

## Section A. ORGANIZATION




| STRENGTH: | OFF | WO | EM | AGG |
|---|---|---|---|---|
| LEVEL 1 | 5 | 0 | 168 | 173 |
| 2 | 5 | 0 | 153 | 158 |
| 3 | 4 | 0 | 134 | 138 |

*Figure B–41. Organizational chart, engineer company, separate light infantry brigade.*

## Section B. GENERAL

### 1. Mission

*a.* To increase the combat effectiveness of the separate light infantry brigade by providing engineer combat support.

*b.* To undertake and carry out an infantry combat mission when required.

### 2. Assignment

Organic to the Separate Light Infantry Brigade, TOE 77–100.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Engineer reconnaissance and produces engineer intelligence for the brigade.

(3) Construction, maintenance, and repair of roads, bridges, fords, and culverts to facilitate the movement of the brigade.

(4) General construction works including construction of assault landing strips.

(5) Atomic demolition munitions (ADM) support, when reinforced with appropriate ADM teams from TOE 5–570.

(6) Personnel and equipment for the purification and supply of potable water.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* This unit is dependent upon the Administration Company, Separate Light Infantry Brigade, TOE 12–197, for personnel administration services.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Separate Light Infantry Brigade, TOE 77–100.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and 90 percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Launcher grenade 40mm | 21 |
| Machinegun 7.62mm light flexible | 7 |
| *Vehicles* | |
| Truck cargo ¾ T | 3 |
| Truck cargo 2½ T | 3 |
| Truck dump 2½ T | 18 |
| Truck tractor 10 T | 2 |
| Truck utility ¼ T | 5 |
| *Engineer Equipment* | |
| Boat recon pneu 3-man | 3 |
| Breaker paving-drill sinker comb | 3 |
| Demolition set explosive initiat | 9 |
| Detecting set mine AN/PRS–4 | 4 |
| Detecting set mine ptbl metallic | 10 |
| Drafting equip set bn | 1 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 2 |
| Gen set 3 KW DC 28V | 2 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 3 |
| Gen set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 2 |
| Grader road mtzd hvy | 2 |
| Loader scoop 2½ cu yd | 4 |
| Penetrometer airfld cone | 2 |
| Saw chain 18 in | 9 |
| Semitrailer low bed 25T | 2 |
| Shop equip contact maint trk mtd | 1 |
| Survey set gen purp | 1 |
| Tank unit liquid disp for trlr mtg | 1 |
| Tool outfit pioneer ptbl elec tools | 3 |
| Tractor full trckd med DBP | 2 |
| Trailer basic utility 2½ T | 3 |
| Water purif equip set trk mtd 1,500 gph | 2 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/PRC–25 | 4 |
| Radio set AN/VRC–46 | 4 |
| Radio set AN/VRC–47 | 1 |
| Radio set AN/VRC–49 | 1 |
| Radio set AN/GRC–125 | 9 |

TOE 5–215T

# ENGINEER BATTALION, AIRMOBILE DIVISION

## Section A. ORGANIZATION

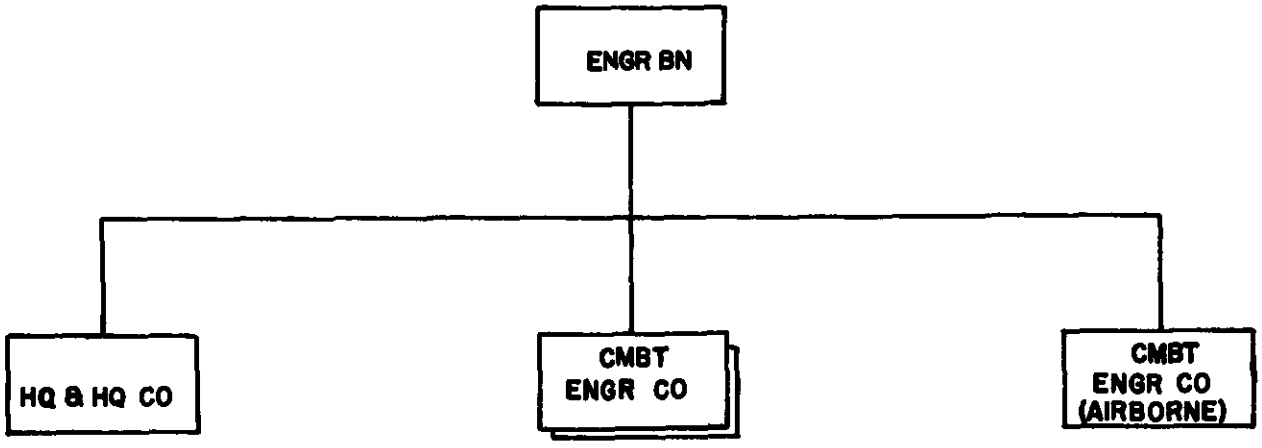



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*Figure B–42. Organizational chart, engineer battalion, airmobile division.*

## Section B. GENERAL

### 1. Mission

To increase the combat effectiveness of the airmobile division by performing general and special engineer tasks, and to undertake and carry out infantry missions when required.

### 2. Assignment

Organic to Airmobile Division, TOE 67.

### 3. Capabilities

*a.* At full strength this unit provides—

(1) Engineer staff planning for the division.

(2) Supervision of organic and attached engineer units.

(3) General engineer support, primarily construction, repair and maintenance of aircraft landing sites for Air Force military medium cargo and all Army aircraft, fords, culverts, and cross gap bridging.

(4) Assistance in the removal and emplacement of obstacles, including mines and boobytraps.

(5) ADM support when required by attachment of TOE 5–570 ADM teams.

(6) Engineer reconnaissance and intelligence service.

(7) Personnel and equipment for purification and dispensing of potable water.

(8) Assistance in the assault of fortified positions and assault demolitions of obstacles.

(9) Technical assistance to other troop units of the division in the construction of obstacles, fortifications, barrier emplacement, camouflage, deception devices, and other engineer matters.

(10) Infantry combat-type missions when required.

(11) A unit for the conduct of airborne engineer and infantry operations, and for parachute landing of assigned personnel and equipment for hasty construction of low criteria air landing facilities for Air Force medium cargo aircraft and all Army aircraft.

*b.* This unit is not adaptable to a reduced strength organization.

*c.* This unit is not adaptable to a type B organization.

*d.* This unit is dependent upon the division administration company for personnel administration.

*e.* Individuals of this organization, except medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Airmobile Division, TOE 67.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

This unit is one hundred percent air transportable in Army and/or U.S. Air Force aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Aggr | breakdown within organic units | |
|---|---|---|---|
| | | 5–215T | 5–216T 5–217T |
| *Weapons* | | | |
| Launcher grenade 40mm | 32 | 5 | 9 |
| Machinegun 7.62mm light flexible | 38 | 2 | 12 |
| *Vehicles* | | | |
| Dolly set lift transp | 3 | 3 | 0 |
| Truck ambulance frontline ¼ T | 1 | 1 | 0 |
| Truck cargo ¾ T | 13 | 13 | 0 |
| Truck cargo 2½ T | 1 | 1 | 0 |
| Truck dump ¾ T 1 cu yd | 42 | 12 | 10 |
| Truck dump 2½ T | 15 | 15 | 0 |
| Truck utility ¼ T | 33 | 21 | 4 |
| Truck wrecker ¾ T | 1 | 1 | 0 |
| Utility vehicle 2 wheel | 4 | 4 | 0 |
| *Engineer Equipment* | | | |
| Compactor vibratory towed helicopter transptbl light weight | 3 | 3 | 0 |
| Crane wheel mtd M60 3 T | 2 | 2 | 0 |
| Cutter grass towed 60 inch cut | 3 | 3 | 0 |
| Detecting set airmobile w/case | 29 | 2 | 9 |
| Detecting set mine trk mtd | 1 | 1 | 0 |
| Detector set mine microwave | 29 | 2 | 9 |
| Distributor water collapsible tank 900 gal | 4 | 4 | 0 |
| Draft equip set bn | 3 | 3 | 0 |
| Drill pneu self-contained | 13 | 4 | 3 |
| Forklift truck helicopter transptbl 3,000 lb | 1 | 1 | 0 |
| Generator set 5 KW | 5 | 5 | 0 |
| Grader/scraper, helicopter transptbl 4½ cu yd | 4 | 4 | 0 |
| Grader sectionalized heavy | 6 | 6 | 0 |
| Hayrake sidecast towed | 3 | 3 | 0 |
| Loader scoop articulated 1¾ cu yd type w/2½ cu yd scoop | 2 | 2 | 0 |
| Roller pneu SP–9–wheel | 2 | 2 | 0 |
| Roller towed sheepsfoot single drum | 3 | 3 | 0 |
| Roller towed sheepsfoot 2 drum | 2 | 2 | 0 |
| Saw chain 18 in | 54 | 0 | 18 |
| Scraper sectionalized 8 cu yd | 4 | 4 | 0 |
| Shop equip contact maint trk mtd | 3 | 3 | 0 |
| Tool outfit pioneer port elect tools | 3 | 3 | 0 |
| Tractor full trckd sectionalized light DBP | 4 | 4 | 0 |
| Tractor full trckd helicopter transptbl | 6 | 6 | 0 |
| Tractor rubber tired w/backhoe and front loader ½ cu yd | 3 | 3 | 0 |
| Tractor wheeled ind sectzd light DBP | 4 | 4 | 0 |
| Trailer basic utility 2½ T | 2 | 2 | 0 |
| Trailer ramp 6 T | 9 | 9 | 0 |
| Transporter engr const equip 12 T | 8 | 8 | 0 |
| Water purification set port 500 gph | 5 | 5 | 0 |
| *Quartermaster Items* | | | |
| Drum fabric collapsible (water) 250 gal | 3 | 3 | 0 |
| Yoke towing for drum collapsible | 6 | 6 | 0 |
| *Signal Items* | | | |
| Camera set still picture KS–4A(2) | 3 | 3 | 0 |
| Radio set AN/PRC–25 | 44 | 5 | 13 |
| Radio set AN/VRC–46 | 13 | 4 | 3 |
| Radio set AN/VRC–47 | 8 | 5 | 1 |
| Radio set AN/VRC–49 | 3 | 3 | 0 |
| Radio teletypewriter set AN/VSC–2 | 2 | 2 | 0 |
| Stationary radio pack consisting of the following major items: | 5 | 2 | 1 |
| 1 ea radio set AN/VRC–46 w/ mount. | | | |
| 1 ea radio set AN/VRC–47 w/ mount. | | | |

| | Aggr breakdown within organic units 5–215T | 5–216T | 5–217T |
|---|---|---|---|
| 1 ea generator set 3 KW DC | | | |
| 1 ea antenna group RC–292 | | | |
| Stationary radio pack consisting of the following major items: | 1 | 1 | 0 |
| 1 ea radio set AN/VRC–47 w/ mount. | | | |
| 1 ea generator set 1.5 KW DC | | | |
| 1 ea antenna group RC–292 | | | |

TOE 5–216T

# HEADQUARTERS AND HEADQUARTERS COMPANY
# ENGINEER BATTALION, AIRMOBILE DIVISION

## Section A. ORGANIZATION

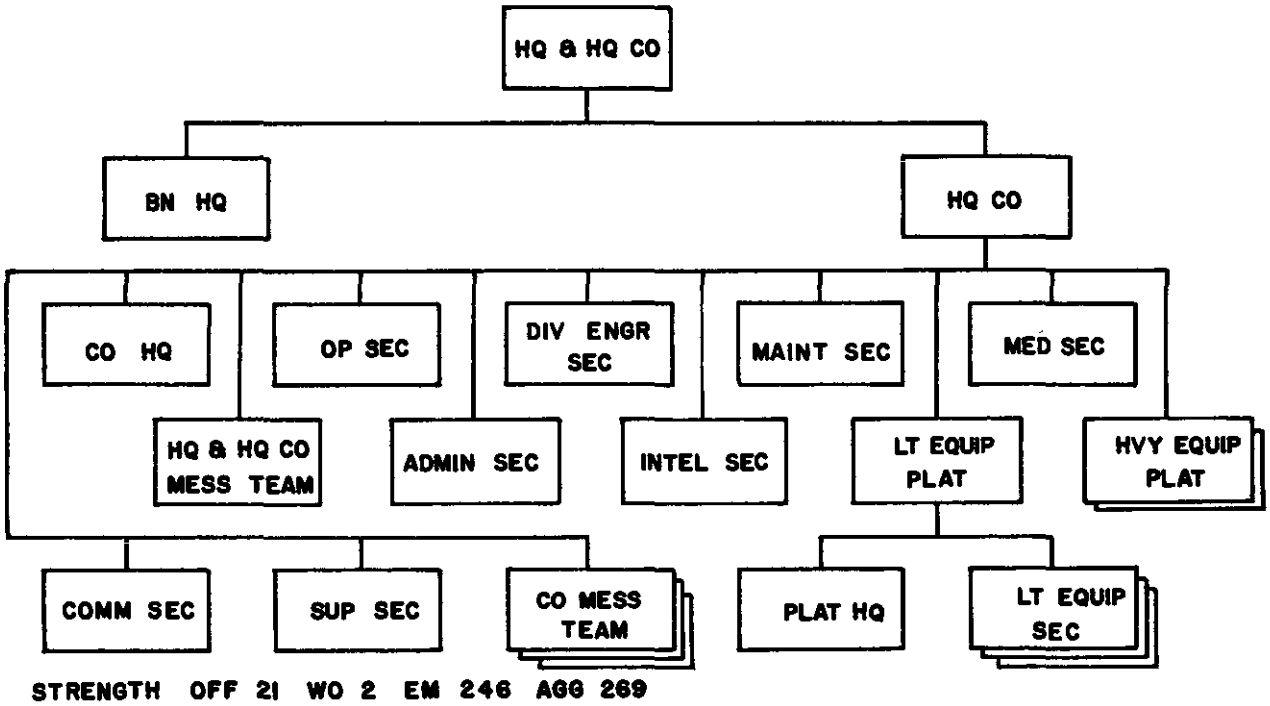


*Figure B–43. Organizational chart, headquarters and headquarters company, engineer battalion, airmobile division.*

## Section B. GENERAL

### 1. Mission

*a.* To provide an engineer special staff section for the division and to provide command and staff for the engineer battalion, airmobile division.

*b.* To provide limited administration; communications, reconnaissance, maintenance support, mess, supply, and unit level medical service for the engineer battalion.

*c.* To undertake and carry out combat missions of a headquarters and headquarters company when required.

### 2. Assignment

Organic to the Engineer Battalion, Airmobile Division, TOE 5–215.

### 3. Capabilities

*a.* At full strength this unit provides—

(1) Staff planning and supervision of engineer operations within the division, including that required for the operations of attached engineer troops.

(2) Engineer reconnaissance and intelli-

gence service and operation of the battalion communications system.

(3) Five water purification and distribution points for the supply of potable water.

(4) Atomic demolition munitions (ADM) support when required, by attachment of TOE 5–570 ADM team.

(5) Unit level medical service to include medical care and evacuation for the battalion, establishing an aid station, and furnishing aid men to battalion units.

(6) Engineer equipment support for the line engineer companies.

*b.* This unit is not adaptable to a reduced strength organization.

*c.* This unit is not adaptable to a type B organization.

*d.* This unit is dependent upon the division administration company for personnel administration.

*e.* Individuals of this organization, except medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Battalion, Airmobile Division, TOE 5–215.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

This unit is one hundred percent air transportable in Army and/or U.S. Air Force aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–215T)

TOE 5–217T

# COMBAT ENGINEER COMPANY, ENGINEER BATTALION, AIRMOBILE DIVISION

# OR

# COMBAT ENGINEER COMPANY (AIRBORNE), ENGINEER BATTALION, AIRMOBILE DIVISION

## Section A. ORGANIZATION

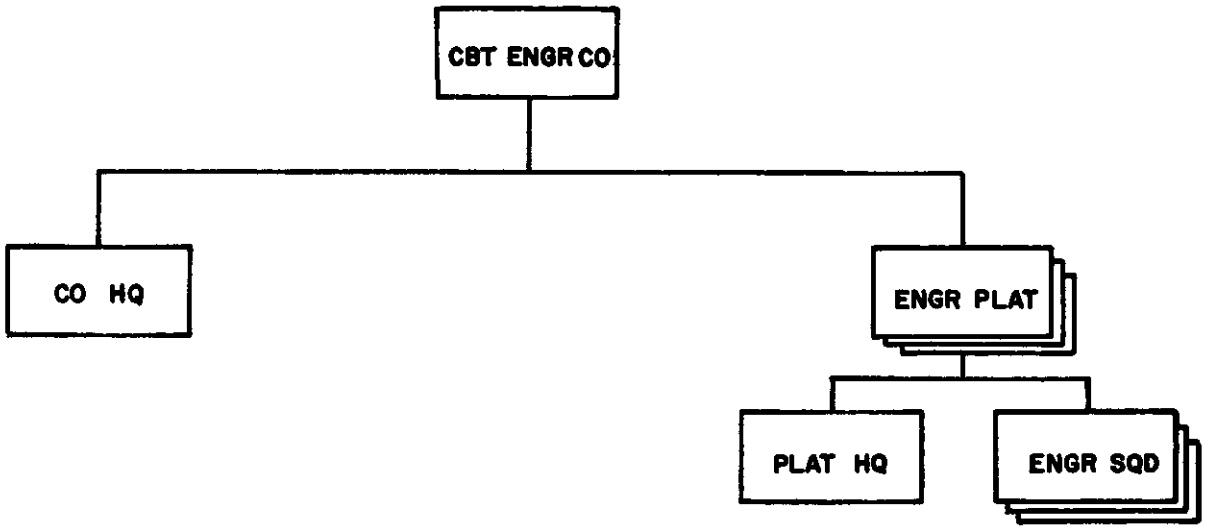


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*Figure B–44. Organizational chart, combat engineer company, engineer battalion, airmobile division; or combat engineer company (airborne) engineer battalion, airmobile division.*

## Section B. GENERAL

### 1. Mission

*a.* To provide combat support for the engineer battalion, airmobile division, by accomplishing general and special engineer tasks.

*b.* To undertake and carry out infantry combat missions when required.

### 2. Assignment

Organic to Engineer Battalion, Airmobile Division, TOE 5–215.

### 3. Capabilities

*a.* When organized as a combat engineer company, engineer battalion, airmobile division, at full strength this unit is capable of—

(1) Accomplishing combat engineer tasks, and limited additional engineer support to the extent possible.

(2) Establishing roadblocks and barriers by emplacement of obstacles, including mines and boobytraps, and demolition of bridges and structures.

(3) Constructing air landing facilities for Air Force medium cargo and all Army aircraft with equipment support from headquarters company.
(4) Making expedient bridge repairs.
(5) Destroying equipment, supplies, structures, and material by burning or demolition.
(6) Conducting airmobile engineer and infantry combat operations.

*b.* When organized as a combat engineer company (airborne), engineer battalion, airmobile division, this unit, at full strength has—

(1) The capabilities listed in *a* above.
(2) The capability of providing an airborne variation to deliver personnel and equipment by parachute in support of division operations.

*c.* This unit is not adaptable to reduced strength organization.

*d.* This unit is not adaptable to a type B organization.

### 4. Basis of Allocation

Three per Engineer Battalion, Airmobile Division, TOE 5–215.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

This unit is one hundred percent air transportable in Army and/or U.S. Air Force aircraft.

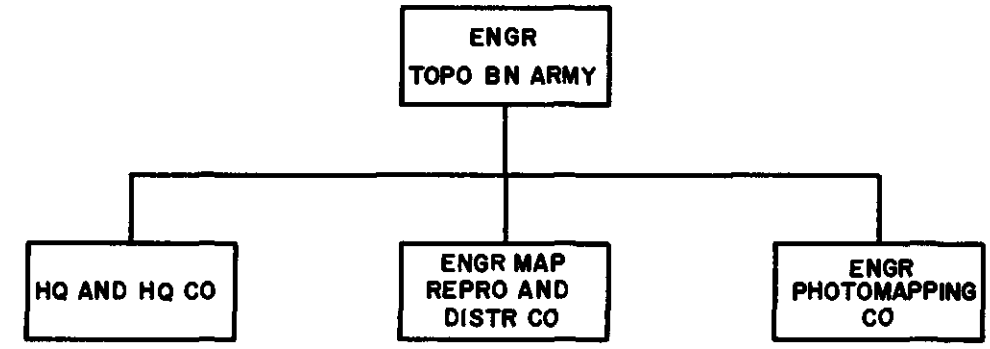
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–215.)

TOE 5-305G

# ENGINEER TOPOGRAPHIC BATTALION, ARMY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 16 | 6 | 346 | 368 |
| | 2 | 16 | 6 | 307 | 329 |
| | 3 | 14 | 6 | 273 | 293 |

*Figure B-45. Organizational chart, engineer topographic battalion, Army.*

## Section B. GENERAL

### 1. Mission

To provide engineer surveys, maps, map substitutes, and related technical information and materials as required for an army in the field.

### 2. Assignment

To a field army.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Surveys and survey information required by an army in the field.

(2) Reproduction of maps, photomaps, overlays, overprints and other intelligence material at the approximate rate of 3,500,000 impressions per month.

(3) Storage and distribution of maps and related materials required by army troops.

(4) Preparation of maps, photomaps, map mosaics, sketches, drawings and related materials for use by an army in the field.

(5) Assistance in preparation of engineer terrain intelligence reports.

(6) Requests for, and evaluation of, aerial photography and operation of a geodetic survey information center.

(7) Organizational maintenance for organic vehicles and direct support maintenance of all organic topographic survey and reproduction equipment.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

One per field army.

## 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

## 6. Mobility

Approximately eighty-five percent mobile in organic transportation. For mobility of the components of this battalion see Section B, General, of each applicable TOE.

## Section C. MAJOR ITEMS OF EQUIPMENT

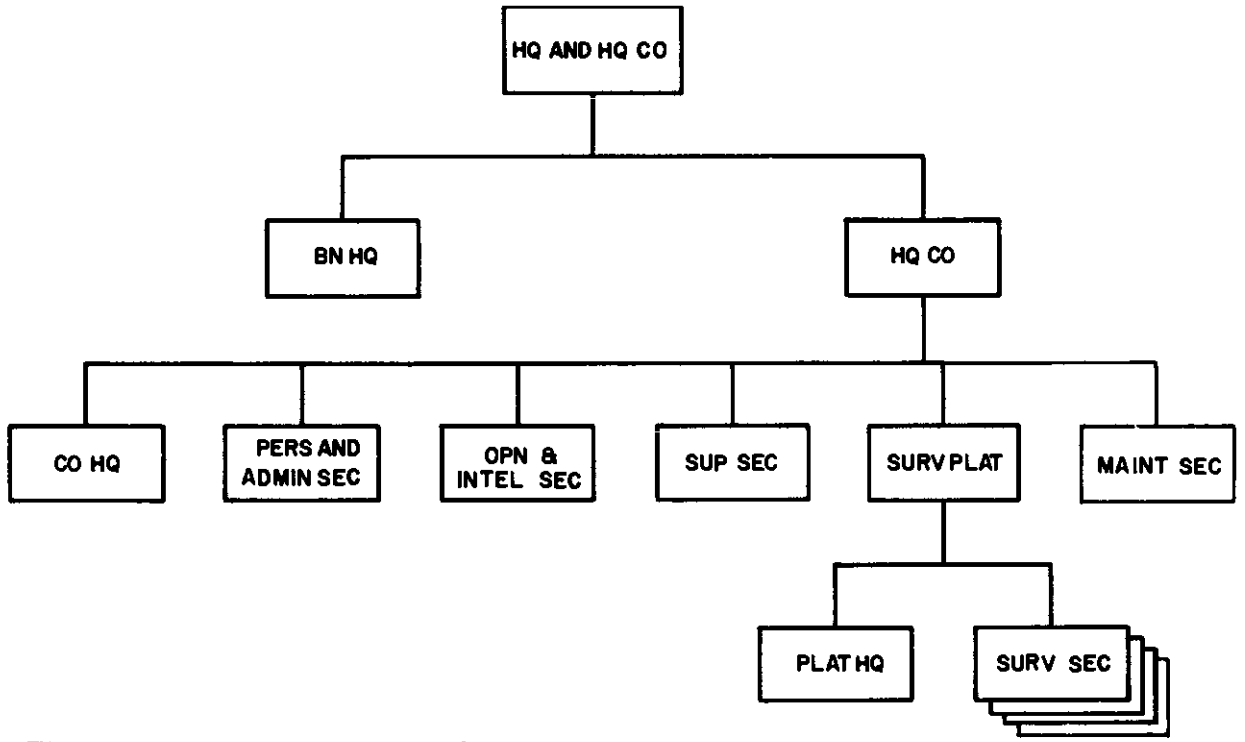
| | *Aggr breakdown within organic units* 5–305G | 5–306G | 5–307G | 5–308G |
|---|---|---|---|---|
| *Vehicles* | | | | |
| Semitrailer van cargo 12 T | 2 | 0 | 2 | 0 |
| Truck cargo ¾ T | 32 | 20 | 7 | 5 |
| Truck cargo 2½ T | 15 | 9 | 4 | 2 |
| Truck cargo 5 T | 2 | 1 | 1 | 0 |
| Truck tank water 2½ T | 2 | 0 | 2 | 0 |
| Truck tractor 5 T | 3 | 1 | 2 | 0 |
| Truck utility ¼ T | 5 | 5 | 0 | 0 |
| Truck van expansible 2½ T | 1 | 0 | 1 | 0 |
| Truck van shop 2½ T | 3 | 2 | 1 | 0 |
| Truck wrecker 5 T | 1 | 1 | 0 | 0 |
| *Engineer Items* | | | | |
| Air conditioner flr mtg 18,000 BTU | 9 | 0 | 9 | 0 |
| Air conditioner flr mtg 24,500 BTU | 1 | 0 | 1 | 0 |
| Air conditioner trlr mtd 36,000 to 60,000 BTU | 1 | 1 | 0 | 0 |
| Altimeter surveying | 12 | 12 | 0 | 0 |
| Camera sect topo repro set trk mtd | 1 | 0 | 1 | 0 |
| Cartographic sect topographic map set trk mtd | 2 | 0 | 0 | 2 |
| Chassis trailer generator 2½ T | 7 | 0 | 4 | 3 |
| Computer gun direction | 1 | 1 | 0 | 0 |
| Copy and sup sect topographic map set trk mtd | 1 | 0 | 0 | 1 |
| Cutter paper guillotine flr mtd elec | 1 | 0 | 1 | 0 |
| Detecting set mine AN/PRS–4 | 3 | 2 | 0 | 1 |
| Detecting set mine ptbl metallic | 3 | 2 | 0 | 1 |
| Drafting equip set bn | 2 | 2 | 0 | 0 |
| Drafting equip set suppl plastic scribing | 12 | 0 | 0 | 12 |
| Fork lift 6,000 lb cap | 1 | 0 | 1 | 0 |
| Gen set 1.5 KW 60 cy 1 ph 120v | 2 | 2 | 0 | 0 |
| Gen set 1.5 KW DC 28V | 2 | 2 | 0 | 0 |
| Gen set 3 KW 400 cy 1–3 ph 120/240V 120/208V | 1 | 1 | 0 | 0 |
| Gen set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 2 | 2 | 0 | 0 |
| Gen set 15 KW 60 cy 3 ph 120/208V 240/416V | 1 | 0 | 1 | 0 |
| Gen set 45 KW 60 cy 3 ph 120/208V 240/416V | 6 | 0 | 3 | 3 |
| Laboratory sec topo repro set trk mtd | 1 | 0 | 1 | 0 |
| Map distribution set depot | 1 | 0 | 1 | 0 |
| Map layout sect topo repro set trk mtd | 1 | 0 | 1 | 0 |
| Map revision sec topo mapping set trk mtd | 2 | 0 | 0 | 2 |
| Multiplex sec topo mapping set trk mtd | 1 | 0 | 0 | 1 |
| Photomapping sec topo mapping set trk mtd | 4 | 0 | 0 | 4 |
| Photomechanical process sect topo repro trk mtd | 1 | 0 | 1 | 0 |
| Plate process sect topo repro set trk mtd | 1 | 0 | 1 | 0 |
| Press sect topo repro set trk mtd | 4 | 0 | 4 | 0 |
| Rectifier sect topo mapping set trk mtd | 1 | 0 | 0 | 1 |
| Reproducer signal data | 1 | 1 | 0 | 0 |
| Shop equip electronic repair semi-trlr mtd | 1 | 1 | 0 | 0 |
| Shop equip woodwork base maint trlr mtd | 1 | 0 | 1 | 0 |
| Supplementary equip set topo photomapping | 1 | 0 | 0 | 1 |
| Survey control set trk mtd | 1 | 1 | 0 | 0 |
| Survey inst dist meas electron microwave | 12 | 12 | 0 | 0 |
| Survey set astronomic position | 1 | 1 | 0 | 0 |
| Survey set precise level | 2 | 2 | 0 | 0 |
| Survey set precise traverse taping and stadia methods | 3 | 3 | 0 | 0 |
| Survey set topo co | 1 | 1 | 0 | 0 |

| | | Aggr breakdown within organic units | | |
|---|---|---|---|---|
| | | 5–305G–5306G | 5–307G | 5–308G |
| Survey set triangulation principal obs and sig tender | 1 | 1 | 0 | 0 |
| Survey set triangulation reconnaissance spcl | 2 | 2 | 0 | 0 |
| Test set computer logic unit | 1 | 1 | 0 | 0 |
| Theodolite survey direct 0.2 sec | 4 | 4 | 0 | 0 |
| *Signal Items* | | | | |
| Radio set AN/GRR–5 | 1 | 1 | 0 | 0 |
| Radio set AN/PRC–25 | 16 | 16 | 0 | 0 |
| Radio set AN/VRC–46 | 5 | 5 | 0 | 0 |
| Radio set AN/VRC–47 | 3 | 3 | 0 | 0 |
| Teletypewriter set AN/TGC–14 | 1 | 1 | 0 | 0 |

TOE 5–306G

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER TOPOGRAPHIC BATTALION, ARMY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 10 | 3 | 143 | 156 |
| | 2 | 10 | 3 | 127 | 140 |
| | 3 | 10 | 3 | 111 | 124 |

*Figure B–46. Organizational chart, headquarters and headquarters company, engineer topographic battalion, Army.*

## Section B. GENERAL

### 1. Mission

To provide command and staff administration, and supply and maintenance support for an engineer topographic battalion, Army, and to furnish engineer surveys, maps and map substitutes, and related technical information and materials required by an army in the field.

### 2. Assignment

Organic to Engineer Topographic Battalion, Army, TOE 5–305.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command for supervising adminis-

tration, training and operations of the battalion.

(2) Surveys required for topographic mapping, carrying forward class I, 2d order, ground control and azimuth data in support of corps survey elements and providing survey support as required for missiles, surveillance devices, and conventional artillery.

(3) Planning and supervision of topographic and photomap compilation and reproduction, and map distribution.

(4) Trigonometric lists, map reproducibles, and other basic materials to the field army and to corps topographic units.

(5) Assistance to Army G2 and Engineer in the production of terrain and other Engineer intelligence reports.

(6) Staff assistance to the battalion in preparation of requests for aerial photography. Photography received is evaluated to determine suitability for mapping purposes.

(7) A geodetic survey information center to collect, correlate, and disseminate survey information as required.

(8) Supply and organizational maintenance service for the battalion.

(9) Direct support maintenance for reproduction, electronic, and optical survey equipment.

