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FM 5-136

DEPARTMENT OF THE ARMY FIELD MANUAL

ENGINEER BATTALIONS AIRBORNE

AND

AIRMOBILE DIVISIONS

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ENGINEER BATTALIONS, AIRBORNE AND AIRMOBILE DIVISIONS

FM 5–136, 15 October 1970, is changed as follows:

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

Remove pages—	*Insert pages—*
i and ii	i and ii
1–1	1–1 and 1–2
2–1 and 2–2	2–1 and 2–2
N/A	2–9
5–1 and 5–2	5–1 through 5–2.1
5–9 through 5–14	5–9 through 5–14.1
6–1 through 6–7	6–1 through 6–8
7–1 through 7–3	7–1 through 7–3
8–1 and 8–2	8–1 and 8–2
9–1 through 9–4	9–1 through 9–4
A–1 through A–3	A–1 and A–2
B–3 and B–4	B–3 and B–4
C–1 through C–3	C–1 and C–2
D–1 and D–2	D–1 and D–2
G–1	G–1
N/A	J–1 through J–5
Index 1 and Index 2	Index 1 and Index 2

2. A star in the margin indicates new or changed material.

3. File this change in front of the manual for reference purposes.

By Order of the Secretary of the Army:

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

Official:

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The Adjutant General.

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FIELD MANUAL
No. 5-136

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WASHINGTON, DC, *15 October 1970*

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PART ONE

INTRODUCTION

CHAPTER 1

GENERAL

1–1. Purpose

The manual is a guide for the battalion commander, his staff, company commanders, platoon leaders, platoon sergeants, and squad leaders in the organization, operation, and employment of the engineer battalions organic to the airborne and airmobile divisions.

1–2. Scope

a. This manual covers the organization, missions, capabilities, employment, and operations of the engineer battalions organic to the airborne and airmobile divisions. The airborne division engineer battalion (TOE 5–25) discussed in this manual should not be confused with the airborne engineer combat battalion (TOE 5–195), a nondivisional unit (see FM 5–142). Since the missions, employment, and operations in other than airborne and airmobile operations are similar to those of other divisional engineer battalions, this manual should be used in conjunction with FM 5–135 for complete coverage of other type operations. Appendix B provides information on airlanding facilities.

★*b.* The discussions of missions, organization, personnel, and equipment are based on the latest issues of tables of organization and equipment (TOE) available at the time of writing. All references to TOE list only the basic numbers. DA PAM 310–3 should be consulted for latest letter suffixes to the basic numbers. Specifically, the TOE included in detail herein are (in order of presentation):

5–25 Engineer battalion, airborne division.
5–26 Headquarters and headquarters company, engineer battalion, airborne division.
5–27 Combat engineer company, engineer battalion, airborne division.
5–215 Engineer battalion, airmobile division.
5–216 Headquarters and headquarters company, engineer battalion, airmobile division.
5–217 Combat engineer company, engineer battalion, airmobile division.

c. The contents of this manual, unless otherwise specified apply to:

(1) General war, including consideration of employment of nuclear munitions and chemical and radiological agents; and protection from nuclear munitions and chemical, biological, and radiological agents.

(2) Limited war.

(3) Cold war, to include stability operations.

★*d.* This manual is in consonance with the international agreements listed below. Applicable agreements are listed by type of agreement and number at the beginning of each chapter.

TITLE	NATO STANAG	CENTO STANAG	SEATO SEASTAG	ABCA SOLOG
Operational Road Movement Orders, Tables & Graphs	2041	2041	2041	51
Reporting Engineer Information in the Field	2096	2096	2096	
Non-Nuclear Demolition Target Folder	2123			
Minimum Potability Standards for Field Water Supply				125

1–3. Recommended Changes

Users of this manual are encouraged to submit recommendations to improve its clarity or ac-

curacy. Comments should be keyed to the specific page, paragraph, and line of text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding Officer, US Army Combat Developments Command Engineer Agency, Fort Belvoir, Virginia 22060. Originators of proposed changes that would constitute a significant modification of approved Army doctrine may send an information copy through command channels to the Commanding General, US Army Combat Developments Command, Fort Belvoir, Virginia 22060, to facilitate review and followup.