(10) Limited survey tower support for the survey platoon.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Helicopters in support of the survey platoons are provided by Team ED, TOE 29–500, as authorized by appropriate major commanders, under the provisions of AR 310–31.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Topographic Battalion, Army, TOE 5–305.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

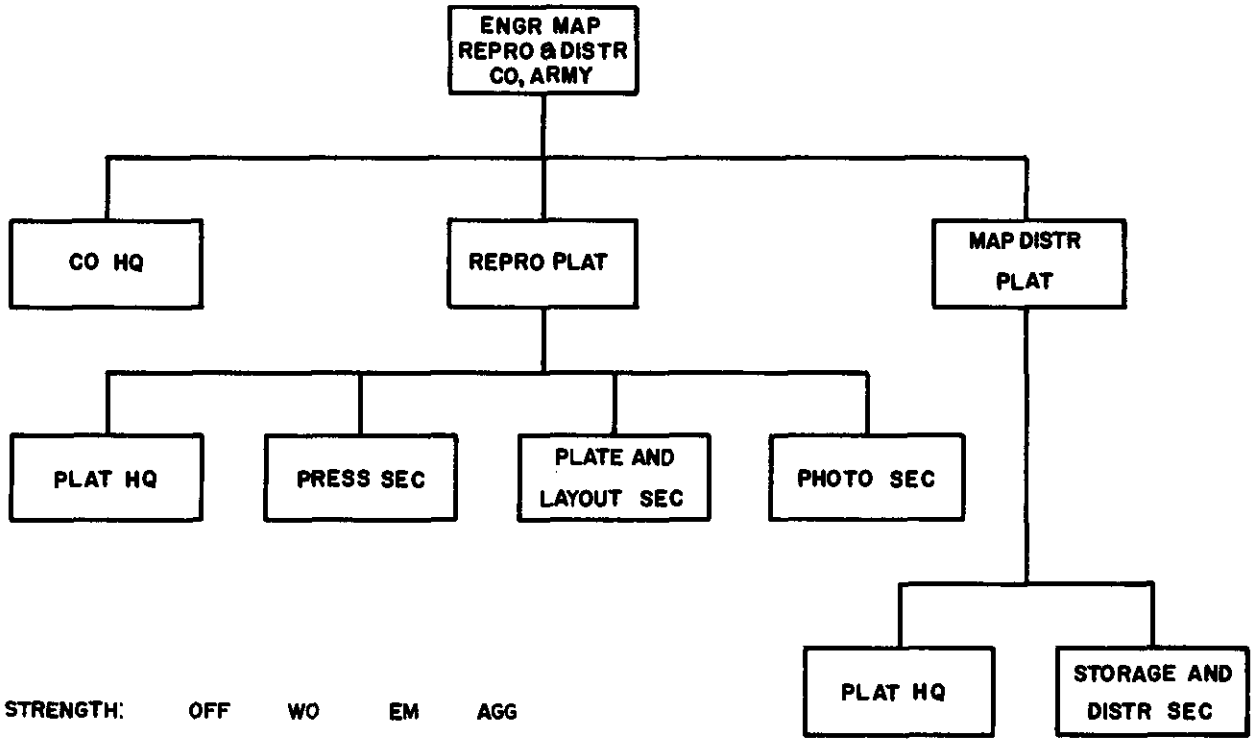
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–305G)

TOE 5-307G

# ENGINEER MAP REPRODUCTION AND DISTRIBUTION COMPANY, ENGINEER TOPOGRAPHIC BATTALION, ARMY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 3 | 1 | 106 | 110 |
| | 2 | 3 | 1 | 94 | 98 |
| | 3 | 2 | 1 | 85 | 88 |

*Figure B-47. Organizational chart, engineer map reproduction and distribution company, engineer topographic battalion, Army.*

## Section B. GENERAL

### 1. Mission

To reproduce, store, and distribute new and existing maps, map substitutes, photomaps, overlays and other engineer intelligence and terrain intelligence material.

### 2. Assignment

Organic to Engineer Topographic Battalion, Army, TOE 5-305.

### 3. Capabilities

*a.* At level 1 this unit is capable of—

(1) Reproducing in quantities, by offset lithography, monochrome and multicolor maps, map substitutes, photomaps, overlays, overprints and other engineer intelligence and terrain intelligence materials at the approxi-

mate rate of 3,500,000 impressions per month, working two shifts per day.

(2) Storing and distributing stocks of maps and material described above as required by Army and corps units, including requirements of other services (e.g., USAF) which may be operating in the corps and Army areas.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

*e.* Depot stockage of up to 600 tons of maps will require additional vehicles when this unit displaces.

### 4. Basis of Allocation

One per Engineer Topographic Battalion, Army, TOE 5–305.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Eighty percent mobile in organic transportation and 100 percent air transportable in medium transport aircraft.

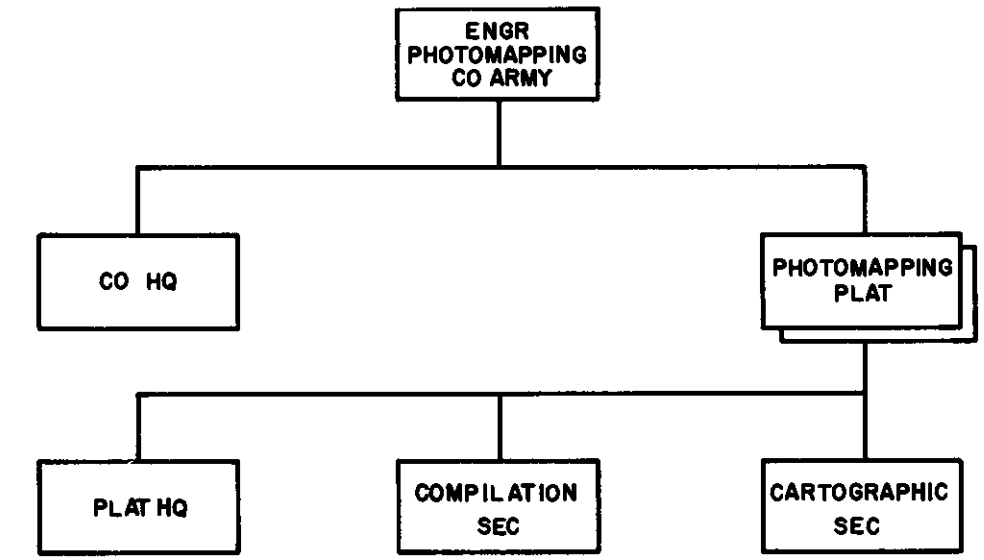
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–305G)

TOE 5–308G

# ENGINEER PHOTOMAPPING COMPANY, ENGINEER TOPOGRAPHIC BATTALION, ARMY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 3 | 2 | 97 | 102 |
| | 2 | 3 | 2 | 86 | 91 |
| | 3 | 2 | 2 | 77 | 81 |

*Figure B–48. Organizational chart, engineer photomapping company, engineer topographic battalion, Army.*

## Section B. GENERAL

### 1. Mission

To compile and revise planimetric, topographic, and special maps and map substitutes and terrain and engineer intelligence material; to perform final evaluation of aerial photography to determine its suitability for mapping purposes; and to extend ground control by photogrammetry for artillery and missile fire control and for surveillance and other purposes in order to increase the combat effectiveness of the field army.

### 2. Assignment

Organic to the Engineer Topographic Battalion, Army TOE 5–305.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Compilation of controlled, semi-controlled, and uncontrolled photomaps and mosaics.

(2) Compilation of a limited number of

new maps from aerial photography, existing maps, charts, and other sources, and a limited revision of existing maps.

(3) Drafting of special maps, overprints, and overlays for Army operations, and terrain and engineer intelligence studies.

(4) Final evaluation of aerial photography for mapping purposes.

(5) A sufficient number of point locations for mapping and fire control, through limited extensions of ground control by photogrammetric means from a strip or strips of aerial photography, to a distance of about 80 kilometers beyond existing ground control, within a period of approximately 36 hours after receipt of photography, to include preparation and printing of a gridded area graphic.

(6) Organizational maintenance on photomapping and air-conditioning equipment and wheeled vehicles.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Topographic Battalion, Army, TOE 5–305.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

This unit is 85 percent mobile in organic transportation. Additional transportation will be required to move 43 men and the 5 tons of photomap paper required to support operations for approximately one month. Organic transportation can move all personnel, equipment, and paper stocks by making four additional trips with the cargo vehicles. This unit is one hundred percent air-transportable in medium transport aircraft.

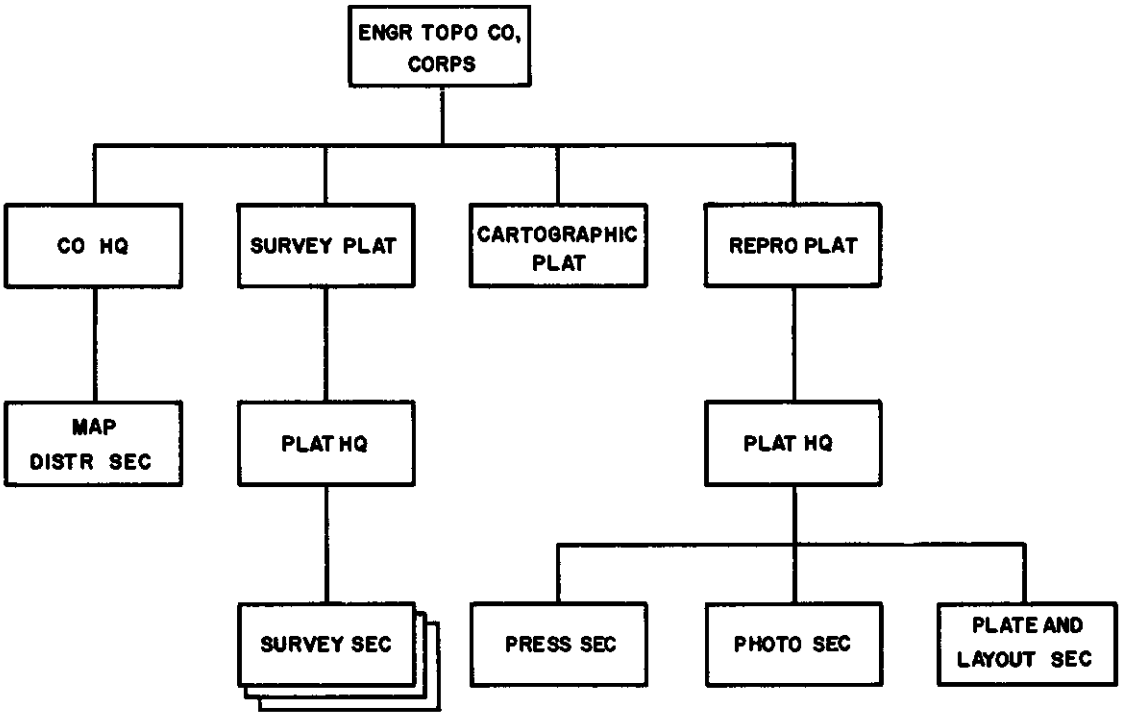
## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–305G)

TOE 5–327G

# ENGINEER TOPOGRAPHIC COMPANY, CORPS

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 3 | 3 | 137 | 143 |
| | 2 | 3 | 3 | 122 | 128 |
| | 3 | 2 | 3 | 109 | 114 |

*Figure B–49. Organizational chart, engineer topographic company, corps.*

## Section B. GENERAL

### 1. Mission

To provide topographic maps, overprinted maps, topographic intelligence, and artillery and topographic survey data in support of corps or independent task force type operations.

### 2. Assignment

Normally assigned to a corps or a corps-size independent task force.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Performs topographic surveys of 2d or 3d order for mapping and other functions. Surveys to extend position azimuth and elevation control forward from corps rear area into division rear area for all users of this control within the corps area.

(2) Furnishes ground control within unit

capabilities to corps artillery missile units and other artillery organizations on a first priority basis.

(3) Drafts special maps, overprints, and overlays for corps operations; lays controlled on uncontrolled mosaics from aerial photographs and makes limited revision of existing maps at the rate of 20 to 30 map sheets per month; compiles and revises military topographic and planimetric maps.

(4) Reproduces in quantities, by offset lithography, monochrome and multicolor maps, photomaps, overlays, overprints, and/or other topographic and engineer intelligence material at the approximate rate of 600,000 impressions per month. Collates and distributes engineer intelligence material as required.

(5) Receives, stores, and makes bulk distribution of maps, trig lists, and engineer survey control point information to corps units.

(6) Provides a sufficient number of point locations, through limited extensions of ground control by photogrammetric means from a strip or strips of aerial photography, to a distance of about 80 kilometers beyond existing ground control, within a period of approximately 36 hours, to include preparation and printing of a gridded area graphic.

(7) Provides direct support maintenance of topographic, special electronic, and reproduction equipment.

*b.* At levels 2 and 3 operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* When aircraft support is required to accomplish the topographic survey mission it is provided by Team ED, TOE 29–500.

*e.* Survey capability may be increased when required, by attachment of Team(s) IA, TOE 5–540.

*f.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

*a.* One per corps.

*b.* One per typical corps-size task force.

### 5. Category

This unit is designated a category II unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Ninety-five percent mobile in organic transportation. Additional transportation is normally required to move basic load maps and related classified and unclassified material. One hundred percent air transportable in medium aircraft.

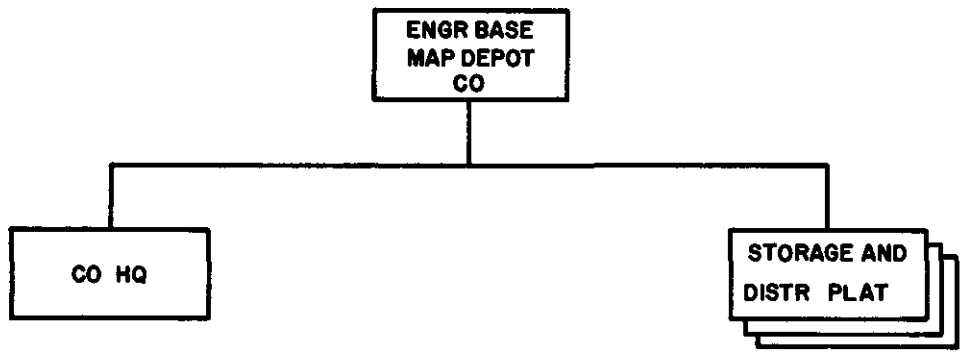
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Truck cargo ¾ T | 14 |
| Truck cargo 2½ T | 10 |
| Truck tractor 5 T | 1 |
| Truck utility ¼ T | 1 |
| Truck van expansible 2½ T | 1 |
| Truck van shop 2½ T | 3 |
| Truck wrecker 5 T | 1 |
| *Engineer Items* | |
| Altimeter surveying | 9 |
| Camera sect topo repro set trk mtd | 1 |
| Cartographic sect topo map set trk mtd | 1 |
| Computer gun direction | 1 |
| Copy and supply sect topo map set trk mtd | 1 |
| Cutter paper flr mtd elec | 1 |
| Detecting set mine AN/PRS–4 | 1 |
| Detecting set mine ptbl metallic | 2 |
| Drafting equip set supplement plastic scribing | 10 |
| Gen set 1.5 KW DC 28V | 1 |
| Gen set 3 KW 400 cy 1–3 ph 120/240V 120/208V | 1 |
| Gen set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 1 |
| Gen set 15 KW 60 cy 3 ph 120/208V 240/416V | 1 |
| Gen set 60 KW 60 cy 3 ph 120/208V 240/416V | 3 |
| Laboratory sect topo repro set trk mtd | 1 |

| | Qty |
|---|---|
| Map distribution set ptbl | 1 |
| Map revision sect topo map set trk mtd | 1 |
| Multiplex sect topo map set trk mtd | 1 |
| Photomapping sect topo map set trk mtd | 1 |
| Photomechanical process sect topo repro set trk mtd | 1 |
| Press sect topo repro set trk mtd | 4 |
| Rectifier sect topo map set trk mtd | 1 |
| Reproducer signal data | 1 |
| Shop equip electronic repair semitrlr mtd | 1 |
| Supplementary equip set topo photomap | 1 |
| Survey control sect trk mtd | 1 |
| Survey inst azimuth | 1 |
| Survey inst distance meas electron microwave | 9 |
| Survey set precise level | 2 |
| Survey set topo co | 1 |
| Survey set triangulation principal obs and signal tender | 3 |
| Test set computer logic unit | 1 |
| Theodolite survey direct 0.2 sec | 2 |
| Theodolite survey direct 1 sec | 4 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/GRC–125 | 3 |
| Radio set AN/PRC–25 | 10 |
| Radio set AN/VRC–47 | 3 |
| Radio set AN/VRC–46 | 4 |
| Teletypewriter set AN/TGC–14 | 1 |

# ENGINEER BASE MAP DEPOT COMPANY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 4 | 0 | 117 | 121 |
| | 2 | 4 | 0 | 108 | 112 |
| | 3 | 4 | 0 | 96 | 100 |

*Figure B–50. Organizational chart, engineer base map depot company.*

## Section B. GENERAL

### 1. Mission

To provide for receipt, storage, and distribution of maps, geodetic control data, gazetteers, aerial photographs, trig lists, intelligence documents, and related topographic material.

### 2. Assignment

Assigned or attached to an engineer base topographic battalion.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Provides map stockage for one Army group.

(2) Stocks an average of 5 million maps and handles 450,000 maps per day.

(3) Receives, classifies, and stores maps, related materiel, and intelligence material.

(4) Packages and prepares maps, related materiel, and intelligence material for shipment to forward depots, and for limited retail issue.

(5) Each map storage and distribution platoon can operate a submap depot with a 150,000 map per day capability.

*b.* At levels 2 and 3, operational capabilities

are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit depends on Headquarters and Headquarters Detachment, Engineer Base Topographic Battalion, TOE 5–346, for messing and for organizational maintenance of organic vehicles. If required, mess teams and maintenance teams are provided from appropriate TOE 500-series.

*d.* The capabilities of a type B organization are the same as those of a level 1 organization.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Army group or independent field army.

### 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

### 6. Mobility

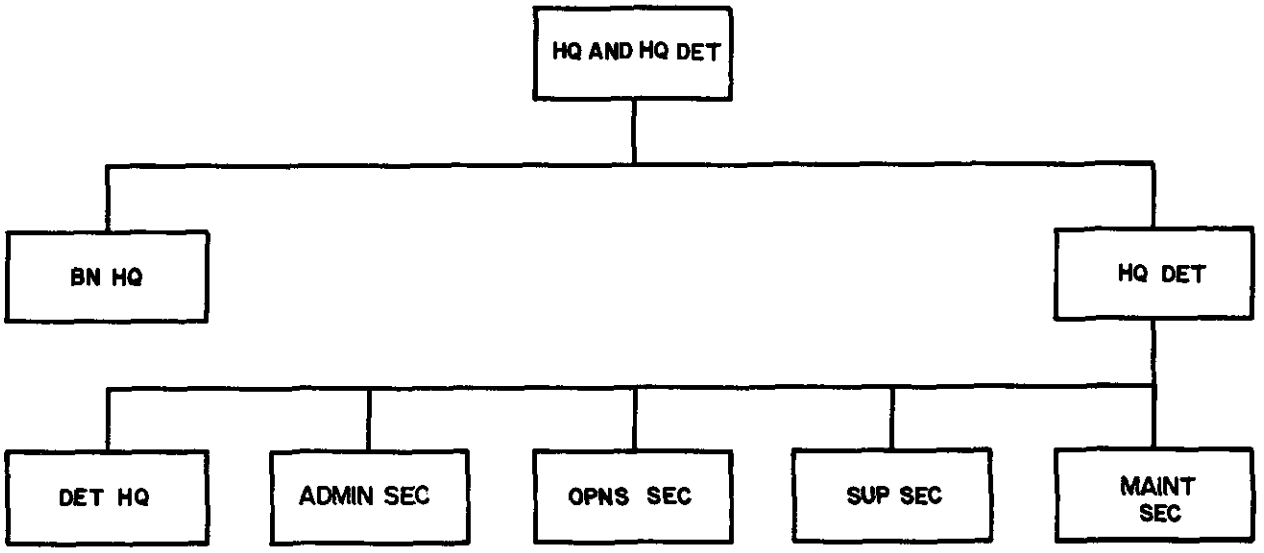
Approximately twenty-two percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Truck cargo ¾ T | 4 |
| Truck cargo 2½ T | 4 |
| Truck utility | 1 |
| *Engineer Items* | |
| Forklift 6,000 lb cap | 3 |
| Gen set 1 KW 6 cy 1–3 ph 12/240V 120/208V | 3 |
| Map distribution set depot | 1 |
| Map distribution set ptbl | 3 |
| Shop equip woodwork base maint trlr mtd | 3 |

# HEADQUARTERS AND HEADQUARTERS DETACHMENT ENGINEER BASE TOPOGRAPHIC BATTALION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 7 | 2 | 60 | 69 |
| | 2 | 7 | 2 | 53 | 62 |
| | 3 | 7 | 2 | 46 | 55 |

*Figure B–51. Organizational chart, headquarters and headquarters detachment, engineer base topographic battalion.*

## Section B. GENERAL

### 1. Mission

*a.* To provide combat support to a theater army group by operational planning and technical control of a battalion engaged in topographic, artillery and missile fire control survey, and topographic map compilation and reproduction.

*b.* To provide geodetic survey control data, trigonometric lists, map reproducibles and other basic engineer intelligence materials to the field army and corps topographic units.

### 2. Assignment

Normally assigned to an engineer command or to theater army support command (TASCOM).

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Administration, planning, supervision, and operational control of an engineer base map depot company; an engineer base reproduction com-

pany; an engineer base photomapping company; an engineer base survey company; and/or engineer topographic or intelligence teams.

(2) Organizational maintenance for its own vehicles and those of the map depot, reproduction, and photomapping companies.

(3) Procurement, compilation, reproduction, and distribution of military maps which, when combined with the efforts of all other topographic units, meet the requirements of a theater of operations.

(4) Military surveys of class II, first order accuracy to produce a basic net with an accuracy of 1/50,000, suitable for topographic and fire control.

(5) Assistance to the theater army G2 and the theater army engineer in the preparation of terrain intelligence reports.

(6) Messing facilities for itself, the map depot, the reproduction, and the photomapping companies as well as any attached cellular teams or units.

*b.* This organization operates one or more messes to support subordinate units other than the engineer base survey company.

*c.* At levels 2 and 3, operational capabilities are 90 percent and 80 percent, respectively, of those provided at level 1.

*d.* The capabilities of a type B organization are the same as those of a level 1 organization.

*e.* Aircraft support, when required to accomplish the topographic mission, is provided by Team ED, or other appropriate teams, of TOE 29–500.

*f.* Appropriate teams from TOE 29–500 provide additional mess personnel or automotive maintenance personnel when requirements exceed the capability of assigned personnel to accomplish these functions.

*g.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

One per TASCOM.

## 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

## 6. Mobility

This unit is one hundred percent mobile in organic transportation and one hundred percent mobile in medium transport aircraft.

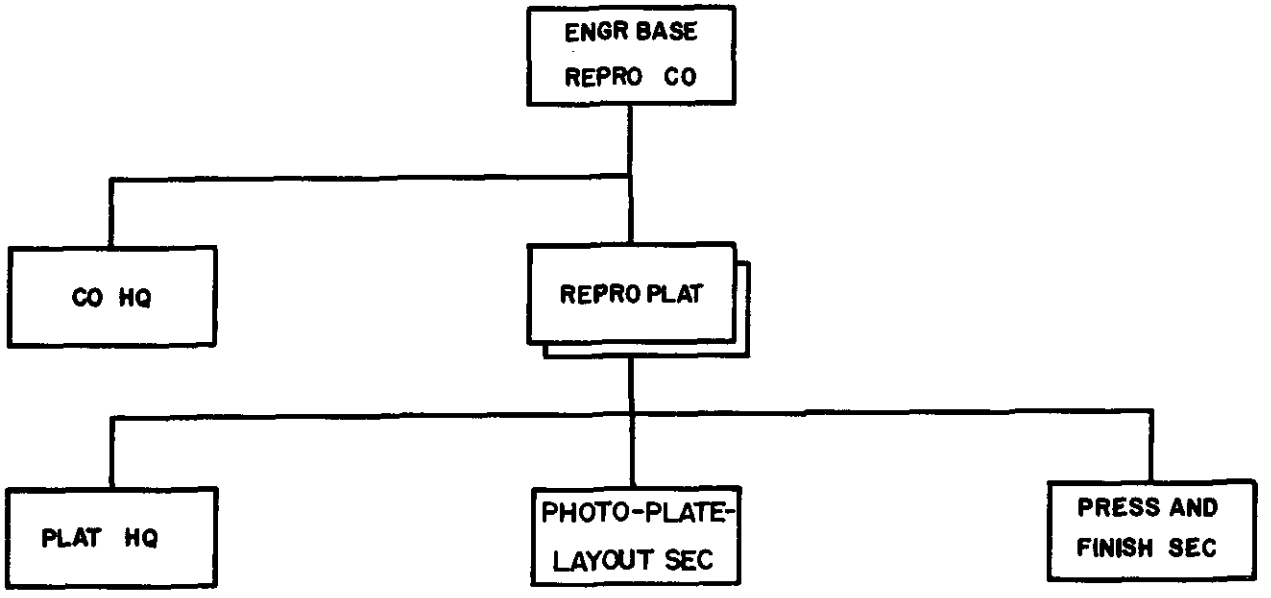
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Semitrailer van cargo 6 T | 1 |
| Truck cargo ¾ T | 5 |
| Truck cargo 2½ T | 4 |
| Truck tractor 2½ T | 1 |
| Truck utility ¼ T | 1 |
| *Engineer Items* | |
| Drafting equip set topo bn or co | 1 |
| Gen set 1.5 KW 6 cy 1 ph 120V | 1 |
| Gen set 1.5 KW DC 28V | 1 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 1 |
| Gen set 3 KW DC 28V | 2 |
| *Signal Items* | |
| Radio set AN/VRC–47 | 1 |

TOE 5–347G

# ENGINEER BASE REPRODUCTION COMPANY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 2 | 2 | 97 | 101 |
| | 2 | 2 | 2 | 87 | 91 |
| | 3 | 2 | 2 | 77 | 81 |

*Figure B–52. Organizational chart, engineer base reproduction company.*

## Section B. GENERAL

### 1. Mission

To reproduce maps, map substitutes, charts, and allied mapping materials such as map indexes, trig lists and gazetteers, and engineer terrain and other engineer intelligence material, as required in support of one or more field armies, TASCOM, or the zone of interior.

### 2. Assignment

Assigned or attached to an Engineer Base Topographic Battalion, TOE 5–346.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Provides reproduction support to one or more field armies in a theater of operations, to a communications zone, or to the zone of the interior.

(2) Reproduces in quantities, by offset lithography, monochrome and multicolor maps, photomaps, overlays, overprints, and/or other topographic and engineer intelligence material at

the approximate rate of five million impressions per month.

(3) Performs organizational and direct support maintenance on engineer photographic and reproduction equipment.

*b.* This unit is dependent on headquarters and headquarters detachment, engineer base topographic battalion, for messing and for motor vehicle maintenance. TOE 29–500 teams provide this service when the company operates independently.

*c.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*d.* The capabilities of a type B organization are the same as those of a level 1 organization.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Normally one per engineer base topographic battalion.

### 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

### 6. Mobility

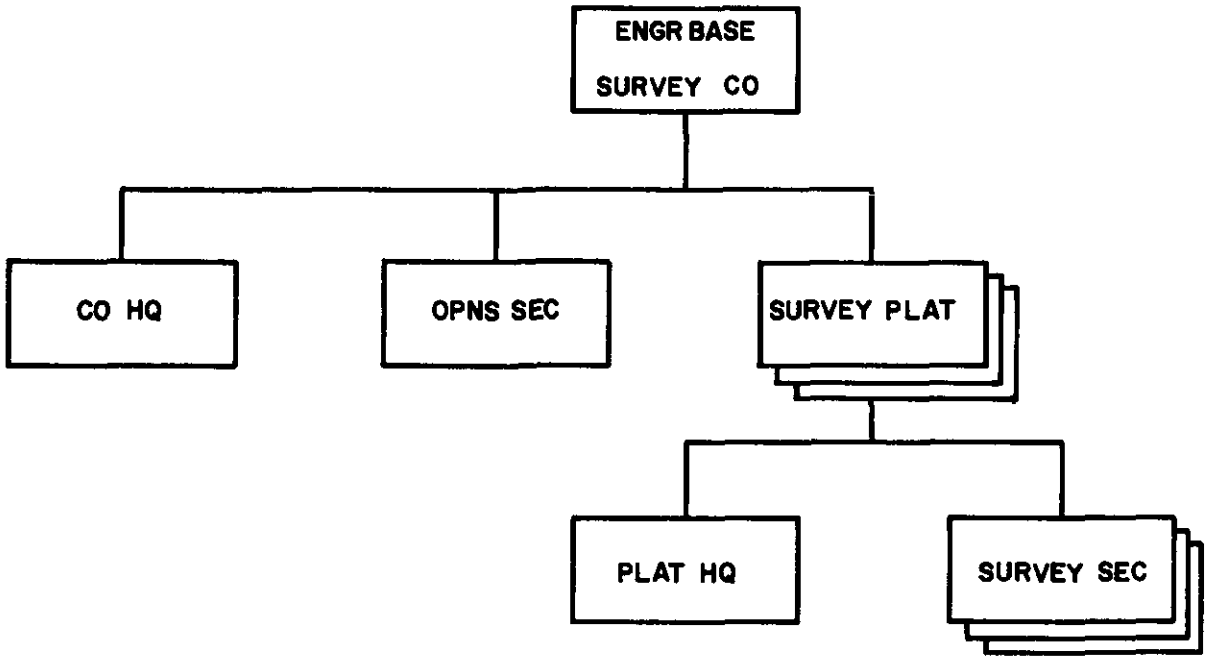
Thirty percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Truck cargo ¾ T | 3 |
| Truck cargo 2½ T | 1 |
| *Engineer Items* | |
| Drilling machine paper | 1 |
| Forklift 4,000 lb cap | 1 |
| Machine stitcher wire | 1 |
| Reproduction set topo photolith reprod | 1 |
| Stitcher book and pamphlet | 1 |

# ENGINEER BASE SURVEY COMPANY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 2 | 4 | 175 | 181 |
| | 2 | 2 | 4 | 161 | 167 |
| | 3 | 1 | 4 | 142 | 147 |

*Figure B–53. Organizational chart, engineer base survey company.*

## Section B. GENERAL

### 1. Mission

*a.* To accomplish plane or geodetic surveys to provide class II, 1st order, topographic data, artillery and missile fire control, and to make necessary computations to establish, recover, or adjust existing geodetic control to a given control system for use in new or revised mapping projects and artillery and missile fire control nets.

*b.* To provide geodetic survey control and other basic data to the field army and corps topographic units.

## 2. Assignment

Assigned or attached to an engineer base topographic battalion, TOE 5–346.

## 3. Capabilities

*a.* At level 1 this unit—

(1) Provides organic topographic and artillery and missile fire control surveying support to one or more field armies in a theater of operations, to a communications zone, or to the zone of interior.

(2) Performs geodetic survey of first, second, and third order accuracy, including first order astronomic position determinations, second and third order leveling, and the establishment of base lines.

(3) Performs topographic and artillery fire control surveys using conventional field methods.

(4) Provides geodetic control data to elements of the battalion and to army and corps for compilation of new maps or revision to existing topographic maps and for artillery and missile fire control survey by stereophotogrammetric methods.

(5) Accomplishes any one of the following, per month, by each of the survey squads, under ideal conditions.

(*a*) Third order survey—

*1.* Triangulation—using "Quads" as the basic figure—750 kilometers of progress.

*2.* Traverse—utilizing electronic survey instruments—600 kilometers of progress.

*3.* Leveling—160 kilometers of progress.

(*b*) Second order survey—

*1.* Triangulation—using the "Quad" as the basic figure—340 kilometers of progress.

*2.* Traverse—rate of progress based on several variables; e.g., transportation provided to move the equipment, terrain, and weather.

*3.* Leveling—160 kilometers of progress.

(6) Completes final computations on all survey data assembled.

(7) Operates as a separate company.

(8) Performs organizational maintenance on all organic vehicles and direct support maintenance on all organic surveying equipment.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The capabilities of a type B organization are the same as those of a level 1 organization.

*d.* Aircraft support required to accomplish topographic missions is provided by team ED, TOE 29–500, or other appropriate team.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

Normally one per TASCOM.

## 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

## 6. Mobility

Approxmiately 22 percent mobile in organic transportation and 100 percent air transportable in medium transport aircraft.

## Section C. MAJOR ITEMS OF EQUIPMENT

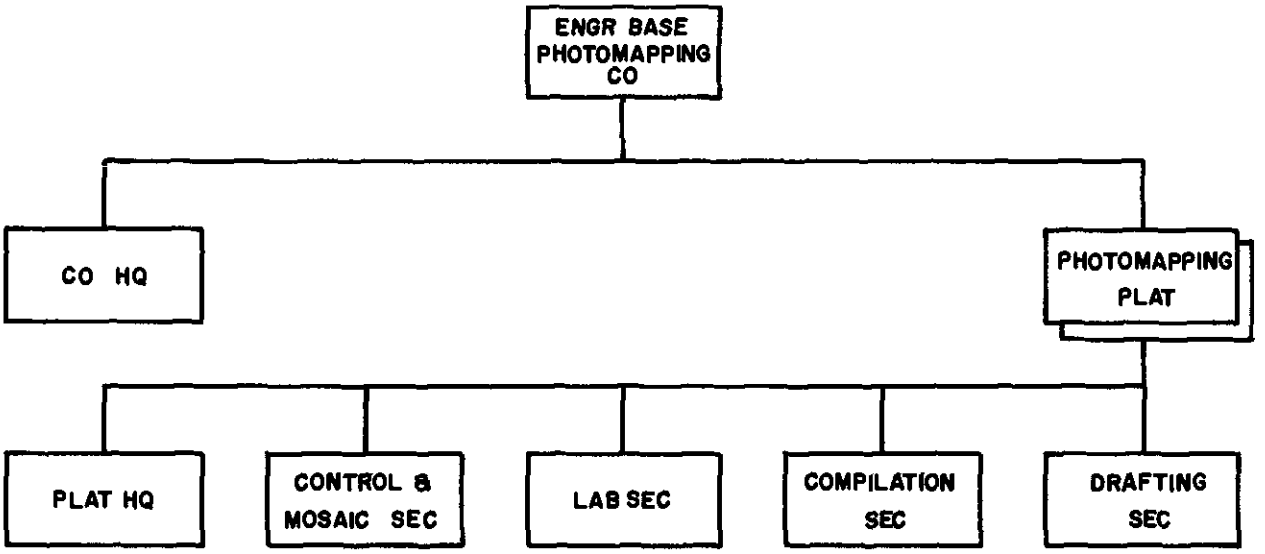
| *Vehicles* | Qty |
|---|---|
| Truck cargo ¾ T | 25 |
| Truck cargo 2½ T | 7 |
| Truck cargo 5 T | 3 |
| Truck tractor 5 T | 1 |
| Truck utility ¼ T | 1 |

| | Qty |
|---|---|
| Truck van shop 2½ T | 3 |
| *Engineer Items* | |
| Air conditioner flr mtg 18,000 BTU | 3 |
| Altimeter survey 4,500 meters | 27 |
| Book set topo gen purp | 1 |
| Computer gun direction | 1 |
| Computing and drafting equip set field survey data | 1 |
| Detecting set mine AN/PRS–4 | 4 |
| Detecting set mine ptbl metallic | 4 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 2 |
| Gen set 1.5 KW DC 28V | 4 |
| Gen set 3 KW DC 28V | 1 |
| Gen set 3 KW 400 cy 1–3 ph 120/240V 120/208V | 2 |
| Gen set 5 KW 60 cy 1–3 ph 120/240V 120/208V | 3 |
| Gen set 10 KW 60 cy 1–3 ph 120/240V 120/208V | 1 |
| Repair kit survey inst | 1 |
| Reproducer signal data | 1 |
| Shop equip electronic rep trlr mtd | 1 |
| Survey control sect trk mtd | 3 |
| Survey inst dist measur electron microwave | 27 |
| Survey set astronomic position | 1 |
| Survey set plane table | 3 |
| Survey set precise baseline 1st order accuracy | 1 |
| Survey set precise level 2d order accuracy | 9 |
| Survey set precise traverse taping and stadia methods | 6 |
| Survey set supplement equip topo bn | 3 |
| Survey set triangulation principal obs and sig tender | 9 |
| Survey set triangulation recon spcl | 3 |
| Target set survey | 27 |
| Target survey beacon | 27 |
| Test set computer logic unit | 1 |
| Theodolite survey direct 0.2 sec | 27 |
| Tower erection set topo | 6 |
| *Signal Items* | |
| Radio set AN/GRR–5 | 1 |
| Radio set AN/VRC–46 | 11 |
| Radio set AN/VRC–47 | 4 |
| Radio set AN/PRC–25 | 36 |

TOE 5–349G

# ENGINEER BASE PHOTOMAPPING COMPANY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 2 | 2 | 169 | 173 |
| | 2 | 2 | 2 | 152 | 156 |
| | 3 | 2 | 2 | 133 | 137 |

*Figure B–54. Organizational chart, engineer base photomapping company.*

## Section B. GENERAL

### 1. Mission

To provide combat support for a theater army by compiling and revising new and existing multicolor maps and map substitues, and by extending ground control for artillery and missile fire using photogrammetric means to produce a gridded graphic. To compile and produce reproducible material for engineer intelligence and terrain studies and to evaluate aerial photography to determine its suitability for mapping purposes.

### 2. Assignment

Assigned or attached to an engineer base topographic battalion.

### 3. Capabilities

*a.* At level 1 this unit—

(1) Evaluates aerial photography to determine its suitability for mapping purposes.

(2) Compiles new maps from aerial photography using photogrammetric methods.

(3) Prepares controlled mosaics of aerial photographs.

(4) Revises topographic, planimetric, and special maps.

(5) Accomplishes color separation engraving or drafting of all map compilation.

(6) Extends ground control for artillery and missile fire by photogrammetric means, to produce a gridded graphic.

(7) Compiles and produces base material for engineer intelligence and terrain studies.

(8) Performs organizational and direct support maintenance on photomapping equipment.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is dependent on headquarters and headquarters detachment, engineer base topographic battalion, for messing and motor vehicle maintenance.

*d.* The capabilities of a type B organization are the same as those of a level 1 organization.

*e.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

Normally one per base topographic battalion.

### 5. Category

This unit is designated a category III unit (reference Unit Categories, AR 320–5).

### 6. Mobility

Nine percent mobile in organic transportation and one hundred percent air transportable in medium transport aircraft.

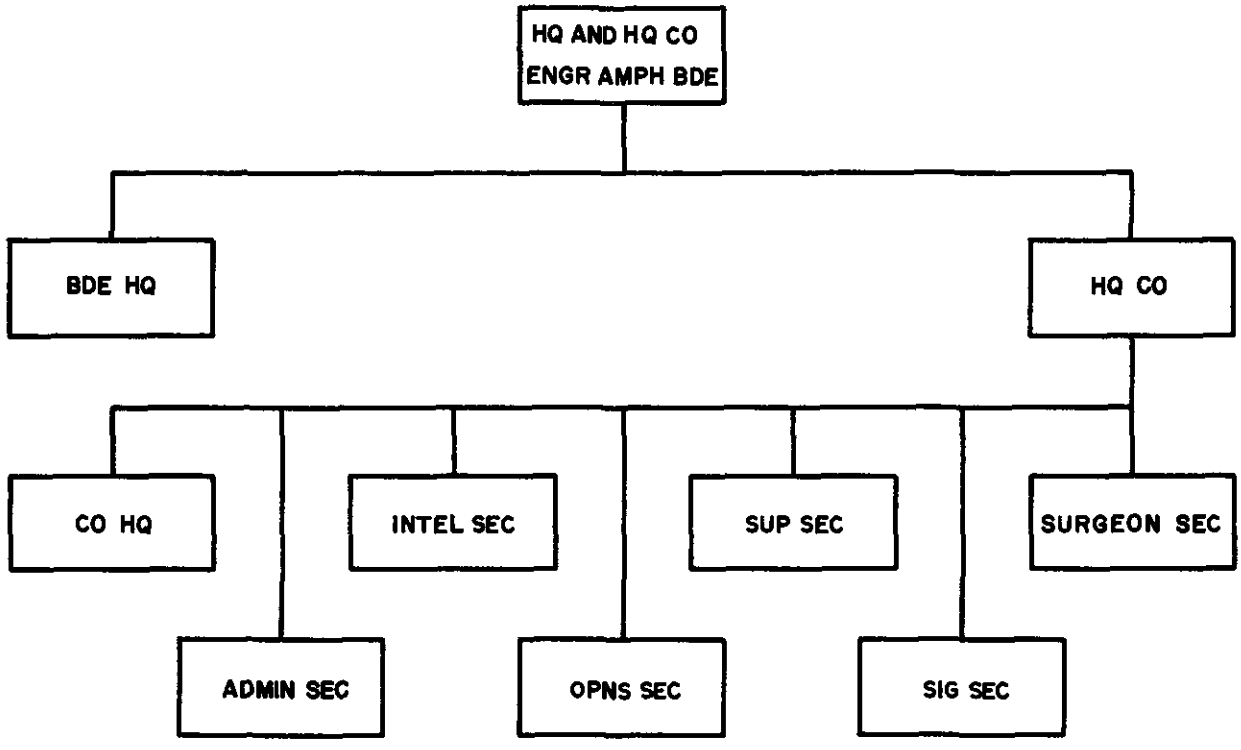
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Vehicles* | |
| Truck cargo ¾ T | 3 |
| Truck cargo 2½ T | 1 |
| *Engineer Items* | |
| Book set topo bn photomap co | 1 |
| Composing machine changeable type | 1 |
| Composing machine photo print type | 1 |
| Drafting equip set topo bn photomap co | 1 |
| Drafting equip set supplement plastic scribing | 40 |
| Gen set 15 KW 60 cy 3 ph 120/208V 240/416V | 4 |
| Plotting inst set control booth | 2 |
| Plotting inst set lab | 1 |
| Plotting inst set plot booth | 4 |
| Shop equip cartograph inst rep | 1 |
| Stereoplotter projection | 18 |

TOE 5-401G

# HEADQUARTERS AND HEADQUARTERS COMPANY ENGINEER AMPHIBIOUS BRIGADE

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 26 | 0 | 84 | 110 |
| | 2 | 25 | 0 | 74 | 99 |
| | 3 | 22 | 0 | 67 | 89 |

*Figure B55. Organizational chart, headquarters and headquarters company, engineer amphibious brigade.*

## Section B. GENERAL

### 1. Mission

*a.* To command assigned and attached units.

*b.* To provide the shore party headquarters of a corps landing force during amphibious or shore-to-shore operations.

*c.* To provide assistance in planning and executing amphibious and shore-to-shore operations including landings on a hostile shore and crossing of major rivers and other water barriers.

## 2. Assignment

Assigned to the field army as required to support a corps-size landing force in amphibious or shore-to-shore operations.

## 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command and control of assigned and attached units.

(2) Assistance to a corps commander and staff in planning an amphibious or shore-to-shore operation.

(3) A corps shore party headquarters.

(4) Communications support to the corps shore party.

(5) Supervision for collection, evaluation, and dissemination of engineer intelligence information to include the preparation of terrain, hydrographic, and hydrologic reports.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The following additional capabilities may be provided, as required:

(1) Aerial liaison, reconnaissance, and transportation support to the corps shore party when reinforced by appropriate teams from TOE 29–500.

(2) Multichannel communications facilities required for shore party operations are furnished by appropriate teams from TOE 11–500.

*d.* A Navy lieutenant commander and a yeoman are placed on temporary duty with this unit by the Navy as required for liaison during specific operations. This unit provides logistical support for these liaison personnel.

*e.* This unit is not adaptable to a type B organization.

*f.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

One per corps as required for amphibious or shore-to-shore operations.

## 5. Category

This unit designated a category I unit (reference Unit Categories, AR 320–5).

## 6. Mobility

One hundred percent mobile in organic transportation.

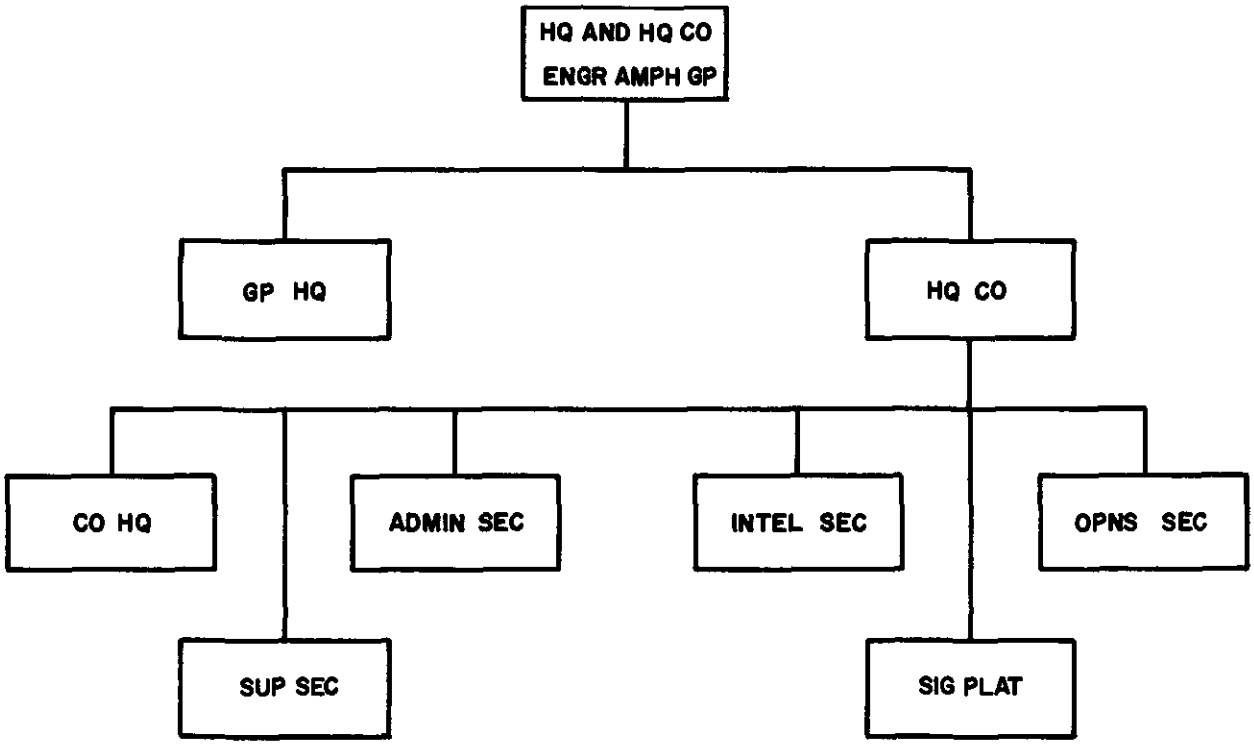
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Machine gun 7.62mm light flexible | 1 |
| *Vehicles* | |
| Truck cargo ¾ T | 10 |
| Truck cargo 2½ T | 6 |
| Truck tank fuel serv 2½ T | 1 |
| Truck utility ¼ T | 15 |
| *Engineer Items* | |
| Book set combat gp | 1 |
| Detecting set mine AN/PRS–4 | 1 |
| Detecting set mine ptbl metallic | 1 |
| Drafting equip set bn | 2 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 1 |
| Gen set 1.5 KW DC 28V | 3 |
| Gen set 3 KW DC 28V | 2 |
| Gen set 5 KW 60 cy 1–3 ph 120/240V 120/208V | 1 |
| *Signal Items* | |
| Camera set still picture studio and general photo | 1 |
| Electronic teletypewriter security equip T/SEC/KW–7 | 1 |
| Radio set AN/GRC–106 | 3 |
| Radio set AN/VRC–46 | 4 |
| Radio set AN/VRC–47 | 15 |
| Radio set AN/GRR–5 | 1 |
| Radio teletypewriter set AN/GRC–46 | 1 |

TOE 5-402G

# HEADQUARTERS AND HEADQUARTERS COMPANY ENGINEER AMPHIBIOUS GROUP

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 17 | 0 | 74 | 91 |
| | 2 | 15 | 0 | 67 | 82 |
| | 3 | 14 | 0 | 60 | 74 |

*Figure B-56. Organizational chart, headquarters and headquarters company, engineer amphibious group.*

## Section B. GENERAL

### 1. Mission

*a.* To command assigned and attached units.

*b.* To provide the shore party headquarters of a division landing force during amphibious or shore-to-shore operations.

*c.* To provide assistance in planning and executing amphibious and shore-to-shore operations including landings on a hostile shore and crossing of major rivers and other water barriers.

*d.* To undertake and carry out the infantry combat missions of a headquarters and headquarters company as required.

## 2. Assignment

Assigned to the field army, as required, to support division-size landing forces in amphibious or shore-to-shore operations.

## 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command and control of assigned and attached units.

(2) A division shore party headquarters.

(3) Assistance to a division commander and staff in planning an amphibious or shore-to-shore operations.

(4) Communications support to the division shore party.

(5) Supervision for collection, evaluation, and dissemination of engineer intelligence information to include the preparation of terrain, hydrographic, and hydrologic reports.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* The following additional capabilities may be provided, as required:

(1) Aerial liaison, reconnaissance, and transportation support to the division shore party when reinforced by appropriate teams from TOE 29–500.

(2) Multichannel communications facilities required for shore party operations are furnished by appropriate teams from TOE 11–500.

*d.* An officer and enlisted rank are placed on temporary duty with this unit by the Marine Corps as required for liaison during specific operations. This unit provides logistical support for these liaison personnel.

*e.* This unit is not adaptable to a type B organization.

*f.* Individuals of this organization, except chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

## 4. Basis of Allocation

One per division size landing force.

## 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

## 6. Mobility

One hundred percent mobile in organic transportation.

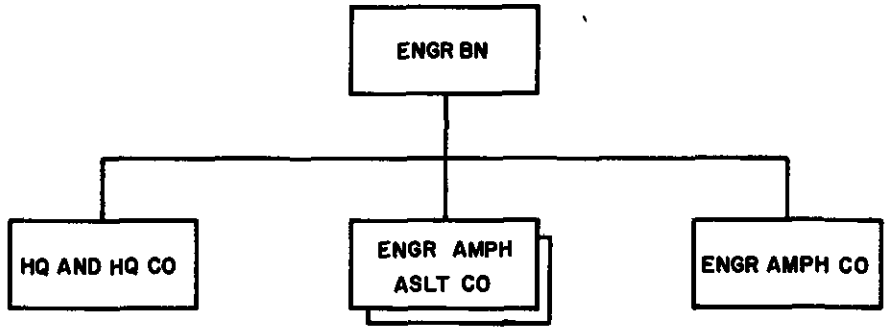
## Section C. MAJOR ITEMS OF EQUIPMENT

| | Qty |
|---|---|
| *Weapons* | |
| Machine gun 7.62mm light flexible | 3 |
| *Vehicles* | |
| Truck cargo ¾ T | 13 |
| Truck cargo 2½ T | 6 |
| Truck utility ¼ T | 8 |
| *Engineer Items* | |
| Detecting set mine AN/PRS–4 | 2 |
| Detecting set mine ptbl metallic | 2 |
| Drafting equip set bn | 3 |
| Gen set 1.5 KW 60 cy 1 ph 120V | 1 |
| Gen set 1.5 KW DC 28V | 2 |
| Gen set 3 KW DC 28V | 2 |
| Gen set 5 KW 60 cy 1–3 ph 120/240V 120/208V | 1 |
| Test set soil trafficability | 1 |
| *Signal Items* | |
| Camera set still picture studio and gen photo | 2 |
| Electronic teletypewriter security equip T/SEC/KW–7 | 1 |
| Radio set AN/GRR–5 | 2 |
| Radio set AN/PRC–25 | 6 |
| Radio set AN/VRC–46 | 1 |
| Radio set AN/VRC–47 | 5 |
| Radio set AN/VRC–49 | 2 |
| Radio set AN/GRC–106 | 2 |
| Radio teletypewriter set AN/GRC–46 | 1 |

TOE 5–405G

# ENGINEER AMPHIBIOUS BATTALION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 38 | 7 | 673 | 718 |
| | 2 | 36 | 7 | 610 | 653 |
| | 3 | 35 | 7 | 538 | 580 |

*Figure B–57. Organizational chart, engineer amphibious battalion.*

## Section B. GENERAL

### 1. Mission

*a.* To command and control assigned and attached units.

*b.* To command, control, and provide the nucleus for the shore party of a brigade-size landing force during amphibious or shore-to-shore operations.

*c.* To provide tactical amphibian mobility for dismounted combat units in the passage of water barriers.

*d.* To provide assistance in planning and executing amphibious and shore-to-shore operations including landings on a hostile shore and crossing of major rivers and other water barriers.

*e.* To undertake and carry out infantry combat missions when required.

### 2. Assignment

Assigned to the field army with normal attachment to an Engineer Amphibious Group, TOE 5–402.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command and control of assigned and attached units.

(2) The nucleus for a brigade shore party.

(3) Assistance to a brigade commander and staff in planning an amphibious or shore-to-shore operation.

(4) Light armor-protected amphibian mobility for 2,040 dismounted assault troops when equipped with the LVTP–5.

(5) Engineer amphibious combat-support for two battalion landing team (BLT) beach areas or a consolidated brigade beach support area.

(6) Engineer reconnaissance and intelligence for the battalion and the supported brigade-size force.

(7) Engineer intelligence, including terrain data, to the engineer amphibious group and/or engineer amphibious brigade.

(8) Medical support to a brigade landing force of two battalion landing teams.

(9) Establishment and operation of signal facilities for two BLT shore parties or one consolidated brigade beach support area.

(10) Direct support maintenance for organic engineer equipment, wheeled and tracked vehicles, and amphibious lighters.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per brigade-size landing force.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

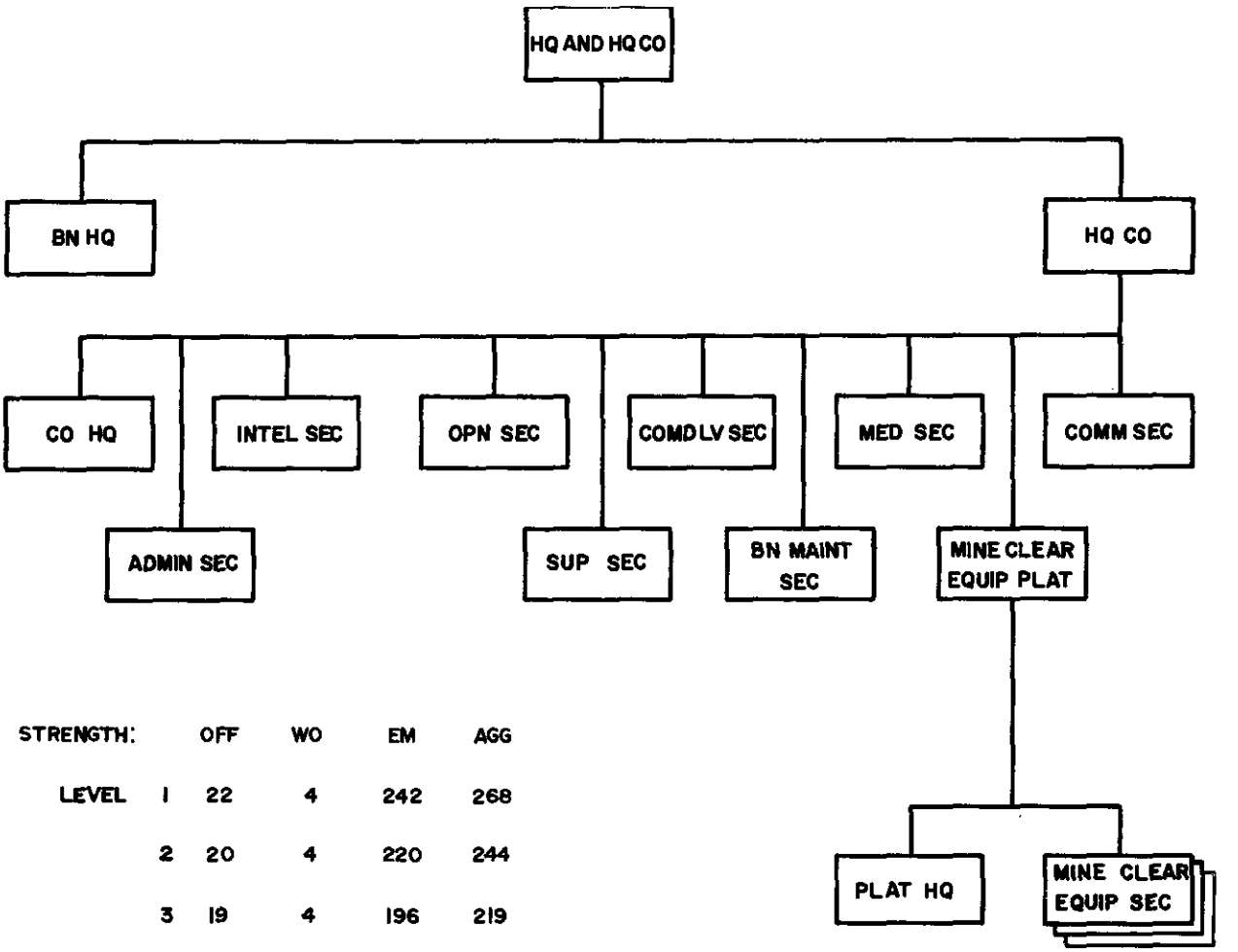
| | *Aggr breakdown within organic units* | | | |
|---|---|---|---|---|
| | *5–405G* | *5–406G* | *5–407G* | *5–408G (2 ea)* |
| *Weapons* | | | | |
| Machine gun 7.62mm light flexible | 8 | 4 | 0 | 4 |
| *Vehicles* | | | | |
| Combat engineer veh full trckd | 2 | 0 | 0 | 2 |
| Landing veh trckd engineer | 10 | 10 | 0 | 0 |
| Landing veh trckd personnel command | 6 | 6 | 0 | 0 |
| Landing veh trckd personnel | 60 | 0 | 30 | 0 |
| Landing veh trckd recovery | 2 | 0 | 1 | 0 |
| Truck amb ¾ T | 2 | 2 | 0 | 0 |
| Truck cargo ¾ T | 35 | 18 | 2 | 13 |
| Truck cargo 2½ T | 24 | 12 | 4 | 4 |
| Truck dump 5 T | 11 | 0 | 0 | 11 |
| Truck tractor 2½ T | 5 | 2 | 1 | 1 |
| Truck tractor 10 T | 8 | 2 | 1 | 4 |
| Truck utility ¼ T | 22 | 14 | 1 | 6 |
| Truck wrecker 5 T | 2 | 2 | 0 | 0 |
| *Engineer Items* | | | | |
| Book set combat gp | 1 | 1 | 0 | 0 |
| Chamber recompression divers 100 psi | 1 | 1 | 0 | 0 |
| Compressed air facility | 1 | 1 | 0 | 0 |
| Crane wheel mtd 20 T ¾ cu yd | 2 | 0 | 0 | 2 |
| Demolition set explosive initiat | 7 | 0 | 0 | 7 |
| Detecting set mine ptbl metallic | 6 | 0 | 0 | 6 |
| Diving equipment set 1 person SCUBA open circuit | 6 | 6 | 0 | 0 |
| Drafting equip set bn | 1 | 1 | 0 | 0 |
| Floodlight set elec ptbl 6 floodlights | 4 | 0 | 0 | 4 |
| Gen set 1.5 KW 6 cy 1 ph 120 V | 11 | 5 | 2 | 2 |
| Gen set 1.5 KW DC 28 V | 8 | 2 | 1 | 4 |
| Gen set 3 KW DC 28 V | 10 | 5 | 2 | 1 |
| Gen set 3 KW 60 cy 1–3 ph 120/240V 120/208V | 2 | 2 | 0 | 0 |
| Gen set 5 KW 60 cy 1–3 ph 120/240 V 120/208 V | 6 | 2 | 0 | 4 |
| Gen set 10 KW 60 cy 1–3 ph 120/240 V 120/208 V | 1 | 1 | 0 | 0 |
| Grader road mtzd hvy | 2 | 0 | 0 | 2 |
| Lighter amphib self-propel 2½ to 5 T | 4 | 0 | 0 | 4 |
| Lubricating-serv unit trlr mtd | 5 | 2 | 1 | 1 |
| Pneu tool and comp outfit trlr mtd 250 cfm | 1 | 0 | 0 | 1 |
| Saw chain 18 in | 6 | 0 | 0 | 6 |

| | Aggr breakdown within organic units 5-405G | 5-406G | 5-407G | 5-408G (2 ea) |
|---|---|---|---|---|
| Semitrlr low bed 25 T | 4 | 0 | 0 | 4 |
| Semitrlr low bed 60 T | 4 | 2 | 1 | 0 |
| Semitrlr van 6 T | 5 | 2 | 1 | 1 |
| Shop equip contact maint trk mtd | 5 | 3 | 0 | 2 |
| Shop equip organzl rep lt trk mtd | 1 | 1 | 0 | 0 |
| Shop set contact and emerg rep fld maint | 1 | 1 | 0 | 0 |
| Shop set fuel and elec system fld maint | 1 | 1 | 0 | 0 |
| Sketching set surveying | 2 | 2 | 0 | 0 |
| Test set soil trafficability | 2 | 2 | 0 | 0 |
| Tractor full trkd heavy DBP | 4 | 0 | 0 | 4 |
| Trailer basic utility 2½ T | 6 | 0 | 0 | 6 |
| Welding set arc inert gas shield | 3 | 1 | 0 | 2 |
| Welding shop trlr mtd 300 amp | 3 | 1 | 1 | 0 |
| *Signal Items* | | | | |
| Camera set still picture for studio and gen photo | 1 | 1 | 0 | 0 |
| Electronic teletype sec equip TSEC/KW-7 | 2 | 1 | 0 | 1 |
| Radio set AN/GRR-5 | 13 | 7 | 1 | 4 |
| Radio set AN/VRC-24 | 8 | 6 | 1 | 0 |
| Radio set AN/PRC-25 | 19 | 5 | 0 | 14 |
| Radio set AN/VRC-46 | 10 | 4 | 2 | 2 |
| Radio set AN/VRC-47 | 22 | 16 | 0 | 6 |
| Radio set AN/VRC-49 | 5 | 1 | 0 | 4 |
| Radio set AN/VRC-53 | 22 | 10 | 4 | 4 |
| Radio set AN/GRC-106 | 5 | 1 | 0 | 4 |
| Radio set AN/GRC-125 | 71 | 0 | 31 | 9 |
| Radio teletype set AN/GRC-46 | 2 | 1 | 0 | 1 |

TOE 5–406G

# HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER AMPHIBIOUS BATTALION

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 22 | 4 | 242 | 268 |
| | 2 | 20 | 4 | 220 | 244 |
| | 3 | 19 | 4 | 196 | 219 |

*Figure B–58. Organizational chart, headquarters and headquarters company, engineer amphibious battalion.*

## Section B. GENERAL

### 1. Mission

*a.* To command assigned and attached units.