PART TWO

ENGINEER BATTALION, AIRBORNE DIVISION

CHAPTER 2

INTRODUCTION

SECTION I. THE AIRBORNE DIVISION

2–1. Mission

The primary mission of the airborne division is the destruction of enemy military forces and the seizure or domination of critical land areas, their populations, and resources. The division may also be employed in stability operations.

2–2. Organization

The airborne division (fig 2–1) consists of a command, staff, combat support, and combat service support structure and nine maneuver battalions (airborne infantry). The division commander, in organizing the division for combat, groups appropriate elements of the division under its three brigade and other control headquarters in types and numbers appropriate to each control unit's specific mission.

2–3. Capabilities and Limitations of the Airborne Division

a. The airborne division can—

(1) Conduct airborne operations alone or as part of a joint force.

(2) Conduct operations deep in the enemy's rear, employing vertical envelopment operations.

(3) Conduct sustained combat operations when augmented by necessary combat, combat support, and combat service support units.

(4) Deploy rapidly by air.

(5) Conduct airmobile operations.

(6) Exploit success, to include the effects of nuclear, chemical, and conventional fires.

(7) Conduct riverine operations.

(8) Operate without ground lines of communication more effectively than other divisions.

b. The airborne division has the following limitations:

(1) Requirement for large initial and continuing Air Force support when employed in an airborne role.

(2) Limited ground vehicular mobility.

(3) Less protection than other divisions against nuclear biological, chemical, and conventional fires.

(4) Limited defense and protection against armor.

(5) Sensitivity to adverse weather conditions and aircraft availability when employed in an airborne role.

(6) Requirement for combat, combat support, and combat service support augmentation for sustained operations.

(7) Limited organic airlift capability.

(8) Lack of organic medium artillery fire support.

Section II. ENGINEER BATTALION, AIRBORNE DIVISION

2–4. Organization

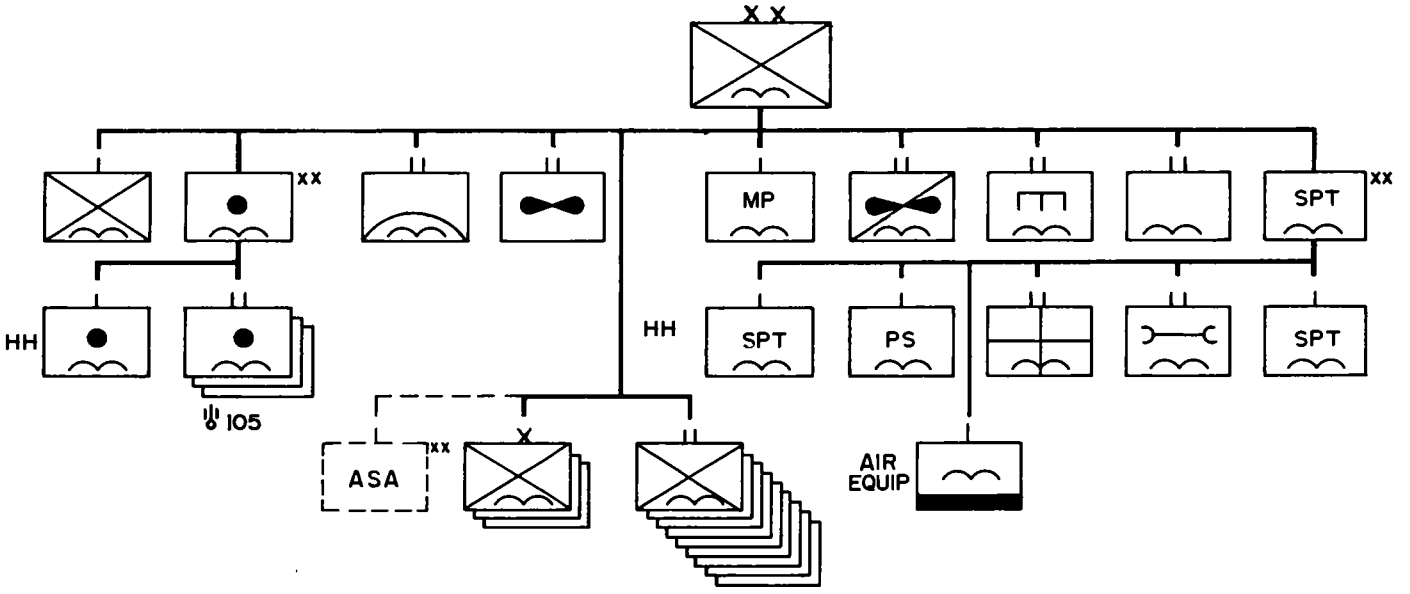
The engineer battalion, airborne division, also referred to as the airborne division engineer battalion (TOE 5–25), consists of a headquarters and headquarters company and three identical combat engineer companies (fig 2–2).