*b.* To command, control, and provide the nucleus of the shore party for a brigade-size landing force during amphibious or shore-to-shore operations.

*c.* To provide assistance in planning and executing amphibious and shore-to-shore operations including landings on a hostile shore and crossing of major rivers and other water barriers.

*d.* To undertake and carry out the infantry

combat missions of a headquarters and headquarters company as required.

### 2. Assignment

Organic to the Engineer Amphibious Battalion, TOE 5–405.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command and control of assigned and attached units.

(2) The nucleus of a brigade shore party headquarters.

(3) Assistance to a brigade commander and staff in planning for an amphibious or shore-to-shore operation.

(4) Reconnaissance within the beach support area.

(5) Breaching natural and manmade beach obstacles, and hasty removal of mines on the beach.

(6) The following medical support to a brigade landing force of two battalion landing teams.

(*a*) Emergency medical treatment, coordination, and supervision of evacuation to off-shore medical facilities. When required, additional litter bearer support may be provided from a medical collecting company, TOE 8–129.

(*b*) The establishment and operation of aid stations within two shore support areas.

(7) Direct support maintenance for engineer equipment, wheeled and tracked vehicles, and amphibious lighters organic to the battalion.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization, except chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Amphibious Battalion, TOE 5–405.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

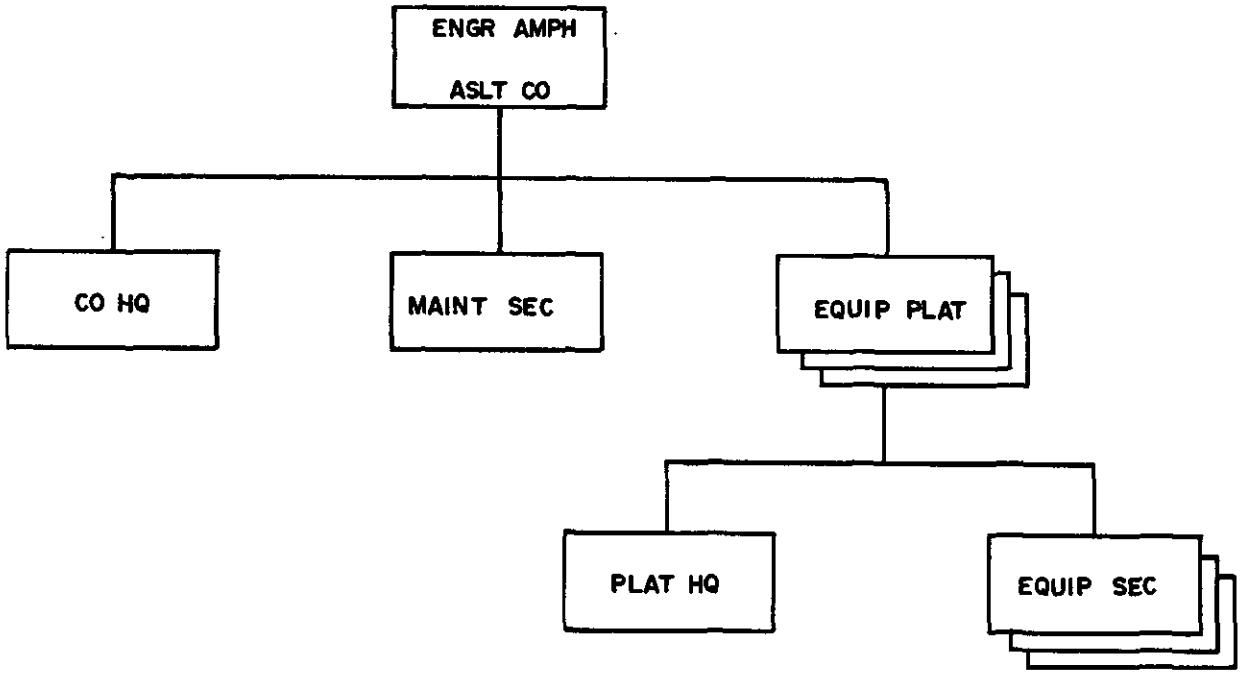
One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–405G)

# ENGINEER AMPHIBIAN ASSAULT COMPANY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 5 | 1 | 129 | 135 |
| | 2 | 5 | 1 | 115 | 121 |
| | 3 | 5 | 1 | 100 | 106 |

*Figure B–59. Organizational chart, engineer amphibian assault company.*

## Section B. GENERAL

### 1. Mission

*a.* To provide tactical amphibian mobility for dismounted combat units in the passage of water barriers and to provide skills and equipment to train other units assigned amphibious missions in amphibious or shore-to-shore operations.

*b.* To undertake and carry out infantry combat missions when required.

### 2. Assignment

Organic to the Engineer Amphibious Battalion, TOE 5–405.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Light armor-protected amphibian mobility for 1,020 dismounted assault troops when equipped with the

LVTP–5. Elements may be attached to one or more battalion landing teams in amphibious or shore-to-shore operations.

(2) Machinegun fire support in the assault phase of an amphibious or shore-to-shore operation.

(3) Local security and supplements beach support area defense as required.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### *4. Basis of Allocation*

Two per Engineer Amphibious Battalion, TOE 5–405.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 320–5).

### 6. Mobility

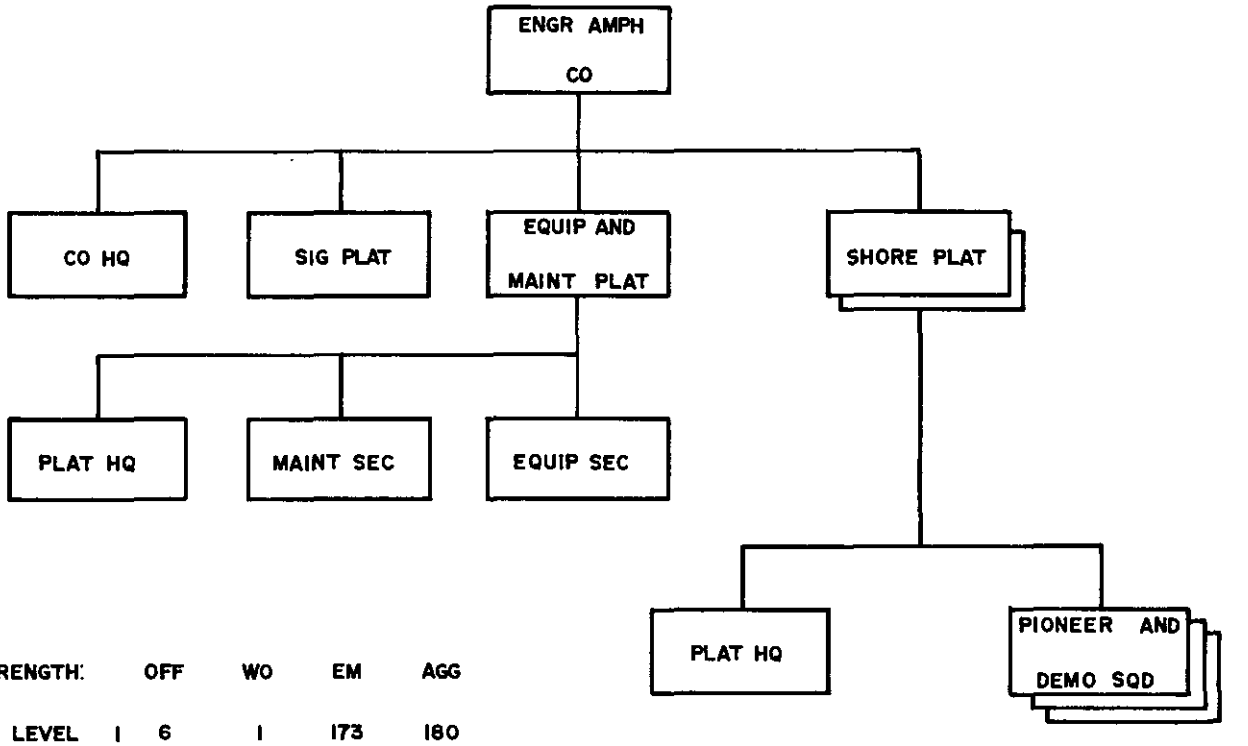
One hundred percent mobile when the LVTP is used for land movement.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–405G)

# ENGINEER AMPHIBIOUS COMPANY

## Section A. ORGANIZATION




| STRENGTH: | | OFF | WO | EM | AGG |
|---|---|---|---|---|---|
| LEVEL | 1 | 6 | 1 | 173 | 180 |
| | 2 | 6 | 1 | 160 | 167 |
| | 3 | 6 | 1 | 142 | 149 |

*Figure B–60. Organizational chart, engineer amphibious company.*

## Section B. GENERAL

### 1. Mission

*a.* To provide the control and nucleus for the shore party of a brigade-size landing force during amphibious or shore-to-shore operations.

*b.* To provide assistance in planning and executing amphibious and shore-to-shore operations including landing on a hostile shore and crossing of major rivers and other water barriers.

*c.* To undertake and carry out combat missions of an infantry unit when required.

### 2. Assignment

Organic to the Engineer Amphibious Battalion, TOE 5–405.

### 3. Capabilities

*a.* At level 1 this unit provides—

(1) Command, staff planning, and supervision of the operations of two Battalion Landing Team (BLT) Shore Parties or one Brigade Landing Team Shore Party.

(2) Engineer amphibious combat support

for two BLT beach areas or a consolidated brigade beach support area as follows:

(*a*) Breaching extensive natural and manmade beach obstacles.

(*b*) Detecting removing mines within the beach support area.

(*c*) Constructing and maintaining beach exits.

(*d*) Destroying enemy beach fortifications.

(*e*) Performing other engineer work necessary to develop and expand beach capacities.

(*f*) Operational control of beaches.

(*g*) Providing local security for the beach support area.

(*h*) Erecting obstacles in the beach support area.

(3) Establishment and operation of the following signal facilities for two BLT shore parties or one consolidated brigade beach support area.

(*a*) Message center, cryptographic, and radio teletypewriter service.

(*b*) Manual telephone switchboard and local telephone service.

(*c*) CW, and AM and FM voice radio stations in the BLT and brigade nets.

(*d*) Trunkline and signal center service to shore party elements.

(*e*) Visual signals consisting of semaphore and blinkers for shore-to-ship and shore-to-shore communications.

*b.* At levels 2 and 3, operational capabilities are reduced to 90 percent and 80 percent, respectively, of those provided at level 1.

*c.* This unit is not adaptable to a type B organization.

*d.* Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

### 4. Basis of Allocation

One per Engineer Amphibious Battalion, TOE 5–405.

### 5. Category

This unit is designated a category I unit (reference Unit Categories, AR 310–25).

### 6. Mobility

One hundred percent mobile in organic transportation.

## Section C. MAJOR ITEMS OF EQUIPMENT

(See Section C, TOE 5–405G)

# ENGINEER CELLULAR TEAMS

## 1. Mission

*a.* To provide engineer technical, combat service, and combat support where units of less than company size are required.

*b.* To increase the capability of fixed strength units where increments of less than company size are required. These teams are designed to provide special support and will be assigned in accordance with the tactical and logistical considerations involved.

*c.* To provide command and administrative personnel for engineer composite units.

*d.* To provide advisory assistance to host country forces and units in an internal defense and development operational environment.

## 2. Assignment

Teams may be attached or assigned as required to fixed strength units or may be organized into a separate composite unit.

## 3. Capabilities

*a.* The capabilities of an individual team are listed in the discussion of that team. The capabilities of an engineer composite unit of several teams will vary with the number and types of teams used.

*b.* Most of these teams must be furnished supply, mess, administrative, personnel, medical, signal, and organizational maintenance services. These are ordinarily provided by the fixed strength unit to which a team is assigned or attached. When applicable, mess teams will be drawn from the TOE 29–500-series, automotive maintenance teams from the TOE 29–600-series, and personnel services will be provided by an AG personnel service unit or a support team drawn therefrom. A composite unit formed from two or more teams may be commanded and provided administrative services by a team from TOE 5–500 (Team AB or AC).

*c.* These teams are not adaptable to Level 2 or 3 strengths nor to a Type B organization. However, host country or allied nationals may in some cases be used to supplement team strength.

*d.* Individuals of these teams can engage in effective coordinated defense of the team's area or installation, or contribute to the defense of the unit to which assigned or attached.

## 4. Basis of Allocation

The allocation of teams depends on the special support requirements. Type allocations are indicated in the discussion of individual teams.

## 5. Category

The category given each team is based on the area of employment of the units to which the team normally is assigned (reference Unit Categories, AR 310–25).

## 6. Mobility

The degree of mobility utilizing organic transport is given for each team. When teams are combined to form a composite unit, the mobility of the composite unit must be computed.

## 7. General

The team organization provides variety and flexibility to permit the most efficient use of manpower and equipment. Teams may be combined to form a composite platoon or company, depending on the nature and scope of the mission. Individual teams may be attached or assigned to an engineer unit to increase the unit's capabilities, or to a unit of another arm or service such as an Area Support Command, to provide a particular, required engineer capability. Teams fall into the following eight classes:

*a.* Administrative and headquarters.
*b.* Firefighting.
*c.* Equipment operating.
*d.* Construction, utilities, and electrical power.
*e.* Topographic and intelligence.
*f.* Dredging.
*g.* Engineer civic action.
*h.* Engineer combat support.

## 8. Characteristics

Teams have the following characteristics:

*a.* They comprise a group of individuals

trained to work together as specialists in some particular field.

*b.* They may perform certain operations as a unit; comprise a specialized cadre around which a larger organization is built; or act as individual inspectors, instructors, or supervisors.

*c.* Their equipment generally is restricted to vehicles required to transport team personnel and materiel, individual weapons, and items specifically related to their specialty.

*d.* Some teams consist of only a handful of specialists and must be provided with additional personnel from the supported unit for mission accomplishment. While others, such as certain topographic and equipment operating teams, are small-scale replicas of corresponding larger units.

### 9. Base Camp Support in Underdeveloped Countries

In underdeveloped countries semipermanent base camps to house troop units will have to be established. To support such camps composite units, consisting principally of engineer cellular teams, may be formed. Figure B–61 shows a type composite cellular unit organized to provide support for a base camp to be occupied by approximately 5,000 tactical troops.

### 10. Engineer Installation Support

*a. In the COMMZ.* The Area Support Groups (ASGP) are assigned areas of responsibility to provide direct combat service support for the TASCOM commands and other designated forces in the COMMZ. The ASGP is a major subordinate command of the Area Support Command (ASCOM). Included in direct combat service support is installation support which is provided by engineer teams of the TOE 5–500-series. In providing installation support to units serviced by the ASGP, the installation support organization provides the following services:

(1) Operation and maintenance of utilities.

(2) Repair and minor alterations of buildings, grounds, and utilities within the area support group area.

(3) Fire protection service.

(4) Sewage and trash disposal.

(5) Installation water supply.

(6) Real estate service.

*b. In the Combat Zone.* Engineer installation support in the combat zone is provided for the Field Army Support Command (FASCOM) by teams of the TOE 5–500-series. Engineer installation support consists of real estate, repair and utilities, and firefighting services. These teams are attached to, and under the command and control of the FASCOM or its subordinate units.

## TOE 5–500G ADMINISTRATIVE AND HEADQUARTERS TEAMS

**Mission.** To provide for command of and administration support for engineer composite units. Teams command engineer composite units organized from 5–500-series TOE teams, to perform engineer technical service or combat support functions.

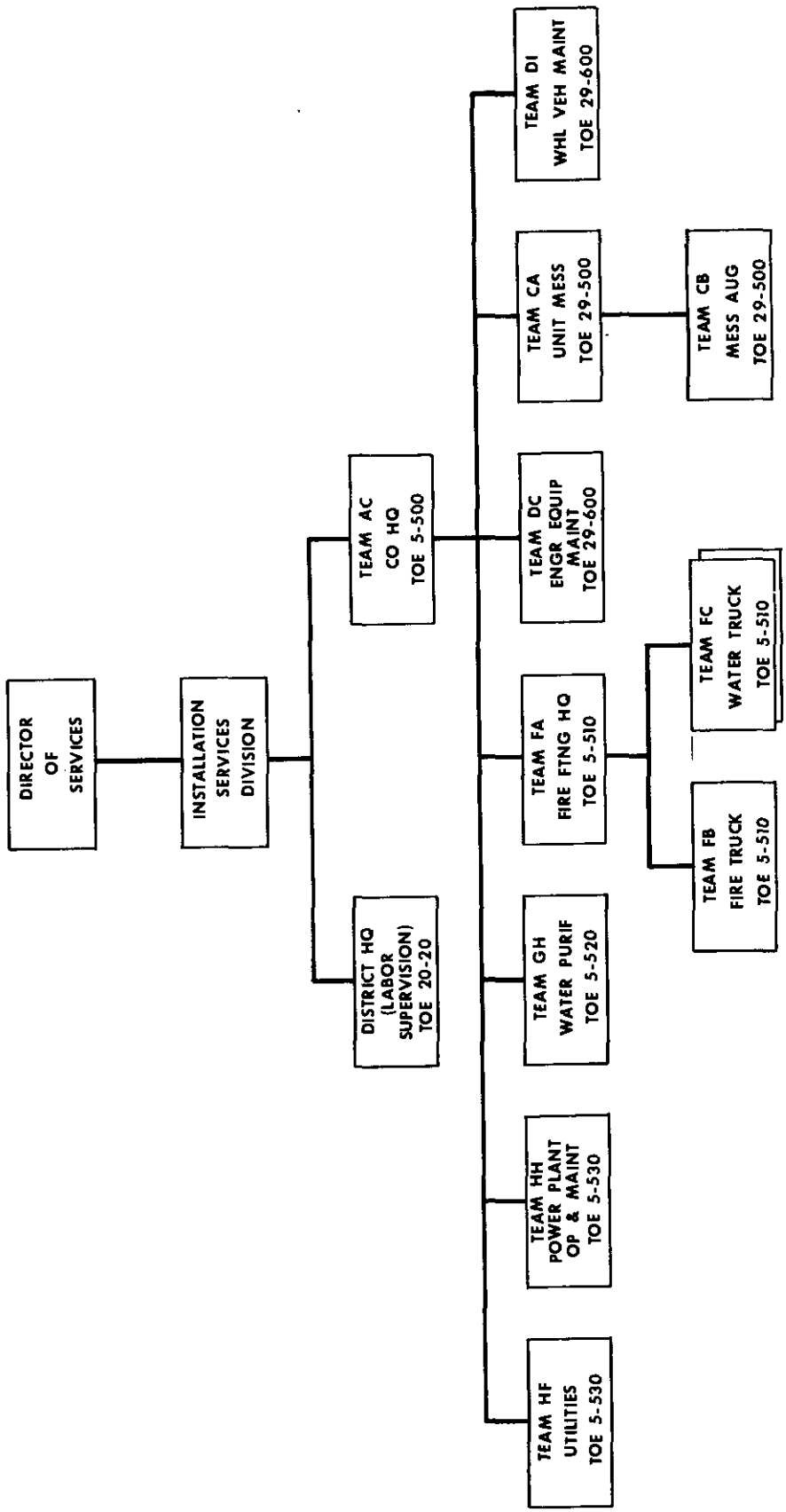
*Team AB, Platoon Headquarters, Separate*

**Capability.** Capable of commanding and providing minimal administrative and logistical support for two or more TOE 5–500-series teams organized into an engineer composite unit of platoon size. The administrative and logistical support provided by this team is equivalent to that provided by the headquarters of a line platoon in a separate company or a company organic to a battalion.

**Basis of Allocation.** One per platoon, composed of TOE 5–500-series teams, with an aggregate strength of about 40 to 60, and to which no officer is assigned.

**Category.** The category of this team depends on the category of the composite unit which it commands and is based on the mission, composition, and area of employment of the command to which the composite unit is assigned or attached.

**Mobility.** 100 percent mobile. The mobility of the composite unit commanded by the team depends on the mobility of the teams which compose it.




★*Figure B–61. Type cellular organization for base camp support.*

**Strength.** Aggregate—4, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 1328 |
| 1 | E–7 (NCO) | 51H40 |
| 1 | E–4 | 71H20 |
| 1 | E–4 | 76Y20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Truck, cargo, ¾–T ---------- 1

*Other Equipment*

Tool kit, armorer's ---------- 1

**Method of Operation.** Team functions as the headquarters for a platoon formed from two or more other teams. For example, two gas generating teams (GB), operating at a single location or close to each other, might be placed under this team's command.

*Team AC, Company Headquarters*

**Capability.** Capable of commanding and providing minimal administrative and logistical support for two or more TOE 5–500-series teams organized into an engineer composite unit of company size. The administrative and logistical support provided by this team is equivalent to that provided by the headquarters of a line company organic to a battalion, less mess and communications.

**Basis of Allocation.** One per engineer composite unit, formed from TOE 5–500-series teams, organized into two or more platoons, and with an aggregate strength of about 80 to 120.

**Category.** I, II, or III.

**Mobility.** 100 percent mobile. The mobility of the composite unit commanded by the team depends on the mobility of the teams which compose it.

**Strength.** Aggregate—8, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | CPT | 1328 |
| 1 | LT | 1328 |
| 1 | E–8 (NCO) | 51H50 |
| 1 | E–6 (NCO) | 76Y40 |
| 1 | E–5 | 71H20 |
| 1 | E–4 | 76Y30 |
| 1 | E–4 | 71H20 |
| 1 | E–3 | 70A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Trailer, cargo, ¾–T ---------- 1
Trailer, cargo, 1½–T ---------- 1
Truck, cargo, ¾–T ---------- 1
Truck, cargo, 2½–T ---------- 1

*Other Equipment*

Telephone set, TA–312/PT ---------- 1
Tool kit, carpenter's ---------- 1

**Method of Operation.** Team functions as the headquarters for a company formed from two or more other teams. Subordinate teams are organized into two or more platoons and, in some cases, may have as a command element a team AB. A composite unit could be organized under this team's command consisting of one or two teams GK, Concrete Mixing and Paving, and one team GD, Quarrying and Rock Processing. Such a composite unit could be engaged in a large concrete producing operation with team GD providing the aggregate for team (s) GK.

## TOE 5–510G
## ENGINEER FIREFIGHTING TEAMS

**Mission.** To provide engineer firefighting service support to the army as required.

*Team FA, Firefighting Headquarters*

**Capability.** Capable of planning for overall area fire prevention and firefighting program; and controlling assigned or attached firefighting teams.

**Basis of Allocation.** One per three to five firefighting teams (FB and FD) and one water truck team (FC).

**Category.** II

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—4, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 9414 |
| 1 | E–6 (NCO) | 51M40 |
| 1 | E–6 (NCO) | 51M40 |
| 1 | E–3 | 70A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Trailer, cargo, ¼–T ---------- 1
Truck, cargo, ¾–T ---------- 1
Truck, utility, ¼–T ---------- 1

*Other Equipment*

Blanket, fire, wool, w/grommets and rope handle -- 2
Extinguisher, fire, carbon dioxide, 15–lb ---------- 2
Extinguisher, fire, vaporizing liquid, 1 gal ---------- 2
Extinguisher, fire, foam, 2½ gal ---------- 2

*Other Equipment*—Continued

| | |
|---|---|
| Firefighting equipment set, repair of extinguishers and fire hose | 1 |
| Light, warning, vehicular, red, w/blinker device | 2 |
| Repair and refill kit, carbon dioxide fire extinguisher | 1 |
| Siren, electric motor operated | 2 |
| Telephone set, TA–312/PT | 1 |

**Method of Operation.** Team leader serves as the fire marshal of the installation or area of responsibility. Team members conduct fire prevention inspections and train volunteer personnel in firefighting operations. In addition to planning for overall fire defense and commanding firefighting teams, this team maintains and refills fire extinguishers and makes minor repairs to fire hose. For information on fire protection in the theater of operations, see TM 5–315.

*Team FB, Fire Truck*

**Capability.** Capable of providing fire protection, administration of timely and adequate first aid, and implementing a fire prevention program for areas housing 5,000 to 10,000 troops, or a warehouse and open storage area of 100,000 square feet.

**Basis of Allocation.** One per installation housing 5,000 to 10,000 troops, or containing 100,000 square feet of warehouse and open storage.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—6, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–5 (NCO) | 51M40 |
| 1 | E–4 (NCO) | 51M40 |
| 3 | E–4 | 51M20 |
| 1 | E–3 | 51M20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Firefighting equipment set, truck mounted, structural type, overseas, class 530 B | 1 |

*Other Equipment*

| | |
|---|---|
| Blanket, fire, wool, w/grommets and rope handle | 2 |

**Method of Operation.** Team members provide fire protection for the team's assigned installation or area by conducting fire prevention inspections and by fighting fires. See TM 5–225 for detailed information on radiological decontamination of structures by firehosing.

*Team FC, Water Truck*

**Capability.** Capable of transporting water for firefighting purposes when insufficient water is available.

**Basis of Allocation.** One or more per firefighting headquarters (Team FA) as required.

**Category.** II

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—2, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–4 | 51M20 |
| 1 | E–3 | 51M20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Truck, tank, water, 2½–T | 1 |

*Other Equipment*

No other major items.

**Method of Operation.** Team transports water for firefighting when sufficient water is not available. Team members may be used as firefighters.

*Team FD, Brush Fire Truck*

**Capability.** Capable of furnishing protection against grass or brush fires within its assigned area of responsibility when augmented with personnel and additional handtools. Can also be utilized to a limited degree to combat structural fires.

**Basis of Allocation.** One per installation housing 5,000 to 10,000 troops, or containing 100,000 square feet of warehouse and open storage.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—2, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–5 (NCO) | 51M40 |
| 1 | E–3 | 51M20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Firefighting equipment set, truck mounted, brush type, overseas, class 530 B | 1 |

*Other Equipment*

No other major items.

**Method of Operation.** Team members train personnel of the supported unit in brush fire-

fighting and supervise them when so engaged. Additional handtools (axes, mattocks, brush hooks) must be provided by the supported unit.

## TOE 5–520G
## ENGINEER EQUIPMENT OPERATING TEAMS

**Mission.** To provide engineer equipment operating teams for support to the Army as required.

*Team GA, Forestry*

**Capability.** Capable of providing personnel and equipment for the conduct of logging and sawmill operations to produce rough lumber and timber piling. Capable of producing 10,000 to 15,000 board feet of rough lumber and timber piling per day.

**Basis of Allocation.** Normally attached to a supply and service battalion of a general support group, to an engineer construction group, or to support independent large scale operations.

**Category.** II.

**Mobility.** 75 percent mobile.

**Strength.** Aggregate—34, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 4942 |
| 1 | E–7 (NCO) | 57D40 |
| 2 | E–6 (NCO) | 57D40 |
| 2 | E–5 | 57D20 |
| 1 | E–5 | 62E20 |
| 1 | E–4 | 62E20 |
| 1 | E–4 | 45D20 |
| 2 | E–4 | 62F20 |
| 1 | E–4 | 62B20 |
| 1 | E–4 | 76Y20 |
| 2 | E–4 | 64B20 |
| 11 | E–4 | 57D20 |
| 18 | E–3 | 57A10 |

### Major Items of Equipment

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Semitrailer, low bed, 25–T | 1 |
| Truck, cargo, ¾–T | 1 |
| Truck, cargo, 2½–T | 1 |
| Truck, tractor, 10–T | 2 |

*Other Equipment*

| | |
|---|---|
| Blade, circular saw, 42-in. for use with walking tractor | 2 |
| Chain saw attachment for walking tractor, 36-in. | 1 |
| Chain saw, 18-in., GED | 3 |
| Crane-shovel, wheel mtd, 20–T, ¾ cu yd | 1 |
| Logging arch, tractor, med | 1 |
| Pneumatic tool and compressor outfit, 250 cfm, trlr mtd | 1 |
| Sawmill, circular, semitrlr mtd, 60-in. blade, DED | 1 |
| Supplementary equipment, forestry company | 1 |
| Telephone set, TA–312/PT | 1 |
| Tool kit, blacksmith's | 1 |
| Tractor, full tracked, DED, and DBP | 1 |
| Tractor, walking, whl mtd, 20 HP | 1 |

**Methods of Operation.** Team personnel select areas from which to cut timber and a suitable site for establishing the sawmill. The team leader supervises the team operations, administration, and training. The logging supervisor coordinates the logging and sawmill operations and acts as first sergeant. The team is informally divided into two sections; the logging and hauling section, supervised by the logging foreman, and the milling and yard section, supervised by the sawmill foreman, who is also the sawyer. The logging and hauling section is responsible for the reduction of standing timber and the movement of the logs to the sawmill site. The milling and yard section is responsible for the stockpiling of logs, the milling of logs, and the grading, stocking, and shipping of milled lumber and piling. Wire communication between the supported unit and the team is supplied by the supported unit. For detailed information on logging and sawmill operations, see TM 5–342.

*Team GB, Acetylene, Nitrogen, and Oxygen Production*

**Capability.** Capable of providing qualified personnel and equipment to operate one acetylene generating plant of 750 cubic feet per hour capacity, and two oxygen-nitrogen generating plants of 1,000 cubic feet per hour capacity each. Operates and maintains machinery to generate acetylene, oxygen, and nitrogen gases, and to store limited quantities of these gases.

**Basis of Allocation.** Normally one per functionalized depot.

**Category.** III.

**Mobility.** 50 percent mobile.

**Strength.** Aggregate—27, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 4944 |
| 1 | E–5 (NCO) | 53B40 |
| 1 | E–5 | 62B30 |
| 1 | E–4 | 52B20 |
| 11 | E–4 | 53B20 |
| 1 | E–4 | 51L20 |
| 11 | E–3 | 53B20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Chassis, trailer, generator, 2½–T | 1 |
| Truck, cargo, 2½–T | 1 |
| Truck, tractor, 5–T | 1 |

*Other Equipment*

| | |
|---|---|
| Cylinder, compressed gas, acetylene, 225 cu ft | 250 |
| Cylinder, compressed gas, oxygen, 240 cu ft | 500 |
| Cylinder, compressed gas, nitrogen, 200 cu ft | 250 |
| Generator and charging plant, oxygen-nitrogen, semitrlr mtd, electric driven, 1,000 cu ft oxygen, 200 cu ft nitrogen per hr | 2 |
| Generator set, 15 kw | 1 |
| Generator and charging plant, acetylene, semitrlr mtd, 750 cu ft per hr | 1 |
| Generator set, 100 kw | 4 |
| Tool kit, pipefitter's | 8 |
| Tool kit, service, refrigeration | 1 |

**Method of Operation.** Team personnel operate and maintain equipment to produce gases for issue by depot to which attached. Issue normally is made on the basis of exchanging full cylinders for empty ones turned in by the using unit. For details on gas generating, see TM 5–351.

*Team GC, Carbon Dioxide-Dry Ice Production*

**Capability.** Capable of generating, storing, and transporting carbon dioxide in gaseous, liquid, and solid (dry ice) forms. Operates machinery for the generation of carbon dioxide gas, production of dry ice and the storage of limited quantities of both.

**Basis of Allocation.** Normally one per functionalized depot.

**Category.** III.

**Mobility.** 44 percent mobile.

**Strength.** Aggregate—13, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 4944 |
| 1 | E–5 (NCO) | 53C40 |
| 1 | E–5 | 62B30 |
| 5 | E–4 | 53C20 |
| 1 | E–4 | 51L20 |
| 4 | E–3 | 53C20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Chassis, trailer, general purpose 3½–T | 2 |
| Truck, cargo, 2½–T | 2 |
| Truck, tractor, 5–T | 1 |
| Truck, tractor, 10–T | 1 |

*Other Equipment*

| | |
|---|---|
| Conversion and storage unit, carbon dioxide semitrlr mtd, 16,000 lb capacity | 1 |
| Conversion unit, carbon dioxide, semitrlr mtd, 260 lb per hr | 1 |
| Cooling tower, liquid, semitrlr mtd, 240 gpm | 1 |
| Cylinder, compressed gas, carbon dioxide | 250 |
| Generating and charging plant, dioxide, semitrlr mtd, 300 lb per hr | 1 |
| Generator set, 60 kw | 2 |
| Tank fabric, collapsible, 3000 gal | 1 |
| Tank, shipping and storage, dry ice, 1–T | 6 |
| Tool kit, pipefitter's | 1 |
| Tool kit, service, refrigeration | 1 |

**Method of Operation.** Team personnel operate and maintain equipment to produce carbon dioxide for issue by depot to which attached. Issue normally is made on the basis of exchanging full cylinders for empty ones turned in by the using unit. For details on carbon dioxide generation, see TM 5–351.

*Team GD, Quarrying and Rock Processing.*

**Capability.** Capable of operating the 225 tons-per-hour crushing, screening, and washing plant on a two-shift basis and issuing the product to users. Capable of providing personnel and equipment for drilling and blasting operations required to produce raw stone for operating the 225–TPH plant. Capable of hauling 120 tons of rock per trip from quarry to processing plant.

**Basis of Allocation.** Normally attached to an engineer construction group as required.

**Category.** III

**Mobility.** 30 percent mobile.

**Strength.** Aggregate—74 as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 1328 |
| 1 | E–7 (NCO) | 62G40 |
| 4 | E–6 (NCO) | 62G40 |
| 4 | E–5 | 62F30 |
| 6 | E–5 | 62E20 |
| 1 | E–5 | 62B20 |
| 8 | E–5 | 62G20 |
| 3 | E–5 | 64B20 |
| 2 | E–4 | 62E20 |
| 3 | E–4 | 62B20 |
| 9 | E–4 | 64B20 |
| 26 | E–4 | 62G20 |
| 2 | E–4 | 52B20 |
| 2 | E–3 | 62A10 |
| 2 | E–3 | 52A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Semitrailer, low bed, 60–T | 1 |
| Truck, cargo, ¾–T | 1 |
| Truck, cargo, 2½–T | 2 |
| Truck, dump, 20–T | 6 |
| Truck, tractor, 10–T | 1 |

*Other Equipment*

| | |
|---|---|
| Ball, wrecking, 3–T | 1 |
| Bin, storage, aggregate, 1 compartment, 60–T | 3 |
| Boom, crane, 50 ft, 40–T | 1 |
| Boom, extension, middle, 10 ft, 40–T | 1 |
| Bucket, clamshell, 2 cu yd | 1 |
| Compressor, rotary, wheel mtd, 600 cfm, 100 psi | 3 |
| Crane shovel, crawler mtd, 40–T, 2 cu yd | 2 |
| Crushing, screening, and washing plant, wheel mounted, 225–T per hour | 1 |
| Floodlight set, elec, portable | 4 |
| Generator set, 5 kw | 2 |
| Generator set, 100 kw | 2 |
| Loader, scoop, 2½ cu yd | 1 |
| Rock Drilling equipment set | 3 |
| Shop equipment, truck mtd | 1 |
| Shovel front, 2 cu yd | 1 |
| Tractor, full tracked, w/bulldozer, heavy DBP | 2 |

**Method of Operation.** Team operates existing quarries or gravel pits or opens up and operates new ones at suitable sites. Team sets up and operates the crushing, screening, and washing plant and produces aggregate of predetermined gradation and cleanliness. Team loads aggregate into trucks of using unit(s). For details of quarrying and crushing operations, see TM 5–331 and TM 5–332.

*Team GE, Well Drilling*

**Capability.** Capable of drilling and developing water wells on a two-shift basis. Installs casings, screens, and pumps to supply water to users at the well head.

**Basis of Allocation.** Normally attached to an engineer construction or combat unit to provide support for drilling operations.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—2, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 2 | E–5 | 62G20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, low bed, 8–T | 1 |
| Truck, flat bed, 5–T | 1 |

*Other Equipment*

| | |
|---|---|
| Drilling machine, rotary, skid mtd, GED, 5⅞ in. hole at 1,500 ft depth | 1 |
| Tool kit, pipefitter's | 1 |

**Method of Operation.** Team personnel reconnoiter an area and select one or more well sites. Each of the team members heads up a shift so that the well drilling operation is continuous. The supported unit provides one or more helpers for each shift and must supply all casings, screens, and pumps required. Engineer work at the well site—clearing, access roads, and a parking area—is performed by the supported unit. For detailed information on well drilling operations, see TM 5–297.

*Team GF, Well Drilling (Airborne)*

**Capability.** Capable of developing and drilling water wells. On a two-shift basis installs casings, screens and pumps, and develops drilled wells to supply water at the water head. May drill blast holes up to 4⅞ inch in diameter and up to 500 feet deep for quarrying or to create obstacles and barriers. Supported unit must provide helper personnel for effective utilization of the team.

**Basis of Allocation.** Normally attached to an engineer combat battalion, airborne, or to the airborne division engineer battalion. May be attached to the engineer light equipment company, airborne.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—2, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 2 | E–5 | 62G2P |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, low bed, 8–T | 1 |
| Truck, flat bed, 5–T | 1 |

*Other Equipment*

| | |
|---|---|
| Driling machine, rotary, skid mtd, GED, 4⅞ inch diameter hole at 600 foot depth | 1 |
| Tool kit, pipefitter's | 1 |
| Torch outfit, cutting and welding | 1 |

**Method of Operation.** Each of the team members heads up a shift so that the well drilling operation is continuous. The supported unit provides one or more helpers for each shift. If the team and its drilling equipment are air dropped, the supported unit provides equipment to move the drill rig to the drilling site. Engineer work at the well site—clearing, access roads, and a parking area—is performed

by the supported unit. For detailed information on well drilling operations, see TM 5–297.

*Team GG, Water Purification (3,000 GPH)*

**Capability.** Capable of producing up to 3,000 gallons of potable water per hour and has a storage capacity of 9,000 gallons.

**Basis of Allocation.** Normally attached to an engineer unit having a large water supply mission or to an area support group.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—4, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–4 (NCO) | 51N40 |
| 1 | E–4 | 51N20 |
| 1 | E–3 | 51N20 |
| 1 | E–2 | 51A10 |

**Major Items of Equipment**

| | |
|---|---|
| *Weapons* | |
| Individual weapons only. | |
| *Vehicles* | |
| Truck, cargo, ¾–T | 1 |
| *Other Equipment* | |
| Generator set, 10 kw | 1 |
| Tank, 3,000 gal, fabric collapsible | 3 |
| Telephone set, TA–312/PT | 1 |
| Water purification equipment set, trk mtd, 3,000 gph | 1 |
| Water quality control set | 1 |

**Method of Operation.** Team personnel reconnoiter for and select a suitable site for the establishment of a water point. Engineer work at the water point—clearing, access roads, turn-arounds, and a parking area—is performed by the supported unit. Wire communication to the water point, when necessary, is installed by the supported unit. Security of the water point beyond the capability of the team is provided by the supported unit. For details of water purification operations, including the treatment of water contaminated with chemical, biological, and radiological (CBR) agents, see TM 5–700.

*Team GH, Water Purification (12,000 GPH)*

**Capability.** Capable of operating single or multiple standard water purification units forming a central field water plant to support 6,000 to 60,000 individuals.

**Basis of Allocation.** Normally attached to an engineer unit, such as a brigade or group, which has a large water supply mission or an area support group. May be attached to a civil affairs team.

**Category.** III.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—12, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 4940 |
| 1 | E–5 (NCO) | 51N40 |
| 1 | E–4 (NCO) | 51N40 |
| 2 | E–4 | 51K20 |
| 3 | E–3 | 51N20 |
| 2 | E–2 | 51N20 |
| 2 | E–2 | 51A10 |

**Major Items of Equipment**

| | |
|---|---|
| *Weapons* | |
| Individual weapons only. | |
| *Vehicles* | |
| Trailer, cargo, ¾–T | 1 |
| Truck, cargo, ¾–T | 1 |
| *Other Equipment* | |
| Generator set 1.5 kw | 1 |
| Generator set 10 kw | 4 |
| Light set, general illuminating, 25 outlet | 1 |
| Tank, 3,000 gal, fabric collapsible | 12 |
| Telephone set, TA–312/PT | 4 |
| Tool kit, pipefitters' | 1 |
| Water purification equipment set, trk mtd, 3,000 gph | 4 |
| Water quality control set | 2 |

**Method of Operation.** Team personnel reconnoiter for and select a suitable site for the establishment of a central field water plant. Individual water purification units (up to four) are connected to a single central distribution point. Engineer work at the water point is performed by the supported unit. Wire communication to the water point, when necessary, is installed by the supported unit. Security of the water point beyond the capability of the team is provided by the supported unit. For details of water purification operations, including the treatment of water contaminated with CBR agents, see TM 5–700.

*Team GI, Water Distillation (250 GPH)*

**Capability.** Capable of producing 5,000 gallons of potable water per day using sea or brackish water operating on a two-shift basis (20 hours).

**Basis of Allocation.** May be attached to any size unit or assigned to a civic action mission on an as required basis.

**Category.** III.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—5, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–4 (NCO) | 51N40 |
| 1 | E–4 | 51N20 |
| 2 | E–3 | 51N20 |
| 1 | E–2 | 51A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Truck, cargo, 2½–T ---------- 2

*Other Equipment*

Distillation equipment set, water, theremocompression, trlr mtd 150 GPH ---------- 2

Water quality control set ---------- 2

**Method of Operation.** Team personnel reconnoiter for and select a suitable site for a water point, Engineer work at the water point; clearing, access roads, turnarounds, brine sumps, and a parking area is performed by the supported unit. For information on water distillation and on the treatment of water contaminated with CBR agents, see TM 5–700.

*Team GJ, Water Tranport (5,000 GAL)*

**Capability.** Capable of transporting water for short hauls of 10 to 15 miles to dry water points. Capable of transporting 5,000 gallons of water per trip.

**Basis of Allocation.** Normally attached to an engineer unit or an area support group with a water hauling requirement.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—8, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–4 | 64A10 |
| 4 | E–3 | 64A10 |
| 3 | E–2 | 64A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Truck, tank, water, 2½–T ---------- 5

**Method of Operation.** Team hauls potable water from a water source to a distribution point or non-potable water to support a large concrete construction project.

## TOE 5–530G
## ENGINEER CONSTRUCTION, UTILITIES, AND ELECTRICAL POWER TEAMS

**Mission.** To provide engineer construction utilities and electrical power teams for specialized support to the Army as required.

*Team HA, Diving*

**Capability.** Capable of providing personnel with equipment to accomplish shallow or deep water diving in support of port construction and rehabilitation and construction of underwater pipeline.

**Basis of Allocation.** Normally one per engineer construction group engaged in major port or submarine pipeline projects.

**Category.** III.

**Mobility.** 80 percent mobile.

**Strength.** Aggregate—9, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 7242 |
| 1 | E–7 (NCO) | 00B40 |
| 2 | E–6 | 00B30 |
| 2 | E–5 | 00B30 |
| 2 | E–4 | 00B30 |
| 1 | E–3 | 00B10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Trailer, cargo, ¾–T ---------- 1

Trailer, cargo, 1½–T ---------- 1

Truck, cargo, ¾–T ---------- 1

Truck, cargo, 2½–T ---------- 1

*Other Equipment*

Chamber, decompression, diver's, 100 psi ---------- 1

Compressed air facility ---------- 1

Compressor, reciprocating, GED, skid mtd, 55 cfm, 100 psi ---------- 2

Compressor, reciprocating, GED, wheel mtd, 15 cfm, 3500 psi ---------- 1

Detector, multi-gas detector, pump model, w/ detector tubes ---------- 1

Diving equipment set, 2 person, 120 foot depth ---------- 2

Diving equipment set, 2 person, 100 foot depth ---------- 2

Diving equipment set, 1 person, open circuit ---------- 4

Repair kit, diving equipment ---------- 1

Repair kit for UDT type life jacket ---------- 1

Resuscitator, military model ---------- 1

Special tools, diver's ---------- 2

Stage, decompression, diver's ---------- 2

**Method of Operation.** Team provides personnel and equipment for underwater operations. Supported unit provides tools such as underwater cutting and welding sets, demolition materials and, if required, watercraft from which to operate. For information on diving, see TM 55–375.

*Team HB, Pipeline Design*

**Capability.** Capable of assisting the supported unit in:

1. Reconnaissance and selection of sites for major tank farms, pipeline route and appurtenant structures, offshore discharging and loading facilities, and fixed dispensing equipment.

2. Design and layout of pipeline projects, preparation of specifications and construction estimates, selection of material and equipment, and formulation of a construction plan.

3. Management and supervision of construction operations.

**Basis of Allocation.** Normally to an engineer construction group on an as required basis.

**Category.** III.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—6, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LTC | 7932 |
| 1 | CPT | 7932 |
| 1 | E-7 (NCO) | 51F40 |
| 1 | E-6 | 81B20 |
| 1 | E-4 | 71B30 |
| 1 | E-4 | 81B20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, 1¼-T | 1 |
| Trailer, cargo, ¾-T | 1 |
| Truck, cargo, ¾-T | 1 |
| Truck, utility, ¼-T | 1 |

*Other Equipment*

| | |
|---|---|
| Drafting equipment set, bn | 2 |
| Interpretation kit, photographic | 1 |
| Sketching kit, survey | 1 |
| Stereoscope lens, aerial photo interpretation | 1 |
| Stereoscope prism-mirror | 1 |

**Method of Operation.** Team works closely with engineer units engaged in pipeline construction and rehabilitation. It provides assistance and supervision in all phases of a project from initial survey through actual construction operations and with petroleum staff elements and units responsible for planning and operating these facilities. For details on pipeline design and construction, see TM 5-343.

*Team HC, Real Estate*

**Capability.** Capable of performing functions incidental to acquisition, utilization and disposal of real property required or occupied for military forces.

**Basis of Allocation.** Normally on per Field Army Support Command, and/or Area Support Command.

**Category.** III.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—16, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | MAJ | 4312 |
| 1 | CPT | 4312 |
| 3 | LT | 4312 |
| 1 | E-8 (NCO) | 51H50 |
| 2 | E-6 | 51H40 |
| 1 | E-6 | 71D20 |
| 4 | E-4 | 71B30 |
| 1 | E-4 | 84B20 |
| 2 | E-3 | 70A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼-T | 2 |
| Trailer, cargo, ¾-T | 1 |
| Truck, cargo, ¾-T | 2 |
| Truck, utility, ¼-T | 3 |

*Other Equipment*

| | |
|---|---|
| Camera set, still picture | 1 |
| Photocopying and processing machine | 1 |
| Photographic set, printing and processing, ES-20 | 1 |
| Reproduction set, diazotype machine, moist process | 1 |
| Reproduction expendable supply set, moist process | 1 |

**Method of Operation.** The team prepares real estate acquisition and disposal documents and inventories and records the location, extent, and condition of real property required or occupied by Army forces. The team commander and his deputy are contracting officers for real estate functions. The deputy also appraises or secures appraisals of real property and reviews and approves rental agreements and damage and restoration estimates. The other officers are responsible for negotiation and preparation of leases, licenses, termination agreements, and disposal documents, and for the investigation and processing of claims connected with real estate operations. For information on real estate operations, see TM 5-300.

*Team HD, Welding*

**Capability.** Capable of providing qualified welders and equipment for one mobile welding shop. Capable of performing electric arc, including inert gas shielded, and oxyacetylene welding.

**Basis of Allocation.** Normally to an engineer construction brigade or group or to a functionalized general support group.

**Category.** III.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—2, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–5 | 44C20 |
| 1 | E–4 | 44C20 |

**Major Items of Equipment**

| | |
|---|---|
| *Weapons* | |
| Individual weapons only. | |
| *Vehicles* | |
| Truck, cargo, 2½–T | 1 |
| *Other Equipment* | |
| Tool kit, welder's | 1 |
| Torch outfit, cutting and welding set No. 3 | 1 |
| Welding set, arc, inert gas shielded | 1 |
| Welding shop, trlr mtd, 300 amp | 1 |

**Method of Operation.** Team furnishes all types of welding to supported unit. For details on welding theory and practice, see TM 9–237.

*Team HE, Utilities (2,500)*

**Capability.** Capable of providing post engineer type services for an oversea or theater of operations installation with a population up to 2,500. Maintains and repairs buildings, roads, and utilities including refrigeration.

**Basis of Allocation.** Normally to the Corps Support Brigade of FASCOM on the basis of one per camp, base, depot, or other installation with a population up to 2,500.

**Category.** III.

**Mobility.** 95 percent mobile.

**Strength.** Aggregate—31, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | CPT | 7130 |
| 2 | E–6 (NCO) | 51P40 |
| 1 | E–5 | 82B20 |
| 1 | E–5 | 62E30 |
| 1 | E–5 | 62E20 |
| 1 | E–5 | 51B20 |
| 1 | E–5 | 51K20 |
| 1 | E–4 | 62E20 |
| 1 | E–4 | 44D20 |
| 3 | E–4 | 51B20 |
| 3 | E–4 | 52F20 |
| 2 | E–4 | 62B20 |
| 1 | E–4 | 81A10 |
| 2 | E–4 | 64B20 |
| 3 | E–4 | 51K20 |
| 1 | E–4 | 62E20 |
| 1 | E–4 | 51L20 |
| 1 | E–4 | 44C20 |
| 1 | E–4 | 63B20 |
| 3 | E–3 | 51A10 |

**Major Items of Equipment**

| | |
|---|---|
| *Weapons* | |
| Individual weapons only. | |
| *Vehicles* | |
| Trailer, cargo, ¼–T | 1 |
| Truck, cargo, ¾–T | 3 |
| Truck, dump 5–T | 2 |
| Truck, utility, ¼–T | 1 |
| *Other Equipment* | |
| Drafting equipment set, bn | 1 |
| Generator set, 3 kw | 1 |
| Grader, road, mtzd, DED, 6 x 4 | 1 |
| Loader, scoop, 2½ cu yd | 1 |
| Pneumatic tool and compressor outfit, 250 cfm, trailer mtd | 1 |
| Pump, centrifugal, pneumatic driven, 25 ft hd, 210 gpm | 2 |
| Rod, level | 1 |
| Rod, stadia | 1 |
| Roller, motorized, GED, 3-wheel, 10-T | 1 |
| Spray outfit, paint, 2 guns, w/compressor | 1 |
| Tool kit, blacksmith's | 1 |
| Tool kit, carpenter's | 4 |
| Tool kit, electrician's, set No. 1 | 3 |
| Tool kit, pioneer, engineer platoon | 1 |
| Tool kit, pipefitter's, ⅛ to 2 in. pipe | 1 |
| Tool kit, pipefitter's, 2½ to 4 in. pipe | 1 |
| Tool kit, service, refrigeration | 1 |
| Tool kit, sheet metal worker's | 1 |
| Tool kit, welder's | 1 |
| Tool outfit, pioneer, portable electric tools | 1 |
| Transit, 1 minute 16 to 21 diam. magnifying power | 1 |
| Tripod, survey | 1 |
| Welding shop, trlr mtd, 300 amp | 1 |
| Welding set, arc, inert gas shielded | 1 |

**Method of Operation.** Team functions in a manner similar to that of a post engineer organization at a CONUS installation. The team leader acts as the post engineer; team members repair and maintain utilities services, structures, and roads, and do minor new construction within the team's capability. For details on repairs and utilities, see the TM 5–600 series.

*Team HF, Utilities (4,000)*

**Capability.** Capable of providing for maintenance of utilities at installations of from 2,500 to 4,000 individuals; provide post engineer-type service in oversea or theater of operations installations; maintain utilities and furnish utilities service and repair, including maintenance of environmental equipment (airconditioners, heaters, and refrigeration equipment). Specialized tools and equipment required to carry out the repair and utility functions described above must be provided by the installation or activity

supported, under the provisions of AR 310–34 and/or AR 385–32.

**Basis of Allocation.** Normally to the Corps Support Command of TASCOM and/or the Engineer Command on the basis of one per camp, base, depot, or other installation with a population of 2,500 to 4,000.

**Category.** III.

**Mobility.** 95 percent mobile.

**Strength.** Aggregate—52, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | CPT | 7130 |
| 1 | WO | 521A0 |
| 1 | E–7 (NCO) | 51P40 |
| 1 | E–6 (NCO) | 51H40 |
| 1 | E–6 (NCO) | 51P40 |
| 1 | E–5 | 82B20 |
| 1 | E–5 | 62E30 |
| 1 | E–5 | 62E20 |
| 2 | E–5 | 51B20 |
| 1 | E–5 | 52F20 |
| 1 | E–5 | 51K20 |
| 1 | E–4 | 62E20 |
| 1 | E–4 | 44D20 |
| 8 | E–4 | 51B20 |
| 3 | E–4 | 52F20 |
| 1 | E–4 | 62B20 |
| 1 | E–4 | 81A10 |
| 3 | E–4 | 51J30 |
| 3 | E–4 | 64B20 |
| 4 | E–4 | 51K20 |
| 1 | E–4 | 62E20 |
| 2 | E–4 | 51L20 |
| 3 | E–4 | 51J20 |
| 1 | E–4 | 76P20 |
| 1 | E–4 | 44C20 |
| 1 | E–4 | 63B20 |
| 4 | E–3 | 51A10 |
| 1 | E–3 | 52A10 |
| 1 | E–3 | 70A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼–T | 1 |
| Trailer, cargo, ¾–T | 2 |
| Truck, cargo, ¾–T | 3 |
| Truck, dump, 5–T | 3 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Drafting equipment set, bn | 1 |
| Generator set, 3 kw | 1 |
| Grader, road, mtzd, *DED*, 6 x 4 | 1 |
| Loader, scoop, 2½ cu yd | 1 |
| Pneumatic tool and compressor outfit, 250 cfm, trlr mtd | 1 |

*Other Equipment*—Continued

| | |
|---|---|
| Pump, centrifugal, GED, frame mtd, 170 gpm, 50 ft head | 1 |
| Rod, level | 1 |
| Rod, stadia | 1 |
| Roller, motorized, GED, 3-wheel, 10–T | 1 |
| Spray outfit, paint, 2 guns, w/compressor | 1 |
| Tool kit, blacksmith's | 1 |
| Tool kit, carpenter's | 10 |
| Tool kit, electrician's, set No. 1 | 4 |
| Tool kit, pioneer, engineer platoon | 2 |
| Tool kit, pipefitter's, ⅛ to 2 in. pipe | 4 |
| Tool kit, pipefitter's, 2½ to 4 in. pipe | 1 |
| Tool kit, service, refrigeration | 1 |
| Tool kit, sheet metal worker's | 3 |
| Tool kit, welder's | 1 |
| Tool outfit, pioneer, portable electric tools | 1 |
| Torch outfit, cutting and welding, set No. 3 | 1 |
| Transit, 1 minute, 16 to 21 diam. magnifying power | 1 |
| Tripod, survey | 1 |
| Welding set, arc, inert gas shielded | 1 |
| Welding shop, trlr mtd, 300 amp | 1 |

**Method of Operation.** Team functions in a manner similar to that of a post engineer organization at a CONUS installation. The team leader acts as the post engineer; team members repair and maintain utilities services, structures, and roads; and do minor new construction within the team's capability. For details on repairs and utilities, see the TM 5–600 series.

*Team HG, Utilities (10,000)*

(To be published)

*Team HH, Power Plant Operation and Maintenance*

**Capability.** Capable of operating and maintaining an electric power plant containing from one to three diesel engine generators of 300 to 2,500 kw capacity.

**Basis of Allocation.** Normally one per Engineer Construction Brigade.

**Category.** III.

**Mobility.** 60 percent mobile.

**Strength.** Aggregate—16, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 7611 |
| 1 | E–6 (NCO) | 52E40 |
| 1 | E–5 | 52G20 |
| 2 | E–5 | 52E20 |
| 2 | E–5 | 52B30 |
| 2 | E–4 | 52F20 |
| 2 | E–4 | 52E20 |
| 4 | E–4 | 52B30 |
| 1 | E–3 | 52A10 |

### Major Items of Equipment

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¾-T | 1 |
| Truck, cargo, ¾-T | 1 |

*Other Equipment*

| | |
|---|---|
| Multimeter, AN/USM-223 | 3 |
| Tool kit, automotive mechanic's | 6 |
| Tool kit, carpenter's, engineer plat | 1 |
| Tool kit, electrician's set No. 1 | 3 |
| Tool kit, electronic equipment repair | 1 |
| Torch outfit, cutting and welding, set No. 3 | 1 |

**Method of Operation.** Team is divided into two shifts to provide continuous operation of the power plant. For information on electric power generation in the field, see TM 5-766.

*Team HI, Engineer Floating Power Plant (NUCLEAR)*

**Capability.** Capable of providing technically qualified personnel, with equipment, to supply large amounts of electrical power (10-50 MW) from nuclear fuel, in support of military operations in coastal areas or along navigable waterways. This plant requires towing to the desired operating location. (It is operated while berthed at a suitable wharf, pier, or offshore anchorage position. When operating from the offshore anchorage position, power is distributed to shore by the use of submarine power cables.) Approximately two (2) megawatts of electrical power from auxiliary diesel generators is available on floating nuclear power plants for ship's service, start-up, and limited support to immediate shore facilities during preparations for reactor plant operations. The reactor plant can provide power for long periods of time with little logistical support. This team must be supported by one Mess Team CA from TOE 29-500 when vessel is under tow from site to site, and one or more Water Distillation Teams from TOE 5-520 when potable water must be provided.

**Basis of Allocation.** Normally to a Theater Army Support Command on an as required basis.

**Category.** III.

**Mobility.** Fixed when plant is operating. Approximately 25 percent of the team personnel accompany the plant when it is under tow.

**Strength.** Aggregate—68, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | MAJ | 0009 |
| 1 | CPT | 0009 |
| 1 | WO | 351A |
| 1 | E-9 (NCO) | 52M50 |
| 7 | E-8 (NCO) | 52M50 |
| 9 | E-7 (NCO) | 52M40 |
| 1 | E-7 (NCO) | 61B40 |
| 1 | E-7 (NCO) | 76K40 |
| 1 | E-6 (NCO) | 05B40 |
| 4 | E-6 | 52J20 |
| 4 | E-6 | 52K20 |
| 5 | E-6 | 52H20 |
| 5 | E-6 | 52L20 |
| 1 | E-6 | 91C20 |
| 2 | E-5 | 52J20 |
| 2 | E-5 | 52K20 |
| 2 | E-5 | 52H20 |
| 2 | E-5 | 52L20 |
| 2 | E-5 | 61B30 |
| 3 | E-5 (NCO) | 61B40 |
| 1 | E-5 | 61C30 |
| 1 | E-5 | 76Y20 |
| 1 | E-4 | 71B30 |
| 4 | E-4 | 61B20 |
| 1 | E-4 | 61C30 |
| 1 | E-4 | 71H20 |
| 4 | E-3 | 61A10 |

### Major Items of Equipment

*Weapons*

Individual weapons.

| | |
|---|---|
| Machinegun, cal. .50, heavy, flexible | 8 |
| Mount pedestal, machinegun, twin cal. .50 | 4 |

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼-T | 1 |
| Trailer, cargo, ¾-T | 1 |
| Truck, cargo, ¾-T | 1 |
| Truck, utility, ¼-T | 1 |

*Other Equipment*

| | |
|---|---|
| Boat, utility | 1 |
| Floating nuclear power plant, type MH, 10-50 megawatts elec | 1 |
| Landing craft—LCVP (wood), BUSHIPS plan No LCVP-8510 or 8860 | 1 |
| Power supply, PP-2953/U | 1 |
| Radio set, AN/GRC-106 | 1 |
| Radio set, AN/PRC-25 | 4 |
| Radio set, AN/SRC-6 | 2 |
| Radio set, AN/SRC-8X | 1 |
| Radio set, AN/VRC-46 | 2 |
| Shelter, electrical equipment, S-318/G | 1 |
| Spray gun, paint, nonbleeder type | 2 |
| Surgical equipment and supply set, individual | 1 |
| Tool kit, canvas worker's | 1 |
| Tool kit, general mechanic's, rail and marine diesel repair | 1 |
| Tool kit, radar and radio, repairman | 1 |
| Tool kit, welders' | 1 |
| Tool kit, armorer's | 1 |
| Water quality control set | 2 |

**Method of Operation**

1. The floating nuclear power plant is towed from site to site by an oceangoing tug. The master of the towing vessel is responsible for the safety and satisfactory accomplishment of this operation.

*a.* Approximately one-fourth of the crew remains on the vessel during towing operations. The remainder constitute the advance party and rear echelon and are airlifted or transported by surface carrier to the new operational site.

*b.* The nuclear reactor is shut down and depressurized while under tow. Ship's power and heat and other ship's services are provided by operation of auxiliary diesel generators, boilers, and equipment.

2. The team is organized into a team headquarters and three sections with functions as follows (fig. B–62) :

*a.* Team headquarters provides the command supervision for the operation and maintenance of the floating nuclear power plant, and personnel for handling administrative activities pertaining to the plant and vessel operations.

*b.* The plant process and radiation control section provides the supervision for all phases of process control, health physics, and radiological safety in the plant.

*c.* The plant operations section provides the supervisory and operational personnel for the safe and efficient operation of the plant.

*d.* The maintenance and deck section provides the supervisory and operational personnel for the repair and maintenance of the nuclear power plant, the vessel, and auxiliary equipment.

3. Each operator in the nuclear power plant is a specialist in two areas: first, operation of nuclear power plants; and second, maintenance in one of four specialty areas, either mechanical, electrical, instrument, or process control. This cross-training and cross-utilization is continued throughout his experience, and provides for teamwork and allows flexibility of assignment and utilization of personnel. Four complete operating shifts are necessary to provide continuous generation of power on a 24-hour day, 7-day week basis.

4. Because of the potential radiation hazard, the team normally is quartered ashore and provided subsistence by attachment to an appropriate unit in the shore or port complex. Where this is not possible, the unit is augmented with a mess team. The operating crew on duty eats one meal on board during their 8-hour shift; this meal is prepared ashore and brought aboard.

5. A shipboard sick bay, with equipment, is provided. A medical field assistant is a member of the detachment and is the only medical support for the crew while the vessel is under tow. Upon arrival at the site, medical support is provided by the shore unit.

6. The vessel is fitted with necessary repair parts and tools to maintain the power plant equipment and auxiliaries. Special requisitions are necessary to replenish nonstandard items not available through normal military channels.