2–5. Mission

The primary mission of the airborne division engineer battalion is to increase the combat effectiveness of the airborne division by providing engineer combat support. The battalion may also undertake and carry out airborne infantry combat missions.

2–6. Equipment

All items of equipment of the battalion are listed



★*Figure 2–1. Organization chart, airborne division.*

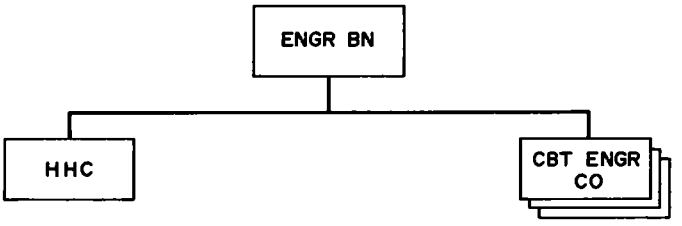


Figure 2–2. Organization chart, engineer battalion, airborne division.

in the applicable TOE. Major items are treated in greater detail in the discussion of the battalion elements. All equipment can be delivered by parachute or from landed medium transport or assault aircraft.

2–7. Mobility

The airborne division engineer battalion is 95 percent mobile in organic transportation and 100 percent air transportable in medium transport or assault aircraft. Army aircraft organic to the airborne division provide some degree of mobility throughout the division's area of influence and may be used by the battalion on a mission basis whenever they can expedite the accomplishment of the mission (FM 1–100).

2–8. Assignment

The airborne division engineer battalion is organic to the airborne division, TOE 57.

2–9. Capabilities

a. At TOE Level 1, the airborne division engineer battalion provides:

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Engineer reconnaissance and production of engineer intelligence for the division.

(3) Limited construction, repair and maintenance of roads, bridges, fords, and culverts to facilitate the movements of the division.

(4) Limited general construction works including construction of assault landing strips.

★2–16. Communications Security

a. General. Communications security (COMSEC) is the safeguarding of messages and communications equipment from the enemy and unauthorized persons, and includes all measures authorized by the US Army to counteract enemy communications intelligence activities. Communications security is a command responsibility, but requires conscientious participation by all individuals concerned with communications activities. The wide dispersal of engineer units and the heavy voice communications traffic necessitate careful planning and implementation of communications security measures.

b. Physical security. Physical security is the safeguarding of classified equipment, materials, and areas from unauthorized access. All classified communications equipment and materials must be used, stored, transferred, and transported in accordance with current security regulations.

c. Transmission security. Transmission security consists of measures to prevent the enemy from deriving intelligence information from electrical communications transmissions. Every means of electrical transmission is subject to interception. Transmission security is improved by the following measures:

(1) Reduction of the number and length of transmissions to a minimum.

(2) Reduction of transmission power.

(3) Strict adherence to authorized transmission procedures.

(4) Circuit discipline and operator training.

(5) Defense against jamming and imitative deception.

(6) Defense against interception and direction finding.

(7) Defense against traffic analysis.

(8) Authentication of all messages.

d. Since in-the-clear transmissions provide potential sources for enemy intelligence activities protective measures are necessary at all times to reduce the danger of compromise of information being transmitted. Strict radio net discipline is the primary defense against radio interception and direction-finding. Both operator and maintenance personnel must be trained to recognize and avoid improper radio procedures that endanger transmission security. For more detailed discussion of communications security see FM 24–1 and FM 32–5.

e. Utilization of KY–8 and KY–38 voice security devices in conjunction with the battalion's VRC–12 and VRC–77 series radios will provide high level security against many forms of enemy traffic analysis. For a more detailed discussion see AR 380–41, TM 11–5810–224–12P and TM 11–8510–245–12P.