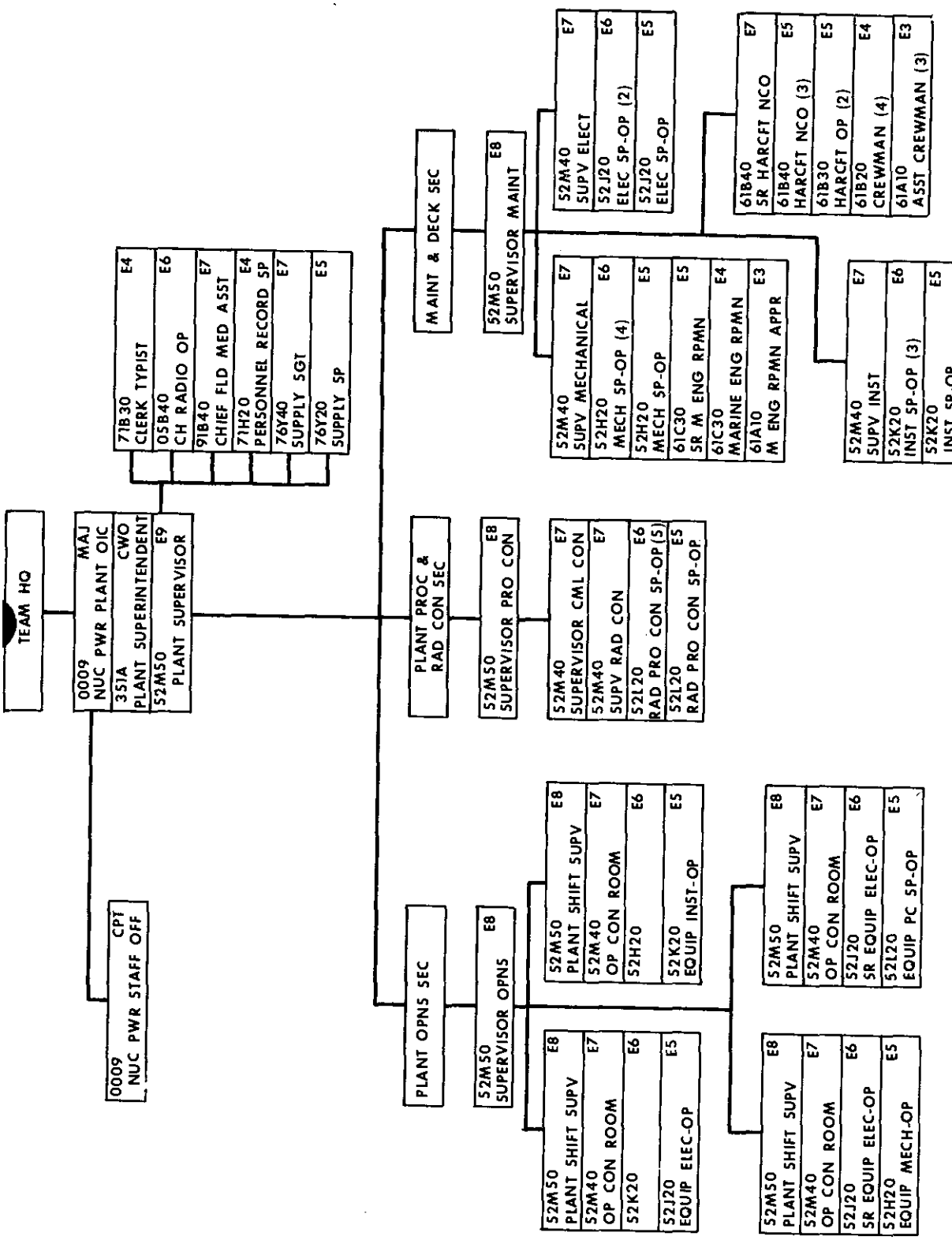
7. A minimum of two vehicles is required to provide transportation for the officer-in-charge, the technical staff officer, shift changes, supply pickup, and shore operations to include limited powerline maintenance and/or installation. One 26-foot utility boat and one 36-foot landing craft (LCVP) transport shift personnel, supplies, and equipment, and place the submarine power cable from the vessel to shore when off-shore operation is required.

8. The vessel is equipped with ship-to-shore and ship-to-ship voice radio communications for operation on Coast Guard and emergency frequencies, harbormaster nets, and for contact with the towing vessel. Standard marine sound and visual signaling equipment is also provided. U.S. Army tactical radio transmitting and receiving equipment is required to permit communications with the higher army headquarters. Portable radio sets provide internal communications to powerboats and vehicles.

*Team HJ, Power Line*

**Capability.** Capable of installing high voltage electric power lines, including setting poles, and maintaining approximately 60 miles of high voltage electric power lines.

**Basis of Allocation.** Normally one per two electric power generator plants of 300 to 2,500 kilowatt capacity.




★*Figure B–62. Organization chart, team HI.*

**Category.** III.

**Mobility.** *100* percent mobile.

**Strength.** Aggregate—14, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 7611 |
| 1 | E–6 (NCO) | 52G40 |
| 9 | E–5 | 52G20 |
| 3 | E–4 | 52G20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cable, reel, 3½–T | 1 |
| Trailer, cargo, 1½–T | 1 |
| Truck, cargo, ¾–T | 3 |
| Truck, cargo, 2½–T | 1 |
| Truck, maintenance, earth borer, pole setter | 1 |

*Other Equipment*

| | |
|---|---|
| Multimeter, AN/USM–223 | 3 |
| Tool kit, carpenter's, engineer plat | 1 |
| Tool kit, electrician's, set No. 1 | 9 |
| Tool kit, electronic equipment repair | 10 |
| Voltmeter, portable | 1 |

**Method of Operation.** Team may be divided into three sections, each responsible for the maintenance and repair of 20 miles of power line. For power line installation it is advisable to augment the team with personnel for setting poles. For information on electric power transmission and distribution, see TM 5–765.

## TOE 5–540G
## ENGINEER TOPOGRAPHIC AND INTELLIGENCE TEAMS

**Mission.** To provide engineer topographic and intelligence teams for specialized support to the Army, as required.

*Team IA, Topo Planning and Control*

**Capability.** Capable of planning and supervising the mapping and related engineer intelligence activities of a major command (field army or larger) to include—

1. Supervision, collection, maintenance, and dissemination of topographic and artillery fire control survey data.
2. Coordination and evaluation of map and engineer intelligence reproduction facilities and planning the employment of these facilities.
3. Supervision of map depot operations.
4. Maintaining liaison with higher headquarters and allied forces.
5. Coordination of indigenous mapping and reproduction facilities in accomplishing the command mapping mission.

**Basis of Allocation.** Normally one per theater army headquarters, as required.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—20, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LTC | 7915 |
| 1 | MAJ | 9301 |
| 2 | MAJ | 7915 |
| 3 | CPT | 7915 |
| 1 | LT | 7915 |
| 1 | E–8 (NCO) | 81C50 |
| 1 | E–7 (NCO) | 81D40 |
| 1 | E–7 (NCO) | 82E40 |
| 1 | E–7 (NCO) | 96B40 |
| 1 | E–7 (NCO) | 76Z50 |
| 1 | E–7 (NCO) | 83Z40 |
| 1 | E–7 (NCO) | 82D40 |
| 1 | E–6 | 51Q20 |
| 1 | E–4 | 81C20 |
| 3 | E–4 | 71B30 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼–T | 1 |
| Trailer, cargo, ¾–T | 1 |
| Trailer, cargo, 1½–T | 1 |
| Truck, cargo, ¾–T | 1 |
| Truck, cargo, 2½–T | 1 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Book set, topo, general purpose | 1 |
| Book set, topo bn, photomapping company | 1 |
| Book set, topo bn, reproduction company | 1 |
| Drafting equipment set, battalion, charts, sketches and overlays | 1 |
| Drawing board and trestle, 42 by 31 inches | 2 |
| Generator set, 1.5 kw | 1 |
| Lettering set, vertical and angular lettering | 1 |
| Light set, general illumination, 25 outlet | 1 |
| Planimeter polar | 1 |
| Stereoscope lens, aerial photo interpretation | 6 |
| Stereoscope, prism-mirror | 1 |
| Template and tracer pin, military symbols | 1 |

**Method of Operation.** The team acts as a special section under the staff engineer in the headquarters of the command to which it is assigned or attached—theater army, army group, or field army. The team chief acts as the staff topographic specialist. The team assists in developing and promulgating command policies and directives in mapping and related activities, and supervises their implementation. For details of mapping functions of the Corps of Engineers, see TM 5–231.

*Team IB, Geodetic Survey*

**Capability.** Capable of accomplishing, instructing, or supervising 1st order astronomic observations surveys and computations in a theater of operations survey operation, or in the field army for guided missile and artillery fire control support.

**Basis of Allocation.** Normally one per topographic battalion.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—20, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LTC | 7915 |
| 1 | MAJ | 7915 |
| 1 | CPT | 7915 |
| 1 | WO | 821A |
| 1 | E–6 (NCO) | 82D40 |
| 4 | E–6 | 82E30 |
| 2 | E–6 | 82D30 |
| 2 | E–5 | 82D20 |
| 1 | E–4 | 81C20 |
| 1 | E–4 | 71B30 |
| 2 | E–4 | 82D20 |
| 1 | E–4 | 41B20 |
| 1 | E–3 | 82A10 |
| 1 | E–2 | 82A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼–T | 1 |
| Trailer, cargo, ¾–T | 2 |
| Trailer, cargo, 1½–T | 1 |
| Truck, cargo, ¾–T | 2 |
| Truck, cargo, 2½–T | 1 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Computing and drafting equipment set, field survey data | 1 |
| Generator set, 1.5 kw | 2 |
| Interpretation kit, photographic | 1 |
| Radio set, AN/VRG–46 | 2 |
| Radio set, AN/VRC–47 | 1 |
| Radio set, AN/PRC–25 | 4 |
| Stereoscope lens, aerial photo interpretation | 1 |
| Stereoscope, prism-mirror | 1 |
| Survey set, astronomic position | 2 |
| Survey set, precise traverse, taping and stadia method | 1 |
| Survey set, supplemental equipment, topographic bn | 2 |
| Tent, observing, astronomic | 1 |
| Theodolite, survey, direct, first order, w/tripod | 1 |
| Tool kit, precision instrument repair | 1 |

**Method of Operation.** Team may be organized into two survey sections and a headquarters section. Team makes first order surveys in support of a theater of operations survey program and for artillery and guided missile fire control. It may also instruct personnel of other topographic units in high order surveying or supervise their operations in this task. For information on geodetic surveying, see TM 5–441 and U.S. Coast and Geodetic Survey Special Publication No's. 225, 237, 239, and 247.

*Team IC, Survey*

**Capability.** Capable of performing topographic reconnaissance and surveying for topographic mapping and establishing second, third, and fourth order ground control for missile support, surveillance devices, and conventional artillery. Requires aircraft, FADAC (field artillery digital automatic computer), and survey tower support from the unit which it reinforces.

**Basis of Allocation.** Normally assigned to a topographic unit whose survey tasks exceed organic capabilities.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—15, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | WO | 821A |
| 2 | E–6 (NCO) | 82E40 |
| 1 | E–6 | 82D30 |
| 1 | E–5 | 82E20 |
| 2 | E–5 | 82D30 |
| 1 | E–4 | 82E20 |
| 3 | E–4 | 82D20 |
| 1 | E–4 | 41B20 |
| 2 | E–3 | 82A10 |
| 1 | E–2 | 82A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¾–T | 4 |
| Truck, cargo, ¾–T | 4 |

*Other Equipment*

| | |
|---|---|
| Altimeter, surveying | 3 |
| Astronomic position set | 1 |
| Detecting set, mine, portable, metallic | 1 |
| Detector set, mine, microwave | 1 |
| Generator set, 1.5 kw, 28 V, DC | 4 |
| Generator set, 1.5 kw, 120 V, AC | 2 |
| Interpretation kit, photographic | 1 |
| Panel marker, aerial liaison | 2 |
| Radio set, AN/VRC–46 | 3 |

*Other Equipment*—Continued

| | |
|---|---|
| Radio set, AN/VRG–47 | 1 |
| Stereoscope lens, aerial photo interpretation | 2 |
| Survey instrument, distance measuring, electronic, microwave, miniature, dual purpose unit | 3 |
| Survey set, plane table, 5-man, topo survey | 1 |
| Survey set, precise traverse, taping and stadia methods | 1 |
| Survey set, triangulation, reconnaissance specialist | 1 |
| Survey set, triangulation, principal observer and signal tender | 3 |
| Survey set, supplemental equipment, topo bn | 1 |
| Target, survey, beacon | 3 |
| Tent, observing, astronomic | 3 |
| Tool kit, precision instrument repair | 1 |

**Method of Operation.** Team performs reconnaissance and survey missions as required. Operates as a single large party or may be divided into smaller parties (two or three) for several simpler missions. For information on topographic surveying, see TM 5–441.

*Team ID, Survey (Airborne)*

**Capability.** Capable of providing jump-qualified personnel with equipment to perform second, third, and fourth order topographic and artillery fire control support surveys for an airborne corps or independent airborne force to include support of TOE 5–195, Engineer Combat Battalion (Airborne). Tower and FADAC support must be provided by the supported unit.

**Basis of Allocation.** Normally assigned to a topographic unit.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—15, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | WO | 821A7 |
| 1 | E–6 (NCO) | 82E4P |
| 1 | E–6 (NCO) | 82D4P |
| 1 | E–6 | 82D3P |
| 1 | E–5 | 82E2P |
| 2 | E–5 | 82D2P |
| 1 | E–4 | 82E2P |
| 3 | E–4 | 82D2P |
| 1 | E–4 | 41B2P |
| 2 | E–3 | 82A1P |
| 1 | E–2 | 82A1P |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¾–T | 4 |
| Truck, cargo, ¾–T | 4 |

*Other Equipment*—Continued

| | |
|---|---|
| Altimeter, surveying | 3 |
| Astronomic position set | 1 |
| Detecting set, mine, portable, metallic | 1 |
| Detector set, mine, microwave | 1 |
| Generator set, 1.5 kw, 28 V, DC | 4 |
| Generator set, 1.5 kw, 120 V, AC | 2 |
| Interpretation kit, photographic | 1 |
| Panel marker, aerial liaison | 2 |
| Radio set, AN/VRC–46 | 3 |
| Radio set, AN/VRG–47 | 1 |
| Stereoscope lens, aerial photo interpretation | 2 |
| Survey instrument, distance measuring, electronic, microwave, miniature, dual purpose unit | 3 |
| Survey instrument, azimuth, gyroscopic, artillery | 1 |
| Survey set, plane table, 5 man, topo survey | 1 |
| Survey set, precise traverse, taping and stadia methods | 1 |
| Survey set triangulation, reconnaissance specialist | 1 |
| Survey set, triangulation, principal observer and signal tender | 3 |
| Survey set, supplemental equipment, topo bn | 1 |
| Target, survey, beacon | 3 |
| Tent, observing, astronomic | 3 |
| Tool kit, precision instrument repair | 1 |

**Method of Operation.** Team jumps into an operational area to perform reconnaissance and survey missions as required. It operates as a single large party or may be divided into two or three smaller parties for several similar missions. For details on topographic surveying, see TM 5–441.

*Team IE, Photographic Evaluation.*

**Capability.** Capable of preparing contact prints and diapositive plates from USAF aerial photography negatives; inspecting negatives and contact prints to evaluate the suitability of the photography for the compilation of military topographic maps.

**Basis of Allocation.** Normally one to an engineer topographic battalion.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—9, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | WO | 811A |
| 1 | E–6 (NCO) | 81D40 |
| 2 | E–5 | 81D30 |
| 2 | E–4 | 81D30 |
| 2 | E–4 | 83D20 |
| 1 | E–3 | 83A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼–T | 1 |
| Trailer, cargo, 1½–T | 1 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Drawing board and trestle, 60 by 42 in. | 2 |
| Generator set, 10 kw | 2 |
| Lettering set, vertical and angular lettering | 1 |
| Multiplex section, topographic mapping set, truck mtd | 1 |
| Photomechanical process section, topographic reproduction set, truck mtd | 1 |
| Straightedge steel 42 in. | 1 |
| Template and tracer pin, military symbols | 1 |
| Tool kit, carpenter's | 1 |
| Trimmer, paper | 1 |

**Method of Operation.** The team usually is located at a USAF photographic unit base. Negatives and contact prints are inspected by team members for warpage, distortion, negative quality, and adequate stereoscopic coverage. Diapositive plates are made from those negatives found suitable. For information on cartographic aerial photography, see TM 5–240 and TM 5–243.

*Team IF, Photomapping Platoon*

**Capability.** Capable of the following:

1. Compilation of photomaps and mosaics, controlled and uncontrolled.
2. Compilation of a limited number of new maps from aerial photography, existing maps, charts and other sources.
3. Limited revision of existing maps.
4. Drafting special maps, overprints, overprints and overlays for operational use and for terrain and engineer intelligence studies.
5. Provision of point locations for mapping and fire control through limited extension of ground control by photogrammetric means from a strip or strips of aerial photographs.

**Basis of Allocation.** Normally attached to an engineer topographic battalion whose photomapping tasks exceed its organic capability.

**Category.** II.

**Mobility.** 80 percent mobile.

**Strength.** Aggregate—44, as follows:

| Number | Grade | MOS |
|---|---|---|
| 1 | LT | 7915 |
| 1 | WO | 811A |
| 1 | E–7 (NCO) | 81C40 |
| 2 | E–6 (NCO) | 81C40 |
| 1 | E–6 (NCO) | 81D40 |
| 4 | E–5 | 81C20 |
| 4 | E–5 | 81D20 |
| 2 | E–5 | 81D30 |
| 1 | E–5 | 82E20 |
| 1 | E–4 | 82E20 |
| 8 | E–4 | 81C20 |
| 5 | E–4 | 81D20 |
| 3 | E–4 | 81D30 |
| 1 | E–4 | 52B20 |
| 2 | E–4 | 83D20 |
| 1 | E–4 | 41B20 |
| 5 | E–3 | 81A10 |
| 1 | E–3 | 83A10 |

## Major Items of Equipment

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Chassis, trailer, 2½–T | 2 |
| Trailer, cargo, ¾–T | 1 |
| Truck, cargo, ¾–T | 1 |

*Other Equipment*

| | |
|---|---|
| Book set, topographic bn, photomapping co | 1 |
| Cartographic section, topographic mapping set, truck mtd | 1 |
| Composing machine, changeable type, plate style, 24 in. paper size | 1 |
| Composing machine, photo printing type | 1 |
| Map revision section, topographic mapping set, truck mtd | 1 |
| Detecting set, mine, portable, metallic | 1 |
| Detector set, mine, microwave | 1 |
| Drafting equipment set, supplemental, plastic scribing | 6 |
| Generator set, 30 kw | 2 |
| Light set, general illumination, 25 outlet | 1 |
| Map revision section, topographic mapping set, truck mtd | 1 |
| Multiplex section, topographic mapping set, truck mtd | 1 |
| Panel marker, aerial liaison | 4 |
| Photomapping section, topographic mapping set, truck mtd | 1 |
| Processing machine, photogrammatic, diapositive plates | 1 |
| Rectifier section, topographic mapping set, truck mtd | 1 |
| Stereoscope lens, aerial photo interpretation | 10 |
| Stereoscope prism-mirror | 1 |
| Supplemental equipment set, topographic photomap | 1 |
| Tool kit, automotive mechanic's | 1 |
| Tool kit, carpenter's | 1 |
| Tool kit, precision instrument repair | 1 |
| Tool kit, service, refrigeration unit | 1 |

**Method of Operation.** The team is organized into a platoon headquarters, a compilation section, and a cartographic section. The compilation section uses survey data and aerial photos to prepare mosaics, working diagrams, and map compilation sheets. The cartographic section uses the output of the compilation section

to prepare the map manuscript. Platoon headquarters personnel provide the necessary command and supervision, perform organizational maintenance on photomapping equipment, and edit the work of the two sections. Water required for the photgraphic process must be furnished by the supported unit. For detailed information on map compilation and revision and on multiplex mapping, see TM 5–240 and TM 5–244.

*Team IG, Map Reproduction Platoon.*

**Capability.** Capable of providing qualified personnel and equipment for the production of maps and other engineer intelligence material from original manuscripts.

**Basis of Allocation.** Normally attached to an engineer topographic unit whose map reproduction requirements exceed its organic capabilities.

**Category.** II.

**Mobility.** 80 percent mobile.

**Strength.** Aggregate—51, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 7915 |
| 1 | WO | 831A |
| 1 | E–7 (NCO) | 83F40 |
| 1 | E–7 (NCO) | 83Z40 |
| 1 | E–6 (NCO) | 83F40 |
| 3 | E–6 (NCO) | 83Z40 |
| 1 | E–5 (NCO) | 83Z40 |
| 1 | E–5 | 52B30 |
| 8 | E–5 | 83F20 |
| 2 | E–5 | 83E20 |
| 2 | E–5 | 83D20 |
| 8 | E–4 | 83F20 |
| 4 | E–4 | 83D20 |
| 5 | E–4 | 83E20 |
| 1 | E–4 | 41K20 |
| 1 | E–4 | 83A10 |
| 10 | E–3 | 83A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Chassis, trailer, 2½–T | 3 |
| Trailer, cargo, ¾–T | 2 |
| Truck, cargo, ¾–T | 2 |
| Truck, van, expansible, 2½–T | 1 |
| Truck, van, shop, 2½–T | 1 |

*Other Equipment*

| | |
|---|---|
| Camera section, topographic reproduction set, truck mtd | 1 |
| Cutter, paper, guillotine, floor mounting, electric motor driven | 1 |
| Generator set, 45 kw | 3 |

*Other Equipment—Continued*

| | |
|---|---|
| Laboratory section, topographic reproduction set, truck mtd | 1 |
| Map layout section, topographic reproduction set, truck mtd | 1 |
| Photomechanical process section, topographic reproduction set, truck mtd | 1 |
| Plate process section, topographic reproduction set, truck mtd | 1 |
| Press section, topographic reproduction set, truck mtd | 4 |
| Tool kit, automotive mechanic's | 1 |
| Tool kit, light machine repair | 1 |

**Method of Operation.** The platoon is organized into a platoon headquarters, a photographic section, a plate and layout section, and a press section. Platoon headquarters personnel provide the necessary command and supervision and perform organizational maintenance on the reproduction and power generating equipment. The photographic section makes copy negatives or positives from map manuscripts or other material. The plate and layout section makes offset press plates from the copy positives. The press section print maps, photomaps, overlays, overprints, and other material. The supported unit provides the necessary water. For information on map reproduction, see TM 5–245.

*Team IH, Map Distribution Platoon*

**Capability.** Capable of receiving, storing, issuing, and distributing maps and other engineer intelligence material for a base army or corps. This platoon may operate a depot.

**Basis of Allocation.** Normally one to three per topographic battalion to operate forward map depots.

**Category.** II.

**Mobility.** 80 percent mobile.

**Strength.** Aggregate—38, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 7915 |
| 1 | E–7 (NCO) | 76Q40 |
| 1 | E–5 (NCO) | 76V40 |
| 1 | E–5 (NCO) | 76Q40 |
| 2 | E–5 | 76Q20 |
| 7 | E–4 | 76Q20 |
| 4 | E–4 | 76V20 |
| 3 | E–3 | 76V20 |
| 11 | E–3 | 76A10 |
| 1 | E–3 | 76V20 |
| 6 | E–2 | 76A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

| *Vehicles* | |
|---|---|
| Chassis, trailer, 2½–T | 1 |
| Semitrailer, van, cargo, 12–T | 2 |
| Trailer, cargo, ¾–T | 2 |
| Truck, cargo, ¾–T | 2 |
| Truck, cargo, 2½–T | 1 |
| Truck, tractor, 5–T | 2 |
| *Other Equipment* | |
| Generator set, 15 kw | 1 |
| Light set, general illumination, 25 outlet | 2 |
| Shop equipment, woodworking, base maintenance, trailer mtd | 1 |
| Tool kit, carpenter's | 1 |
| Truck, hand, lift pallet, 4000 lb capacity | 1 |
| Truck, hand, 2-wheeled | 2 |

**Method of Operation.** The platoon normally operates an advance map depot for a base topographic battalion or a forward map depot for an army topographic battalion. On occasion it may operate a corps map depot for a corps topographic company. The platoon usually is organized into a platoon headquarters for command and supervision and three sections: receiving, storing, and shipping. For details on map distribution, see FM 5–146 and FM 101–10–1.

*Team II, Military Hydrology*

**Capability.** Capable of predicting river stages and discharges, and natural and artificial flood velocities, depths, and widths, in a drainage basin with an area up to 1,000 square miles; preparing hydrologic analyses of river crossings sites; preparing studies of hydrologic and hydraulic factors involved in military installations from a point of view of flood and tidal incidence; providing technical advice on hydraulic features of logistic operations and on equipment for use in water. When necessary the theater commander will provide for the allocation of additional communication facilities and for joint operation of Air Weather Service Units Naval Hydrographic units and Corps of Engineers units.

**Basis of Allocation.** Normally one per field army or independent corps; may be assigned to a geographic area, determined by stream and drainage basin characteristics.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—22, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | MAJ | 7900 |
| 1 | CPT | 7900 |
| 1 | CPT | 7915 |
| 1 | LT | 8204 |
| 1 | E–6 (NCO) | 82D40 |
| 2 | E–5 | 82D20 |
| 1 | E–4 | 81C20 |
| 2 | E–4 | 71B30 |
| 1 | E–4 | 76C20 |
| 2 | E–4 | 82E20 |
| 2 | E–4 | 01D20 |
| 2 | E–4 | 01F20 |
| 2 | E–3 | 01D20 |
| 1 | E–3 | 01F20 |
| 1 | E–3 | 05B20 |

## Major Items of Equipment

| *Weapons* | |
|---|---|
| Individual weapons only. | |
| *Vehicles* | |
| Trailer, cargo, ¼–T | 1 |
| Trailer, cargo, ¾–T | 5 |
| Truck, cargo, ¾–T | 5 |
| Truck, utility, ¼–T | 1 |
| *Other Equipment* | |
| Altimeter, surveying | 2 |
| Astrolabe, pendulum, 60 degree instrument, altitude | 2 |
| Astronomical attachment for transit or theodolite | 2 |
| Boat, reconnaissance, pneumatic, 3-man | 2 |
| Drafting machine, 24 in. long arm | 1 |
| Driver, projectile unit, power activated, underwater | 1 |
| Duplicating machine, stencil process | 1 |
| Float, copper rod, 25 mm ID by 12 in. long | 24 |
| Float, gage, portable, automatic water storage recording | 2 |
| Gage, precipitation | 20 |
| Gage, hook, weir | 10 |
| Generator set, 1.5 kw, 28 V, DC | 1 |
| Generator set, 5 kw, 120/208/240 V, 60 cycle, AC, 1- or 3-phase | 1 |
| Hygrometer, dial indicating, electrolytic type | 2 |
| Indicator, wind direction and speed | 5 |
| Light set, general illumination, 25 outlet | 1 |
| Meter, current, water, pygmy-type | 4 |
| Meter, current, price, type A | 2 |
| Planimeter, polar | 2 |
| Printing and heat developing machine | 1 |
| Radio set, AN/GRC–106 | 1 |
| Radio set, AN/VRC–46 | 4 |
| Reel equipment, CE–11 | 1 |
| Refraction system, multi-trace, GT–2, portable | 1 |
| Refraction seismograph, Terra-Scout | 1 |
| Reproduction set, diazotype machine | 1 |
| Sketching set, survey, military field sketch | 2 |
| Staff, gage, 2 meters long | 24 |
| Stilling device, 1 meter long | 24 |
| Survey set, precise level | 2 |
| Telephone set, TA–1/PT | 1 |
| Telephone set, TA–312/PT | 1 |
| Tent, observing, astronomic | 2 |
| Test set, soil trafficability | 2 |

| *Other Equipment*—Continued | |
|---|---|
| Thermometer, self-indicating, minus 60 to plus 160 degrees F | 4 |
| Tool kit, carpenter's | 1 |
| Tool kit, general use tools | 1 |
| Tool kit, pioneer, engineer squad | 1 |

**Method of Operation.** The team is organized into a headquarters and four branches: precipitation, hydraulic surveys, analysis and prediction, and administration and supply. The team provides hydraulic and hydrologic information as follows:

1. *Floods.* The team makes a preliminary literature and field study of the streams or basin for which flood predictions are to be issued. Reconnaissance to determine proper locations of stream and precipitation gages is made, techniques are established, and a suitable prediction organization, utilizing personnel assistance from available engineer field units, is activated through the army or separate corps engineer. Gage readings are established and correlated with existing data as available. Rainfall-runoff and gage relationships, hydrographs, and flood-routing curves or coefficients are computed. Field survey parties make discharge measurements, locate high water marks, and determine flood profiles. From these data are established the specific techniques to be used in forecasting floods. When gage date or weather forecasts indicate possible flooding the analysis and prediction branch initiates flood forecasts. If flooding occurs, gage data collected during the flood are compared with the predictions, and data is adjusted so as to increase the accuracy of future forecasts.

2. *River crossing sites.* Hydrologic studies of tentative river crossing areas to determine stream depths, widths, and velocities are given to the advance planners of methods to be used in the crossing. During the crossing period, planners, operators, and units will require round-the-clock forecasts. Many of the techniques of data collection, analysis, and dissemination of flood prediction data apply to this aspect of the team's work.

3. *Advance studies.* The team provides a general analysis of river and basin characteristics for use in planning strategic and tactical operations. Analysis of streams as barriers with modifications caused by storm run-off or artificial flooding; effects of flooding on approaches; and effects of use of water for power, navigation, and irrigation on operations are typical data presented.

4. *Artificial flood studies.* Effects on military operations of—

*a.* Creating major flood waves by sudden breaching of a dam or other hydraulic structure.

*b.* Detrimental stream-flow variations caused by opening and closing outlet works of water control structures, thereby washing away or damaging bridges downstream.

*c.* Creation of still water barriers by breaching levees and flooding land.

*d.* Drainage obstacles or mud flats created by cutting off natural drainage, destroying pumping facilities and draining reservoirs.

5. *Hydrologic analysis of sites, logistic operations and equipment.* The team produces data for the commander as to suitability of sites for military installations; protection of sites from floods; operation of navigation facilities, hydroelectric power plants, and water works. Military equipment for use in water such as boats and bridges is selected for an operation after considering hydrologic intelligence as to velocities, depths, and surface conditions prevailing in the streams to be crossed.

**Reference.** For information on the military aspects of hydrology and geology, see TM 5–545.

*Team IJ, Terrain*

**Capability.** Capable of the following:

1. Producing general and detailed military terrain studies and related intelligence data in such fields as geography, routes of communication, beaches, hydrology, urban areas, utilities, and evaluative subjects such as ground mobility, airborne operations, and suitability for construction.

2. Field collection of data and on-site reconnaissance.

3. Consulting services in fields of responsibility.

**Basis of Allocation.** Normally one per field army and separate corps; to a force less than a corps for given operations.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—13, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | MAJ | 8311 |
| 1 | CPT | 7940 |
| 1 | CPT | 7900 |
| 1 | CPT | 7020 |
| 1 | CPT | 7140 |
| 1 | CPT | 7902 |
| 1 | E–8 (NCO) | 12Z5A |
| 2 | E–6 | 51Q20 |
| 1 | E–5 | 51G20 |
| 1 | E–4 | 81G20 |
| 2 | E–4 | 71B30 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼–T | 1 |
| Trailer, cargo, ¾–T | 2 |
| Trailer, cargo, 1½–T | 1 |
| Truck, cargo, ¾–T | 2 |
| Truck, cargo, 2½–T | 1 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Adapter back, photographic film, LE–19 | 1 |
| Book set, construction group | 1 |
| Camera, Polaroid model 101 | 1 |
| Camera set, still picture, KS–4 | 1 |
| Camera set, still picture, KS–15 | 1 |
| Dividers, drafting, proportional | 2 |
| Drafting equipment set, bn, charts, sketches, and overlays | 1 |
| Drafting machine, 24 in. long arm | 2 |
| Drawing board and trestle, 60 by 42 in. | 2 |
| Flash unit, photographic, repeating, LM–33 | 1 |
| Generator set, 1.5 kw | 1 |
| Interpretation kit, photographic | 1 |
| Light set, general illumination, 25 outlet | 1 |
| Meter, photographic exposure, LM–46 | 1 |
| Planimeter, polar | 1 |
| Stereoscope lens, aerial photo interpretation | 2 |
| Stereoscope, prism-mirror | 1 |
| Straightedge, steel, drafting | 1 |
| Telephone set, TA–312/PT | 2 |
| Template and tracer pin, military symbols | 1 |
| Tool kit, carpenter's | 1 |
| Tripod, photographic, LM–15 | 1 |

**Method of Operation.** The team's officer specialists, assisted by the enlisted personnel, compile graphic and tabular data, using automatic data processing (ADP) where required. Materials used include: published allied and captured documents, aerial photography, raw data secured from field surveys by team members or other armed forces elements, and information and intelligence from higher and lateral headquarters. Data are published as overlays and overprints to existing maps or as separate graphics, and with accompanying tabular/textual data, including tabular runs from ADP. Final drafting and printing support are provided by topographic units when needed. For information on terrain intelligence, see FM 30–10.

*Team IK, Hydrographic Survey*

**Capability.** Capable of hydrographic surveys and analysis of collected data in connection with military operations. Capable of surveying rivers, harbors, lakes and other waterways; collecting and recording hydrographical data of surveyed waterways; performing reduction and analytical computations of collected data; preparing final manuscripts for supported units. Cartographic and reproduction requirements in excess of team capabilities are provided by engineer topographic units. Team requirements for boats in which the organic boats are not adaptable, are provided by engineer or transportation units.

**Basis of Allocation.** Normally one per field army or independent corps.

**Category.** II.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—12, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | CPT | 7915 |
| 1 | LT | 7900 |
| 1 | E–7 (NCO) | 12B40 |
| 2 | E–6 (NCO) | 82D40 |
| 2 | E–5 | 61B30 |
| 2 | E–5 | 82D20 |
| 1 | E–4 | 71D30 |
| 1 | E–4 | 81C20 |
| 1 | E–4 | 84B20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¾–T | 2 |
| Trailer, cargo, 1½–T | 1 |
| Truck, cargo, ¾–T | 2 |
| Truck, cargo, 2½–T | 1 |

*Other Equipment*

| | |
|---|---|
| Adapter back, Polaroid, K3–4A | 1 |
| Airboat, 16 ft, 160 HP | 2 |
| Book, cartography | 1 |
| Book, Civil Engineering Handbook | 1 |
| Book set, topographic, general purpose | 1 |
| Book, soil mech foundation and earth structures | 1 |

*Other Equipment*—Continued

| | |
|---|---|
| Calculating machine, nonlisting, hand-electric, 10 digit | 1 |
| Camera set, still picture | 1 |
| Camera, still picture, PH–383 | 1 |
| Camera, 16mm, wide-angle lens | 6 |
| Case, field office machine | 2 |
| Chest, map filing | 1 |
| Desk, field, 2 folding stools | 1 |
| Drafting, equipment set | 1 |
| Duplicating machine, stencil process | 1 |
| Fathometer, 200 KC | 1 |
| Filing cabinet, letter size | 1 |
| Gage, tide, self reading | 2 |
| Generator set, 1.5 kw, 120 V, 69 cycle, AC, 1-phase | 1 |
| Generator set, 3 kw, 120/208/240 V, 60 cycle, AC, 1- or 3-phase | 1 |
| Light set, general illumination, 25 outlet | 1 |
| Photographic set, printing and processing, ES–20 | 1 |
| Reel equipment CE–11 | 1 |
| Reproduction set, expendable supply | 1 |
| Reproduction set, diazotype machine | 1 |
| Sketching set, survey, military field sketch | 1 |
| Surveying set, general purpose | 2 |
| Table, utility, folding legs | 2 |
| Telephone, cable, WD–1 TT DR–8 | 2 |
| Telephone set, TA–312/PT | 1 |
| Test set, soil trafficability | 1 |
| Tool kit, general use tools | 1 |
| Tool kit, automotive mechanics | 1 |
| Typewriter, nonportable, 15 in carriage | 1 |

**Method of Operation.** The team is organized into a headquarters and two survey sections. The team provides information to tactical commanders on the status of inland waterways. Hydrographic data is collected for arriving at explanations of hydrographic phenomena. Equations are developed for compiling bed load, saltation load, and suspension load in rivers. Hydrologic data is used to determine and describe river meanders, levees, and other significant inland waterway data. For details on hydrographic surveys, see TM 5–235.

## TOE 5–550G
## ENGINEER DREDGE TEAMS

**Mission.** To provide teams for the operation of engineer dredges for specialized support to the army as required.

*Team JA, Cutterhead, Pipeline, 12- to 16-inch*

**Capability.** Capable of operating and maintaining one of a group of diesel-powered, 12- to 16-inch cutterhead, pipeline dredges on a round-the-clock, 7 day per week basis. Must be augmented by one mess team CA and one mess team CB from the TOE 29–500 series. Typical of the dredges in this group is a 16-inch self-propelled dredge with the following physical and operational characteristics:

Length ——— 200 ft., 6 in
Beam ——— 36 ft, 8 in
Maximum draft ——— 5 ft, 10 in
Dredge pump ——— 1 each diesel powered, 16-inch discharge
Twin screws, diesel powered, 350 HP per shaft
Dredging depth:
  Maximum ——— 30 ft
  Minimum ——— 8 ft
Cutterhead ladder w/18 in suction line.
  Speed ——— 8.5 mph
  Vertical clearance ——— 51 ft, 3 in
  Spuds (2 each) ——— 40 ft, 6 in long

**Basis of Allocation.** Normally assigned to TASCOM as required.

**Category.** III.

**Mobility.** 100 percent mobile afloat, when dredge is self-propelled or provided with a towing vessel.

**Strength.** Aggregate—42, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | MAJ | 0820 |
| 1 | CPT | 0823 |
| 1 | CPT | 0820 |
| 1 | LT | 0823 |
| 1 | LT | 0820 |
| 4 | WO | 562A |
| 2 | WO | 561A |
| 2 | E–7 (NCO) | 61B40 |
| 4 | E–5 | 62F30 |
| 2 | E–5 | 91B30 |
| 1 | E–5 | 91B20 |
| 5 | E–4 | 61B20 |
| 1 | E–4 | 71H20 |
| 1 | E–4 | 61C30 |
| 1 | E–4 | 44C30 |
| 1 | E–4 | 71J20 |
| 3 | E–4 | 51F20 |
| 2 | E–4 | 61B30 |
| 7 | E–3 | 61A10 |
| 1 | E–3 | 71A10 |
| 2 | E–3 | 51A10 |
| 1 | E–2 | 51A10 |

### Major Items of Equipment

*Weapons*

Individual weapons only.

*Vehicles*

None.

*Other Equipment*

| | |
|---|---|
| Barge, deck cargo, nonpropelled, steel, 130–T, 81 ft | 2 |
| Barge, deck cargo, nonpropelled, steel, 585–T, 120 ft | 1 |

*Other Equipment—Continued*

| | |
|---|---|
| Boat, bridge erection, 27 ft long | 1 |
| Dredge, hydraulic, pipeline, cutterhead type, diesel engine powered | 1 |
| OR | |
| Dredge, hydraulic, pipeline, cutterhead type, steam powered, oil burning | 1 |
| Surgical instrument and supply set, individual | 1 |

**Method of Operation.** Team is organized into three sections: command, power plant, and deck operation. The command section provides overall supervision of dredge operations and administrative services for the team. The power plant section operates, maintains, and repairs the power equipment aboard the dredge. The deck operation section operates and moves the dredge as required during dredging operations and constructs and maintains the discharge pipeline in lengths up to 2500 feet.

*Team JB, Cutterhead, Pipeline, 18- to 24-Inch*

**Capability.** Capable of operating and maintaining one of a group of diesel-electric, or steam powered, 18- to 24-inch cutterhead, pipeline dredges on a round-the-clock, 7 day per week basis. Must be augmented by one mess team CA and one mess team CB from the TOE 29–500 series. A typical 24-inch diesel powered, self-propelled, dredge of this class has the following physical and operational characteristics:

| | |
|---|---|
| Length | 270 ft, 0 in |
| Beam | 38 ft, 0 in |
| Maximum draft | 5 ft, 10 in |
| Dredge pump | 1 each diesel powered, 24-inch discharge |

Twin screws, diesel powered, 750 HP per shaft

Dredging depth:

| | |
|---|---|
| Maximum | 62 ft |
| Minimum | 12 ft |

| | |
|---|---|
| Cutterhead ladder w/26 in suction line. | |
| Vertical clearance | 61 ft, 6 in |
| Spuds (2 each) | 92 ft long |

**Basis of Allocation.** Normally assigned to TASCOM as required.

**Category.** III.

**Mobility.** 100 percent mobile afloat, when dredge is self-propelled or provided with a towing vessel.

**Strength.** Aggregate—67, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LTC | 0820 |
| 1 | MAJ | 0823 |
| 1 | MAJ | 0820 |
| 1 | CPT | 0823 |
| 1 | CPT | 0820 |
| 5 | WO | 562A |
| 2 | WO | 561A |
| 1 | E–7 (NCO) | 61B40 |
| 1 | E–5 (NCO) | 51F40 |
| 3 | E–5 | 62F30 |
| 1 | E–5 | 91B20 |
| 1 | E–5 | 44E20 |
| 2 | E–5 | 52E20 |
| 2 | E–5 | 61B20 |
| 3 | E–5 | 62E20 |
| 4 | E–4 | 52E20 |
| 9 | E–4 | 61B20 |
| 2 | E–4 | 71H20 |
| 1 | E–4 | 61C30 |
| 4 | E–4 | 51F20 |
| 2 | E–4 | 44K20 |
| 13 | E–3 | 61A10 |
| 1 | E–3 | 71A10 |
| 4 | E–3 | 51A10 |
| 1 | E–2 | 51A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

None.

*Other Equipment*

| | |
|---|---|
| Barge, deck cargo, nonpropelled, steel, 130–T, 81 ft | 2 |
| Barge, deck cargo, nonpropelled, steel, 585–T, 120 ft | 2 |
| Boat, bridge erection, 27 ft long | 1 |
| Dredge, hydraulic, pipeline, cutterhead type, diesel engine powered | 1 |
| OR | |
| Dredge, hydraulic, pipeline, cutterhead type, steam powered, oil burning | 1 |
| Surgical instrument and supply set individual | 1 |
| Tractor, full tracked, medium DBP, w/angledozer | 1 |

**Method of Operation.** This team is organized and operates the same as team JA. However, the larger capacity dredge permits discharge pipeline lengths up to 5,000 feet.

*Team JC, Seagoing Hopper, 500–900 Cubic Yard (Diesel)*

**Capability.** Capable of operating and maintaining one of a group of diesel-electric powered, seagoing hopper dredges, varying in hopper capacity from 500 to 900 cubic yards of material, on a round-the-clock, seven day per week basis. Must be augmented by one mess team CA and two mess teams CB from the TOE 29–500 series. A typical 900 cubic yard dredge of this class has the following physical and operational characteristics:

Length ----------215 ft, 10 in
Beam ----------40 ft, 4 in
Dredge pump ----------1 each diesel powered (420 HP), 20-inch discharge.
Twin screw, diesel-electric powered, 700 HP per shaft
Light ----------9 ft, 11 in
Loaded ----------13 ft, 0 in
Drag arms (2 each) ----------18 in diam
Speed:
Light ----------14.1 mph
Loaded ----------13.1 mph
Dredging depth (maximum) -40 ft
Vertical clearance ----------71 ft, 6 in

**Basis of Allocation.** Normally assigned to TASCOM as required.

**Category.** III.

**Mobility.** 100 percent mobile afloat.

**Strength.** Aggregate—64, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | MAJ | 0820 |
| 1 | CPT | 0823 |
| 1 | CPT | 0820 |
| 1 | LT | 2120 |
| 5 | WO | 562A |
| 4 | WO | 561A |
| 2 | E-7 (NCO) | 61B40 |
| 1 | E-6 (NCO) | 61C40 |
| 4 | E-6 (NCO) | 61B40 |
| 1 | E-5 (NCO) | 61B40 |
| 8 | E-5 | 62F30 |
| 1 | E-5 | 44E20 |
| 1 | E-5 | 61C30 |
| 1 | E-5 | 91B20 |
| 1 | E-4 | 71H20 |
| 2 | E-4 | 61C30 |
| 1 | E-4 | 05C20 |
| 1 | E-4 | 44C30 |
| 1 | E-4 | 71J20 |
| 4 | E-4 | 61B20 |
| 17 | E-3 | 61A10 |
| 1 | E-3 | 71A10 |
| 4 | E-2 | 61A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Truck, cargo, ¾-T ---------- 1

*Other Equipment*

Dredge, seagoing hopper, diesel-electric powered, Lyman class ---------- 1
Surgical instrument and supply set, individual ---- 1

**Method of Operation.** Team is organized into four departments: command, engine room, deck, and electrical. The command department is responsible for all vessel operations and ship's administration. The engine room department operates, maintains, and repairs the ship's power plant. The deck department is responsible for all deck operations and for the maintenance and upkeep of the vessel (less engine room equipment). The electrical department operates, maintains, and repairs the electric-powered marine equipment. This department operates under the supervision of the chief engineer who is the head of the engine room department. The team is provided with a ¾-ton truck as organic equipment for supply and administrative runs when the ship is docked.

*Team JD, Seagoing Hopper, 3000 Cubic Yard (Steam)*

**Capability.** Capable of operating and maintaining one steam powered, seagoing hopper dredge, capacity of 3000 cubic yards of material, on a round-the-clock, 7 day per week basis. Must be augmented by one mess team CA and three mess teams CB from the TOE 29-500 series. A typical 3000 cubic yard, steam powered dredge of this class has the following physical and operational characteristics:

Length ----------351 ft, 9 in
Beam ----------60 ft
Dredge pump ----------2 each, 28 inch discharge
Dredge pump motor ----------2 each, 1,150 HP
Twin screw, steam turbine powered, 3,000 HP per shaft
Draft:
Light ----------21 ft, 3 in
Loaded ----------24 ft, 3 in
Drag arms (2 each) ----------30 in diam
Speed:
Light ----------15.8 mph
Loaded ----------12.0 mph
Dredging depth (maximum) -50 ft
Vertical clearance ----------95 ft

**Basis of Allocation.** Normally assigned to TASCOM as required.

**Category.** III.

**Mobility.** 100 percent mobile afloat.

**Strength.** Aggregate—89, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LTC | 0820 |
| 1 | MAJ | 0823 |
| 1 | MAJ | 0820 |
| 1 | CPT | 0823 |
| 1 | CPT | 0820 |
| 1 | LT | 2120 |
| 1 | LT | 0820 |
| 9 | WO | 562A |
| 3 | WO | 561A |
| 3 | E-7 (NCO) | 61B40 |
| 1 | E-6 (NCO) | 61C40 |

| Number | Grade | MOS |
|---|---|---|
| 5 | E–6 (NCO) | 61B40 |
| 2 | E–5 (NCO) | 61B40 |
| 1 | E–5 | 91B20 |
| 8 | E–5 | 62F30 |
| 1 | E–5 | 44E20 |
| 2 | E–5 | 52E20 |
| 1 | E–5 | 61C30 |
| 5 | E–4 | 52E20 |
| 1 | E–4 | 05C20 |
| 1 | E–4 | 71H20 |
| 2 | E–4 | 61C30 |
| 1 | E–4 | 44C30 |
| 1 | E–4 | 71J20 |
| 5 | E–4 | 61B20 |
| 18 | E–3 | 61A10 |
| 1 | E–3 | 71A10 |
| 11 | E–2 | 61A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Truck, cargo, ¾–T ---------- 1

*Other Equipment*

Dredge, seagoing hopper, steam type oil burning, 3,000 cu yd, Langfitt, Gerig, Biddle, or Comber class ---------- 1

**Method of Operation.** This team is organized and operates the same as team JC.

*Team JE, Seagoing Hopper, 6,000–8,100 Cubic Yard (Steam)*

**Capability.** Capable of operating and maintaining one of a group of steam-powered, seagoing hopper dredges, varying in capacity from 6,000–8,100 cubic yards of material, on a round-the-clock, 7 day per week basis. Must be augmented by one mess team CA and three mess teams CB from the TOE 29–500 series. A typical dredge of this group, with a hopper capacity of 8,100 cubic yards, has the following physical and operational characteristics:

Length ---------- 525 ft, 2 in
Beam ---------- 72 ft
Dredge pump ---------- 2 each, 32-inch discharge
Dredge pump motor ---------- 2 each, 1,850 HP
Twin screw, steam turbine powered, 4,000 HP, per shaft
Draft:
  Light ---------- 20 ft, 6 in
  Loaded ---------- 30 ft, 7 in
Drag arms (2 each) ---------- 36 in diam
Speed:
  Light ---------- 17.3 mph
  Loaded ---------- 16.6 mph
Dredging depth (maximum) 60 ft
Vertical clearance ---------- 140 ft

**Basis of Allocation.** Normally assigned to TASCOM as required.

**Category.** III.

**Mobility.** 100 percent mobile afloat.

**Strength.** Aggregate—98, as follows:

| Number | Grade | MOS |
|---|---|---|
| 1 | COL | 0820 |
| 1 | LTC | 0823 |
| 1 | LTC | 0820 |
| 1 | MAJ | 0823 |
| 1 | MAJ | 0820 |
| 1 | CPT | 0820 |
| 1 | LT | 2120 |
| 3 | LT | 0820 |
| 9 | WO | 562A |
| 3 | E–7 (NCO) | 61B40 |
| 1 | E–6 (NCO) | 61C40 |
| 5 | E–6 (NCO) | 61B40 |
| 2 | E–5 (NCO) | 61B40 |
| 1 | E–5 | 91B20 |
| 10 | E–5 | 62F30 |
| 1 | E–5 | 44E20 |
| 4 | E–5 | 52E20 |
| 1 | E–5 | 61C30 |
| 1 | E–4 | 05C20 |
| 9 | E–4 | 52E20 |
| 1 | E–4 | 71H20 |
| 2 | E–4 | 61C30 |
| 1 | E–4 | 44C30 |
| 1 | E–4 | 71J20 |
| 1 | E–4 | 44K20 |
| 6 | E–4 | 61B20 |
| 17 | E–3 | 61A10 |
| 1 | E–3 | 71A10 |
| 11 | E–2 | 61A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

Truck, cargo, ¾–T ---------- 1

*Other Equipment*

Dredge, seagoing hopper, steam powered, oil burning, 6,000–8,100 cu yd, Goethals, Essayons, or equivalent class ---------- 1

**Method of Operation.** This team is organized and operates the same as team JC.

## TOE 5–560G
## ENGINEER CIVIC ACTION TEAMS

**Mission.** To provide Engineer Civic Action Teams for specialized support of the Army as required.

*Team KA, Engineer Civic Action Headquarters*

**Capability.** Capable of providing supervision, staff planning, coordination, and administrative support for up to three engineer civic action control teams (KB). May operate as the engineer staff section of a military assistance

advisory group or a special forces operational detachment.

**Basis of Allocation.** One per two or three engineer civic action control teams (KB).

**Category.** III.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—10, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LTC | 7010 |
| 1 | MAJ | 7020 |
| 1 | WO | 621A |
| 1 | E–9 (NCO) | 51H50 |
| 1 | E–8 (NCO) | 51H50 |
| 1 | E–6 (NCO) | 67C40 |
| 1 | E–5 | 71H20 |
| 1 | E–4 | 71B30 |
| 1 | E–4 | 81B20 |
| 1 | E–4 | 76C20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼–T | 1 |
| Trailer, cargo, ¾–T | 1 |
| Truck, cargo, ¾–T | 1 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Book set, construction group | 1 |
| Drafting and duplicating equipment set | 1 |
| Sketching set, survey, military field sketch | 1 |

**Method of Operation.** This team serves as a headquarters exercising administrative and technical control over two or three engineer civic action control teams (KB). Personnel of the team serve as technical consultants on problems relating to construction, maintenance, and operation of public works and utilities.

*Team KB, Engineer Civic Action Control*

**Capability.** Capable of providing supervision, staff planning, coordination, and administrative support for up to nine subordinate engineer civic action advisory teams (KC), and for other engineer cellular teams employed in civic action operations.

**Basis of Allocation.** One per four to nine engineer civic action advisory teams (KC).

**Category.** III.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—5, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | MAJ | 7010 |
| 1 | CPT | 7020 |
| 1 | E–8 (NCO) | 51H5H |
| 1 | E–4 | 71B30 |
| 1 | E–4 | 81B20 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Truck, cargo, ¾–T | 1 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Drafting and duplicating equipment set | 1 |
| Generator set, 3 kw | 1 |
| Tool outfit, pioneer portable electric tools | 1 |

**Method of Operation.** The team controls assigned engineer civic action advisory teams which are engaged in assisting indigenous military engineer units and staffs. It may also control other engineer teams assigned or attached for employment in military civic action projects.

*Team KC, Engineer Civic Action Advisory*

**Capability.** Capable of providing—

1. Advice and assistance to host country engineer forces on civic action projects such as farm-to-market roads, bridges, village wells, and sanitation measures, and construction of schools, hospitals, and other public buildings.

2. Assistance to host country engineer units in preparing to support their own tactical troops for internal defense and internal development operations.

3. Advice and assistance to US Military Forces when committed in support of host country forces.

4. Supervision of operations with host country counterparts.

**Basis of Allocation.** One per indigenous force comparable in size to a U.S. Army engineer combat battalion or per municipal area for civic action as required.

**Category.** III.

**Mobility.** 100 percent.

**Strength.** Aggregate—5, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | CPT | 87900 |
| 1 | E–7 (NCO) | 51H4H |
| 1 | E–7 (NCO) | 62B4H |
| 1 | E–6 (NCO) | 62B4H |
| 1 | E–6 (NCO) | 51H4H |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¾-T | 1 |
| Truck, cargo, ¾-T | 1 |

*Other Equipment*

| | |
|---|---|
| Saw, chain, 18 inch | 1 |
| Tool kit, automotive mechanic's | 2 |
| Tool kit, carpenter's, engineer squad | 1 |
| Tool kit, pioneer, engineer squad | 1 |

**Methods of Operation.** The team advises, trains, and assists host country engineer units and their staffs in developing plans for and executing civic action projects in conjunction with the overall civil affairs program. Maximum utilization is made of local means of transportation, materials, and equipment. Projects are selected which are necessary and within the capabilities of host country personnel.

## TOE 5-570G
## ENGINEER COMBAT SUPPORT TEAMS

**Mission.** To provide atomic demolitions munitions (ADM) teams for combat support to the Army (including friendly non-nuclear powers) as required.

*Team MA, Atomic Demolition Munitions Platoon Headquarters, Separate*

**Capability.** Capable of—

1. Commanding and administrating control of two to six ADM teams.
2. Providing the supported unit with technical liaison, advisory, and limited planning services for the employment of ADM.
3. Commanding subordinate teams in the execution of ADM missions.
4. Coordinating the supply and resupply of ADM.

**Basis of Allocation.** One per two to six ADM squads (Team MC).

**Category.** I.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—5, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 1331 |
| 1 | E-7 (NCO) | 12B4N |
| 1 | E-3 | 70A10 |
| 1 | E-3 | 12A10 |
| 1 | E-3 | 05B20 |

**Major Items of Equipment**

*Weapons*

| | |
|---|---|
| Individual weapons, and | |
| Launcher, grenade, 40 mm | 1 |

*Vehicles*

| | |
|---|---|
| Tralier, cargo, ¼-T | 1 |
| Trailer, cargo, 1½-T | 1 |
| Truck, cargo, 2½-T | 1 |
| Truck, utility, ¼-T | 1 |

*Other Equipment*

| | |
|---|---|
| Antenna, modified ground plane type, 20 to 389 mc frequency | 1 |
| Generator set, 1.5 kw | 1 |
| Boat, reconnaissance, pneumatic, 3-man | 1 |
| Power supply, PP2953/U | 1 |
| Radio set, AN/VRC-47 | 1 |
| Telephone set, TA-312/PT | 1 |
| Tool kit, pioneer, engineer squad | 1 |

**Method of Operation.** The platoon leader commands the platoon and serves as a special advisor in ADM operations to the unit to which attached. When subordinate teams are deployed for specific ADM missions, he may, to insure adequate control, place part of the platoon under the command of the platoon sergeant, while he retains command of the remainder; he may also be required to conduct liaison between the deployed ADM teams and the supported headquarters, coordinating matters of ADM employment and associated matters of communications, supply, and security. When an ADM platoon is formed, the supported unit must augment the team with communications equipment, as necessary, to insure reliable communications between the supported unit and the team and between the team and its squads.

*Team MB, Atomic Demolition Munitions, Liaison*

**Capability.** Capable of acting in the capacity of a special staff officer providing technical knowledge and advice for ADM employment and providing liaison between the headquarters to which attached and other supporting or attached ADM teams.

**Basis of Allocation.** One per headquarters assigned ADM, otherwise mission not authorized an ADM qualified officer.

**Category.** I.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—2, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | CPT | 51331 |
| 1 | E-3 | 12A10 |

**Major Items of Equipment**

*Weapons*

Individual weapons only.

*Vehicles*

| | |
|---|---|
| Trailer, cargo, ¼–T | 1 |
| Truck, utility, ¼–T | 1 |

*Other Equipment*

| | |
|---|---|
| Radio set, AN/VRC–47 | 1 |

**Method of Operation.** The officer assigned to this team operates as the ADM staff officer for the unit or headquarters to which he is attached. He provides technical knowledge, advice, and limited planning service in ADM matters.

*Team MC, Atomic Demolition Munitions Squad*

**Capability.** Capable of assembly, preparation for firing, and, when necessary, recovery, disassembly, or destruction of an emplaced ADM. Must be supported by the unit to which attached for ADM storage, transport, security, site preparation, and team administration.

**Basis of Allocation.** One or more to provide a required ADM employment capability to an Engineer Combat Battalion (Army), U.S. Army units, tack forces, or Allied forces, and as required to increase the ADM capability of a divisional engineer battalion.

**Category.** I.

**Mobility.** 100 percent mobile.

**Strength.** Aggregate—5, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | E–6 (NCO) | 12B4N |
| 2 | E–5 | 12B2N |
| 2 | E–4 | 12B2N |

**Major Items of Equipment**

*Weapons*

| | |
|---|---|
| Individual weapons, and, Launcher, grenade, 40 mm | 2 |

*Vehicles*

| | |
|---|---|
| Trailer, cargo, 1½–T | 1 |
| *Truck, cargo, 2½–T | 1 |

*Other Equipment*

| | |
|---|---|
| Antenna modified ground plane type, 20 to 389 mc frequency | 1 |
| Blasting machine, 50-cap capacity | 1 |
| Coder transmitter set, XM3 (Radio), XM4 (Wire) | 2 |
| Demolition set, explosive initiating, electric and nonelectric | 1 |
| Radio set, AN/GRC–125 | 1 |
| Radio set, AN/PRC–25 | 1 |
| Reeling machine, cable, hand, manual operated | 1 |
| Splicing kit, telephone cable, MK/356/G | 1 |
| Telephone set, TA–312/PT | 2 |
| Tool kit, general use tools | 2 |
| Tool kit, special weapons support | 1 |

*When support unit is equipped with tracked vehicles, team may be issued a full-tracked amored personnel carrier in lieu of the 2½-ton truck.

**Method of Operation.** Team is dependent on the unit to which attached for ADM storage and resupply, additional transport, security, site preparation, and team administration. When two or more of these teams are formed into a platoon, a Team MA provides the necessary command and control.

## TOE 5–590T
## ENGINEER CONCRETE MIXING AND PAVING TEAM

**Mission.** To provide specialized concrete mixing and paving equipment and technically qualified personnel to increase the construction capability of engineer construction units engaged in rigid pavement construction projects.

*Team GK, Engineer Concrete Mixing and Paving*

**Capability.** Capable of producing 100 to 125 cubic yards of concrete per hour of operation at a central mix plant; placing, finishing, and curing up to 532 cubic yards of portland cement concrete (without reinforcing mesh), operating at regulated paver width (24 feet), maximum paving thickness (10 inches), and fastest paving speed (12FPM), per hour of operation; performing organizational maintenance on organic equipment, and on-site direct support maintenance on the paver-finisher, batching-mixing plant, curing machine, subgrade planer, and 100 kw generator; and working on a two-shift basis. The supported unit must provide dump trucks and drivers to supply the batching-mixing plant and to haul concrete to the paver-finisher. It must also provide additional labor for plant set up and operations.

**Basis of Allocation.** Normally attached to an engineer construction group as required.

**Category.** III.

**Mobility.** Thirty percent mobile.

**Strength.** Aggregate—22, as follows:

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 1 | LT | 0663 |
| 1 | E–7 (NCO) | 62H40 |
| 2 | E–6 (NCO) | 62H40 |
| 3 | E–5 | 62H20 |
| 2 | E–5 | 62M20 |
| 3 | E–4 | 62H20 |
| 2 | E–4 | 62B20 |
| 4 | E–4 | 64B20 |

| *Number* | *Grade* | *MOS* |
|---|---|---|
| 2 | E–4 | 52B20 |
| 1 | E–4 | 51G20 |
| 1 | E–3 | 64A10 |

## Major Items of Equipment

*Weapons*

Individual weapons only.

*Vehicles*

Trailer, cargo, 1½–T ---------- 1
Truck, cargo, ¾–T ---------- 1
Truck, cargo, 2½–T ---------- 1
Truck, tractor, 5–T ---------- 2

*Other Equipment*

Concrete batching and mixing plant, 4 cubic yd, cubic yd, wheel mtd, consisting of: ---------- 1
1—Bin and batching unit, 3 compartment, 4 cubic yd;
1—Silo, cement, 330 barrel, 1 compartment, w/ elevator;
1—Mixer, concrete, tilting, 4 cubic yd.
Curing machine, concrete, wheel mtd, GED pump, hand-held spray bar ---------- 1
Floodlight set, portable, 6 floodlights ---------- 2
Generator set, 5 kw ---------- 1
Generator set, 100 kw ---------- 3
Loader, scoop, 2½ cubic yd ---------- 1
Paver, concrete, slip-form type, full-tracked, GED, 24 ft width ---------- 1

*Other Equipment*—Continued

Planer, subgrade, crawler track mtd, towed type -- 1
Pump, centrifugal, GED, 2 inch, 125 gpm, 50 foot head ---------- 2
Pump, centrifugal, GED, 4 inch, 500 gpm, 30 foot head ---------- 1
Saw, abrasive disk, masonry, GED, 18-inch blade 1
Semitrailer, tank, water, 5000 gal ---------- 2
Tank, 10,000 gal, fabric collapsible ---------- 1
Test set, concrete ---------- 1

**Method of Operation.** Team sets up and operates concrete batching and mixing plant, and operates slip-form type paving equipment in support of a unit engaged in large-scale rigid pavement construction. Supported unit provides dump trucks and drivers to haul aggregates and cement to batching-mixing plant, and to haul concrete from plant to paving site. Supported unit also provides additional labor at both sites. Team can furnish operators for two shifts. For details of concrete paving operations, see TM's 5–331, 5–331D, 5–337, and TB 5–337–1.

# APPENDIX C
# OUTLINE FOR AN SOP FOR AN ENGINEER UNIT

(To be used as a guide in the preparation of an SOP for an Engineer Unit. It may be modified to fit the type unit for which it is written.)

HEADQUARTERS (Title of Unit)

STANDING OPERATING PROCEDURES

Date _____

## Section I. GENERAL

1. APPLICATION (Operations to which SOP applies).
2. PURPOSE
3. REFERENCES (FM's, TM's, SOP's of higher headquarters, and similar publications.)
4. RESPONSIBILITIES (For the preparation, changes, and revisions.)
5. EFFECTIVE DATE

## Section II. COMMAND, STAFF AND LIAISON

6. ORGANIZATION
   a. Normal.
   b. Special internal attachments and organizations.
   c. Normal and special external attachments and support.
7. COMMAND POSTS
   a. Normal location (in relation to next higher headquarters).
   b. Reporting changes of location (coordinates and time).
   c. Forward CP's.
      (1) Situation for which required.
      (2) How organized.
      (3) Personnel and equipment.
8. STAFF DUTIES
   a. Special or additional duties of staff officers.
   b. Duties for special staff officers.
9. LIAISON
   a. Duties of liaison officers.
   b. Responsibilities for (higher, lower, and adjacent units).
10. PLANNING RESPONSIBILITIES

## Section III. ADMINISTRATION

11. GENERAL CHANNELS
12. REPORTS
    a. Routine reports.
    b. Special reports.
    c. Information concerning submission of reports.
        (1) Title and reports control symbol.
        (2) Report forms.
        (3) Date due.
        (4) Number of copies.
        (5) Negative reports required or permissible.
13. UNIT JOURNAL (Method of preparation and time due.)
14. UNIT FUNDS (Monthly close out date and due date for submission for audit.)
15. LEAVES AND PASSES (Policy on leaves and passes.)
16. HISTORY (Responsibility for unit history.)
17. AWARDS AND DECORATIONS
    a. Channels.
    b. Form.
    c. Presentation.
18. ORDERS (Preparation and responsibilities.)
19. MAIL
    a. Handling of official mail.
    b. Handling of personal mail.
    c. Censorship.
20. BILLETS AND BIVOUACS
    a. Policies (occupation and clearance).
    b. Billeting party (composition).
21. COURTS MARTIAL
    a. Preparation and submission of charge sheets and personal data.
    b. Composition of the courts-martial board.
22. MORALE AND PERSONNEL SERVICES
23. WEARING OF THE UNIFORM (Annex 1)
24. SCHEDULE OF CALLS (Annex 2)
25. MEDICAL
    a. Aid stations.
    b. Sick call.
    c. Evacuation of patients.

## Section IV. INTELLIGENCE

26. RECONNAISSANCE
    a. Engineer (collection of engineer intelligence information).
    b. Combat (collection of combat intelligence information).
    c. Composition of reconnaissance party.
    d. Reports rendered by reconnaissance parties.

27. INTELLIGENCE
    a. Evaluation of information.
    b. Interpretation.
    c. Channels for forwarding information and disseminating intelligence.

28. COUNTERINTELLIGENCE
    a. Mail censorship.
    b. Blackout discipline.
    c. Signs and countersigns.
    d. Destruction of classified documents.
    e. Civilian control.
    f. Communications security.

29. PRISONERS OF WAR (Method of handling.)

30. CAMOUFLAGE

## Section V. OPERATIONS AND TRAINING

31. REPORTS
    a. Status of project reports.
    b. Status of equipment reports.
    c. Status of material reports.

32. DIRECTIVES
    a. Types of directives (training or operations).
    b. Action upon receipt.

33. OPERATIONS
    a. Priority of operations.
    b. Standards of work.
    c. Plans.
    d. Policies.

34. TRAINING
    a. Traning cycles.
    b. Training policies.
    c. Training schedule formats (Annex 3).

35. SECURITY
    a. Warning system.
    b. In bivouac.
    c. During movement.

d. Of working parties.
e. Counterinsurgency.

36. MOVEMENT

a. Motor (Annex 4). (Conformance with STANAG 2041, Operational Road Movement Orders, Tables, and Graphs; reference FM 55–30, Motor Transportation Operations.)
b. Rail (Annex 5).
c. Water (Annex 6).
d. Air (Annex 7).

37. REORGANIZATION TO FIGHT AS INFANTRY TYPE MISSION (Annex 8)

a. Rorganization.
b. Designation of forward echelon.
(1) Personnel.
(2) Equipment.
c. Designation of rear echelon.
(1) Personnel.
(2) Equipment.
d. Supply.
e. Communications.
f. Medical evacuation.

38. REAR AREA SECURITY AND DAMAGE CONTROL (Annex 9 and 10)

a. Duties and responsibilities.
b. Composition of parties.

39. CBR (Annex 11)

a. Individual defense (before, during, and after attack).
b. Collective defense (before, during, and after attack).

40. ADM EMPLOYMENT (Annex 12)

## Section VI. LOGISTICS

41. LOGISTICS-SUPPLY

a. Class I.
(1) Ration pickup.
(2) Reserve rations.
(3) Strength returns for rations.
b. Class II and IV supply.
(1) Requisition days.
(2) Pickup procedures.
(3) Salvage procedures.
(4) Droppage.
c. Class III.
(1) Resupply.
(2) Fuel reserve.

d. Class V.
   (1) Method of requisitioning.
   (2) Forms used and certificates required.
   (3) Basic load.
   (4) Salvage.

42. LOGISTICS—MAINTENANCE (Annex 13)
   a. Categories of maintenance.
   b. Responsibilities of unit personnel for maintenance.
   c. Forms used.
   d. Priorities.
   e. Repair parts.
   f. Evacuation of vehicles and equipment.

43. TRANSPORTATION
   a. Policies.
   b. Responsibilities.

## Section VII. CIVIL AFFAIRS

44. CIVIC ACTION PROGRAM

45. LABOR
   a. Indigenous labor.
   b. Third state nationals.

46. USE OF LOCAL RESOURCES

Annexes

1. Wearing of the uniform (omitted).
2. Schedule of calls (omitted).
3. Training schedule formats (omitted).
4. Movement, motor vehicles (omitted).
5. Movement, rail (omitted).
6. Movement, water (omitted).
7. Movement, air (omitted).
8. Reorganization to fight an infantry type mission (see app. D).
9. Rear area security SOP (omitted).
10. Area damage control SOP (omitted).
11. CBR annex (omitted).
12. (SECRET) ADM employment (omitted).
13. Maintenance (omitted).

# APPENDIX D

# SOP, ANNEX 8. OUTLINE FOR REORGANIZATION TO FIGHT AN INFANTRY TYPE MISSION

This outline serves as a guide for the preparation of an annex entitled, "Reorganization to Fight an Infantry Type Mission." It is designed primarily for the engineer battalion, infantry division. With modifications, however, it may be used as a guide by the engineer battalion, infantry (mechanized), armored, or airborne divisions, and by the engineer combat battalion, army.

HEADQUARTERS _____ ENGINEER BATTALION

STANDING OPERATING PROCEDURES

ANNEX 8

REORGANIZATION TO FIGHT AN INFANTRY TYPE MISSION

1. PURPOSE

The purpose of reorganizing the battalion for combat is to prepare the battalion to fight an infantry mission.

2. REFERENCES

SOP's and training memoranda of . . . and FM 61–100 and applicable FM's of the 7-series.

3. ALERT

This reorganization plan will be implemented upon receipt of alert from battalion or other higher headquarters.

4. COMPANY SOP

Each company of this battalion will prepare an annex to the company SOP to provide for "Reorganization to Fight an Infantry Type Mission," establishing therein specfic duties for all its personnel.

5. ORGANIZATION INTO ECHELONS

The battalion will be organized into two echelons (fig. D–1), the forward echelon and the rear echelon.

6. HEADQUARTERS AND HEADQUARTERS COMPANY (fig. D–2)

a. Battalion Headquarters.

(1) Forward echelon. The forward echelon will consist of the battalion commander and all battalion staff officers except the S4 and engineer equipment officer. Members of the battalion forward echelon will operate the command post.

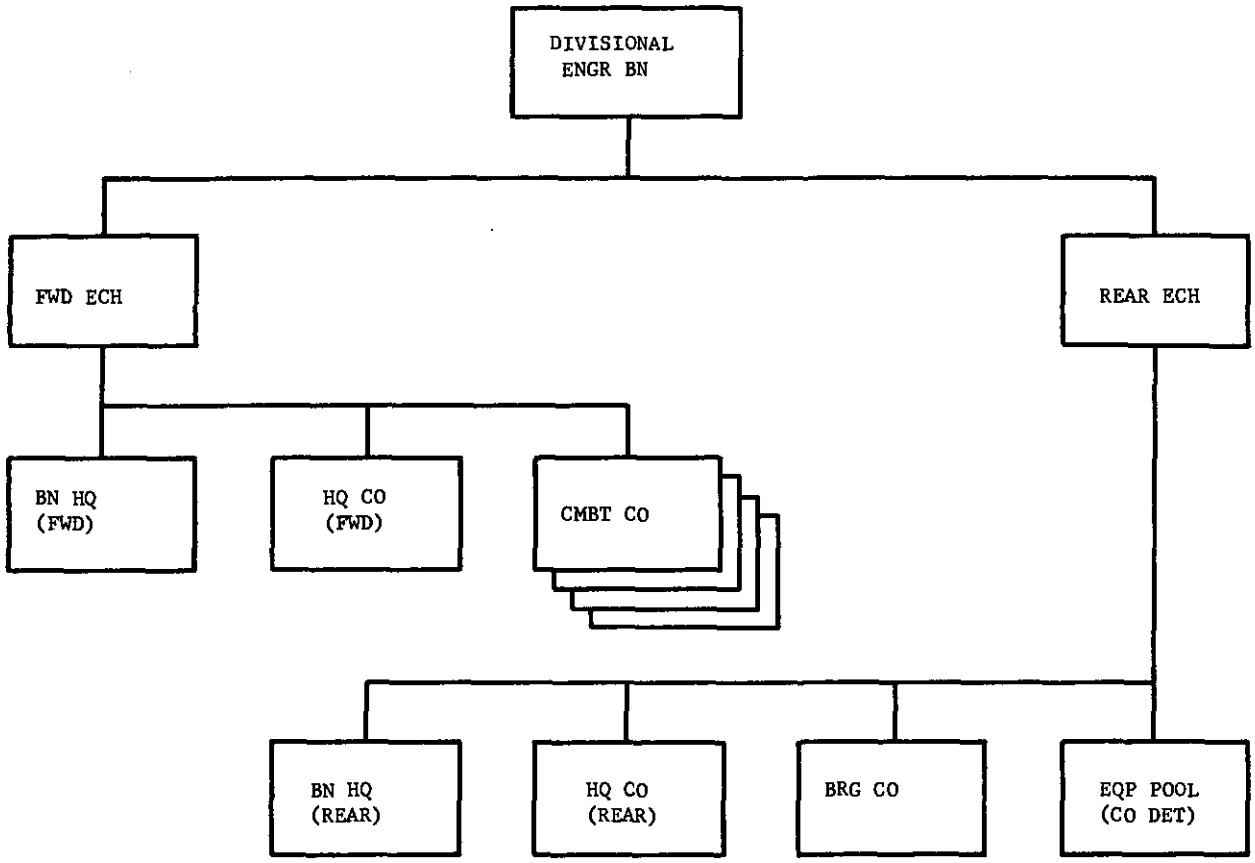



*Figure D-1. Divisional engineer battalion reorganized to fight an infantry type mission.*

(2) Rear echelon. Members and equipment of the battalion staff sections which are not required in the forward echelon and are to perform an essential mission in the rear, will be a part of the rear echelon. The battalion rear echelon will be commanded by the engineer equipment officer. The S4 will operate between the forward echelon and the rear echelon in obtaining necessary supplies and ammunition from division distribution points.

(3) Assistant Division Engineer. The ADE remains at division headquarters as liaison officer.

b. Headquarters Company.

(1) Forward echelon. The forward echelon will consist of the equipment and personnel of headquarters company necessary to establish, operate, and defend the battalion command post. This echelon is commanded by the headquarters company commander.

(2) Rear echelon. The rear echelon will be composed of the equipment and personnel not required in the forward echelon and those which are required to perform an essential mission in the rear.

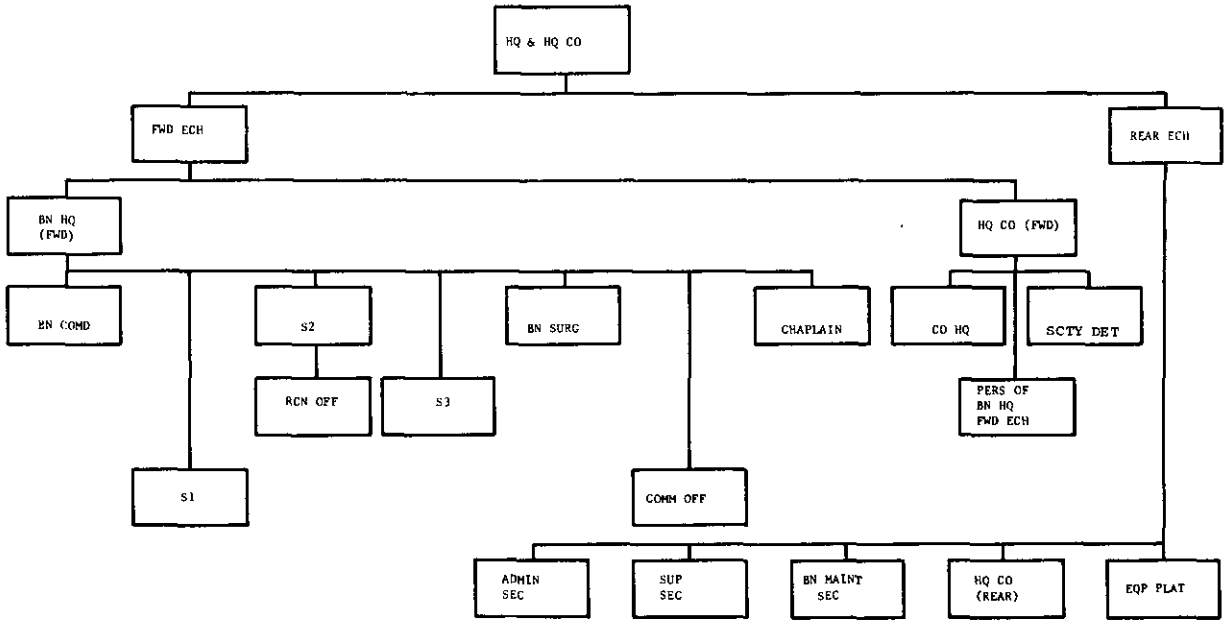



*Figure D-2. Headquarters and headquarters company, divisional engineer battalion, reorganized to fight an infantry type mission.*

## 7. ENGINEER COMPANIES (fig. D-3)

a. Forward Echelon. The forward echelon will consist of the personnel and equipment necessary to accomplish the combat mission. Engineer companies will be modified so that each will have a headquarters and three combat platoons.

b. Rear Echelon. The rear echelon will consist of personnel and equipment not directly essential to the forward echelon. It will be moved to the area of the battalion rear echelon. The company rear echelon will support the company's forward echelon. It will also provide security for the company equipment temporarily stored in the rear.

## 8. BRIDGE COMPANY

The bridge company normally will not be committed to an initial combat role. It will move to the rear and become a part of the battalion rear echelon. It will assist in providing part of the security element for that area and will perform essential engineer tasks when required. It will also constitute an additional reserve force commanded by the bridge company commander.

## 9. COMMUNICATIONS

a. The battalion communications section will provide wire and radio nets to all organic companies. The battalion will enter the radio net of the organization to which attached.

b. Wire tie in to battalion headquarters will be provided by higher headquarters. The battalion communications section will provide wire tie in to subordinate units. Wire tie in to lateral unit will be specified in current SOIs and SOPs.

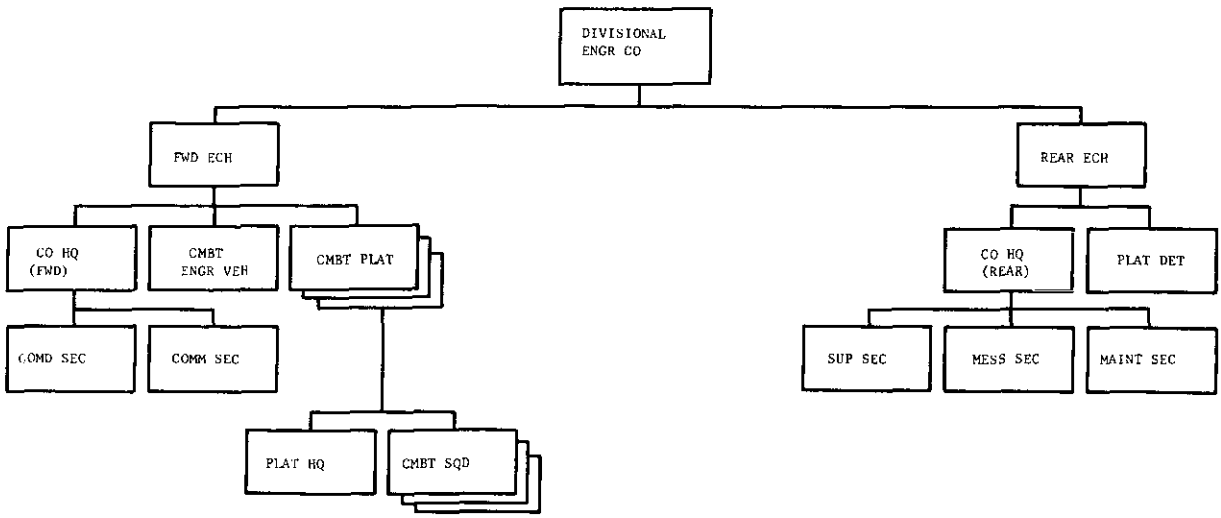



*Figure D-3. Engineer company, divisional engineer ~~battalion~~, ~~reorganized~~ to fight an infantry type mission.*

c. The S4 will assist the communications officer in obtaining any additional communications equipment needed to support the infantry type mission.

d. Companies will provide messengers (mounted or dismounted) to battalion headquarters as needed.

10. FIRE SUPPORT

a. Mortar. Mortar support will be obtained from units of the division when required and authorized. Forward observers for mortar units will be attached to the engineer companies.

b. Artillery. Artillery support will be obtained from artillery units of the division when required and authorized. Forward artillery observers will be attached to the engineer companies and artillery liaison personnel to battalion headquarters. The fire support coordination center (FSCC) is located at battalion headquarters.

c. Combat Engineer Vehicle. Combat engineer vehicles will be used for breaching, removal of obstacles, for pioneering operations, and such other support tasks for which they are suitable.

d. Rocket Launchers. The 3.5 rocket launchers will be used in anti-tank operations.

e. Machine Guns. Machine gun teams will be formed using the machine guns organic to each company.

11. ENGINEER OPERATIONS AND EQUIPMENT

a. Operations. Upon notification of alert to reorganize for combat, all engineer operations will cease. Company commanders will notify the battalion commander of any engineer operations they consider essential so that provision may be made for continuation of the work by some non-divisional engineer units under corps control.

b. Engineer Equipment. Engineer equipment not considered essential to the combat mission will be moved to a designated rear area and guarded by the rear echelon.

12. SUPPLY

a. Combat rations and water will be furnished elements of the forward echelon by elements of the rear echelon. Mess sections will provide hot meals to the forward echelon when the tactical situation permits.

b. Ammunition, clothing, and POL supply will be provided by the S4 through the rear echelon company supply sections.

13. MEDICAL EVACUATION

a. The unit surgeon will establish a battalion aid station near battalion headquarters.

b. A minimum of one aid man will be attached to each platoon.

c. Litter bearers will be drawn from company personnel as required.

# APPENDIX E
# THE COMBAT ENGINEER VEHICLE

## E-1. Characteristics of the Combat Engineer Vehicle (CEV)

*a.* The CEV (fig. E-1) is a full tracked vehicle which consists of a tank hull with a front mounted, hydraulically operated bulldozer surmounted by a turret bearing a 165mm demolition projector, a retractable boom of welded tubular construction, and a winch. The demolition projector is operated from within the vehicle. The winch is housed on the rear of the turret wall and is used in conjunction with the boom to lift, or without the boom to provide direct pull. The vehicle and dozer blade are operated from the driver's compartment from within the vehicle. The demolition projector may be elevated or lowered for use at various ranges. A .50 caliber machinegun is cupola mounted and a 7.62mm machinegun is coaxially mounted with the demolition projector.

*b.* In general, the CEV is a companion vehicle to the main battle tank, but one which incorporates many features adaptable to a wide variety of combat engineer uses. Specifically, CEV's were designed as special purpose engineer heavy equipment vehicles; they lack the firepower and shock ability found in the main battle tank. In the main, use of CEV's will be confined to engineer tasks in direct and/or general support of forward elements that require engineer support. Engineer support of the tactical command is enhanced by the CEV and this special purpose vehicle should remain under engineer supervision and control for optimum effectiveness.

## E-2. Authorization

Two CEV's are authorized for each combat engineer company of the engineer battalion, armored division and the engineer battalion, infantry division (mechanized). One CEV is authorized for each combat engineer company of the engineer battalion, infantry division. Two CEV's are authorized for each separate combat engineer company, separate armored, infantry, or infantry (mechanized) brigade. Two CEV's are also authorized for each engineer amphibious company of the engineer battalion (amphibious).

## E-3. Capabilities

The CEV provides engineer troops in the forward combat area a versatile, armor-protected means of performing pioneer tasks under hostile fire in support of the major combat elements. The CEV is considered an assault vehicle and accordingly, its availability for amphibious and combat engineer units is essential. It can perform varied tasks of a combat engineer nature. Representative of the tasks which can be accomplished under hostile fire by the CEV are—

*a.* Destruction or removal of roadblocks, obstacles, and barriers by the use of the demolition charge projector, the dozer blade, winch or boom.

*b.* Construction of roadblocks or obstacles by the use of the dozer blade, winch or boom.

*c.* Passage of short dry gaps, ditches and craters by earthfilling using the dozer blade.

*d.* Transportation to site and placement of fixed span assault bridging or fascines for short gap passage.

*e.* Removal of barbed wire by dozing or running through or over the wire obstacle.

*f.* Construction of near shore approaches for bridges, rafts and amphibious vehicles such as the armored personnel carrier. Construction of the far shore approaches when transported to the far shore by raft.

*g.* Destruction of key features such as bridges, railroad facilities and installations by use of the demolition charge projector during denial operations.

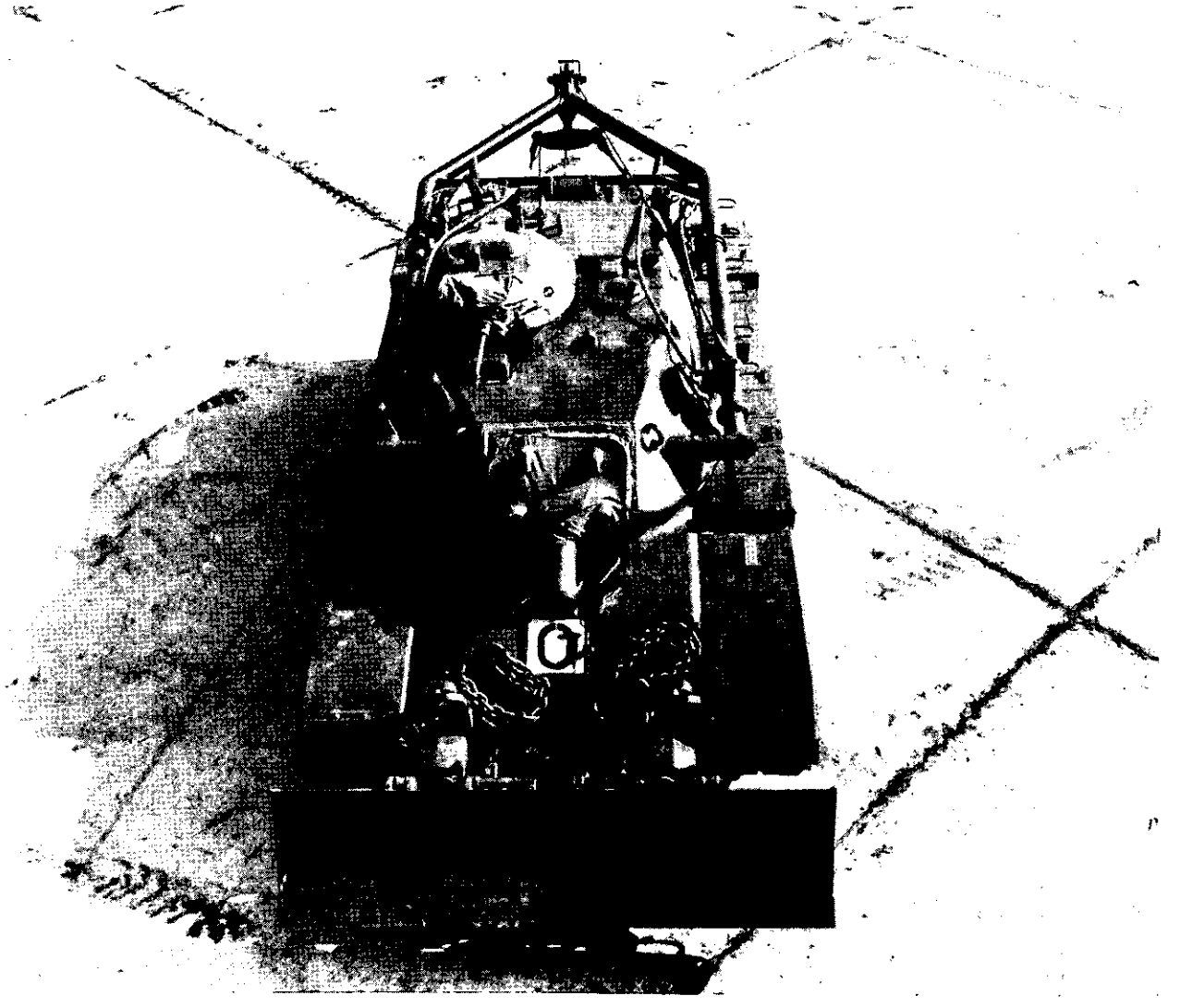


*Figure E-1. Combat engineer vehicle (CEV).*

*h.* Construction of combat roads, trails and avenues of approach in support of offensive operations.

*i.* Construction of tank and gun emplacements, and expedient entrenchments and protective shelters in offensive, defensive and retrograde operations.

*j.* Destruction of enemy held strong points during combat in fortified, built-up and urban areas. Clearance of rubble or debris in built-up areas to permit passage of other combat vehicles.

*k.* Assistance in the assault breaching of minefields by the launching of explosive mine clearing devices (such as the "snake").

## E-4. Limitations

Although the CEV consists of a tank hull and turret bearing a 165mm demolition projector it is primarily an assault support vehicle and is not employed as a tank. When employed in forward areas susceptible to enemy tank or antitank fire the CEV requires protection by

tanks or other armored assault vehicles. Designed primarily for combat construction and demolition tasks, the vehicle is commanded by an engineer noncommissioned officer trained in combat engineer tasks and not in armor tactics. As a consequence, use of the CEV should be confined to those engineer combat tasks required in support of assault elements on the battlefield.

## E-5. Concepts of Operation

*a.* Based on intelligence and mission the company commander decides which platoons require use of the CEV. Normally, the CEV's support the forward elements in offensive operations and the withdrawing elements in a defensive or retrograde operation.

*b.* The CEV is operated by a four-man crew consisting of a commander, driver, loader, and gunner. The crew is highly trained in special techniques which exploit the capabilities of the CEV in demolitions, breachings, minefield clearances, and construction tasks in forward battle areas. The commander and his crew are thoroughly trained in all facets of CEV employment in conjunction with the supported units. All platoons of the engineer company employing the CEV should receive unit training with the vehicle. Additionally, the CEV crew should train with the supported units to insure proficient operation.

## E-6. Employment

*a. Planning.* Plans for appropriate security must be provided and executed by the tactical unit for which the CEV provides support. In the advance, a minimum of one engineer squad and the CEV should be well forward to rapidly demolish roadblocks encountered. Additionally, a mounted squad in an armored personnel carrier is in position to provide protection to the CEV along with that furnished by the tactical unit supported. Appropriate security must be provided the CEV during the accomplishment of tasks. For some engineer tasks, supervision of the CEV and crew at work is best observed and supervised from a position outside the vehicle. When the CEV is being used to perform a task under fire, observation of the work area from the vehicle is limited to periscope, making outside supervision of task accomplishment desirable and sometimes essential. Under such operating conditions supervisor communication by radio, wire, sound or visual signal are essential.

*b. Liaison.* Liaison with supported units must receive primary attention of the engineer unit commander in preparation for operations of the CEV. Liaison is essential for the CEV's security during operations to prevent its being fired upon by supported units. The CEV creates considerable noise, dust, and an air of activity which might be construed by supported units to be of enemy creation unless adequate liaison has established the nature of this friendly mission. Engineer unit liaison with military police and transportation personnel along approach routes to work areas is essential on priority movements. Constant liaison by the engineer unit with interested staff agencies and units must be maintained during CEV operations. Supported units must be kept informed at all times as to the status of the task accomplishment, i.e., unforeseen delay or expedited completion times.

*c. Cover and Concealment.* It is mandatory that the CEV use techniques that will limit enemy observation both during the approach to the worksite and during the accomplishment of the mission. The CEV must move by routes or defiles that provide the maximum of protection from enemy observation and fire. Where such protection cannot be provided, the CEV must use a maximum of other protective measures, such as screening by artillery fire, smoke, or flamethrower. The supported units must recognize the limitations of the CEV during operations and provide the required security, screening operations, or other protection, distracting or diverting enemy efforts to make the mission successful.

(1) When the CEV has to move at night or through a screen of smoke to gain access to a worksite, and perform its mission in an area obscured by smoke or the elements, the vehicle should be guided and supervised from the ground by dismounted troops. Operating procedures employed in the movement of tanks at night and under poor visibility conditions are equally applicable to CEV's (FM 17-1). At night

the CEV can be moved to the worksite under tactical conditions best by guidance from a dismounted guide equipped with a flashlight with an infrared filter inserted. The CEV driver directs infrared devices toward the flashlight emitting infrared radiation and is thus guided to the worksite. The CEV's infrared equipment will enable it to move without guidance by dismounted troops, but for the sake of speed the vehicle can move best when dismounted guidance is provided. A supplemental means available for dismounted guidance of the CEV in night movement is the external telephone located on the rear of the CEV.

(2) The worksite can be screened from the likely enemy approach side by smoke. The area can then be illuminated by supported unit searchlights, flares, and the headlights mounted on the CEV, enabling completion of the mission.

*d. Communications.* In all employment phases the essentiality of adequate communications equipment for the CEV is as great as for other armored vehicles. The CEV commander must be able to communicate with the platoon leader of the platoon he is detailed to support. Coordination of arrangements and plans between CEV crew commander and the platoon commander must be maintained at *all times* to effect proper operation.

# INDEX

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,
*General, United States Army,*
*Chief of Staff.*

Official:

J. C. LAMBERT,
*Major General, United States Army,*
*The Adjutant General.*

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*Active Army:*

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TJAG (1)
TPMG (1)
TSG (1)
OPO (1)
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CofCh (1)
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  USACDCCARMSA (3)
  USACDCARMA (5)
  USACDCEA (3)
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  USACDCMSA (5)
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Engr Bde (5)
Engr Gp (5)
Engr Bn (8)
Engr Co (2)
Br Svc Sch (10) except
  USAOC&S (25)
  USAIS (40)
  USAARMS (50)
Joint Sch (5)
USAWC (10)

*NG:* State AG (3); units—same as Active Army except allowance is one copy to each unit.

*USAR:* Units—same as Active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320–50.

☆U.S. Government Printing Office: 1965—200-502/5701A