★2–17. Electronic Warfare

a. General. Electronic warfare (EW) is that division of the military use of electronics involving actions taken to prevent or reduce an enemy's effective use of radiated electromagnetic energy, and actions taken to insure our own effective use of radiated electromagnetic energy.

b. Vulnerability. Engineer battalion communications nets are vulnerable to enemy detection, interception, analysis, direction-finding and exploitation each time electromagnetic energy is radiated. Enemy exploitation may be oriented toward intelligence support of his fire and maneuver; or, it may be in the form of electronic warfare support measures (ESM) operations. For example, analysis of radiated communications signals can result in the determination of the type, purpose, location, and composition of radio nets and technical parameters, such as transmission frequency, modulation type, and power output. The enemy uses these data to develop electronic countermeasures (i.e., jamming and deception) to degrade or deny friendly use of communications systems.

c. Defensive Measures. The vulnerability of communications systems to ESM and ECM must be accepted as an inherent limitation and a necessary risk since complete immunity is difficult to attain. Nonetheless, this exploitation can be minimized by adhering to the COMSEC procedures outlined in paragraph 2–16 and through the application of electronic counter-countermeasures (ECCM). A prerequisite to the implementation of ECCM is the radio operator's ability to distinguish between unintentional interference (accidental or atmospheric) and deliberate jamming or deception. Once ECM has been determined to be the source of interference, appropriate ECCM procedures must be employed to minimize the detrimental effects while assuring continuity of the mission. Recognition of ECM as well as ECCM are discussed in FM 32–20 and FM 61–24.

CHAPTER 5

BATTALION OPERATIONS

★(NATO STANAG 2041, CENTO STANAG 2041, SEATO SEASTAG 2041, ABCA SOLOG 51, ABCA SOLOG 125, NATO STANAG 2123)

Section I. GENERAL

5-1. Employment

a. The airborne division engineer battalion is a self-contained unit designed to provide engineer combat support in the airhead and in the forward portion of the battle area. It can overcome a variety of obstacles incident to the movement of the division, thereby contributing to the mobility of the division and its capability to maneuver in offensive action. In defense, retrograde, or denial operations, the battalion has the capability to impede the progress of enemy ground operations by blocking critical avenues of approach.

b. The airborne division engineer battalion operates as part of division troops and deploys its companies in support of the brigades and combat maneuver elements of the division. The headquarters company contains a limited amount of engineer construction equipment with operators to supplement the engineer companies for specific tasks.

c. The combat engineer companies of the airborne division engineer battalion normally are associated with particular brigades to increase operational efficiency. The company performs the unit engineer functions of tactical engineer staff planning and execution of the engineer mission in this role. Continuous liaison is maintained by the company to the brigade for this purpose.

d. Attached or supporting engineer units should be kept under engineer battalion control when possible. Platoons may be placed in support of maneuver battalions or task forces for specific missions.

e. Attachment of engineer teams to combat elements is necessary for accomplishment of specific tasks requiring close command control. In the offensive this may consist of assault breaching or demolition tasks. In defense or retrograde, the execution of barrier demolitions and the employment of ADM may require attachment for completion of the specific mission. In the airborne assault, attachment is the normal procedure, before marshaling for such operations, to facilitate control required for development of air loading plans and rehearsals.

f. Airborne engineer troops engage in limited combat incident to accomplishment of their engineer missions. The nature of airborne operations is such that these troops will engage in combat more frequently than engineer units in other types of divisions. Disengagement of engineer elements from the enemy is made by other combat elements to enable the engineers to continue their normal mission. When the situation requires deliberate commitment of the engineer battalion in an infantry mission, the battalion is committed by the division commander who, when possible, preserves unit integrity.

g. When task organizations are committed on separate missions, the engineer battalion provides an appropriate engineer element to accompany the force.

h. When the requirement for engineer support within the division exceeds the capability of the organic engineer battalion, additional engineer support is provided by the next higher echelon of command.

(1) Additional engineer support to the division may range from reinforcing the combat engineer strength to the provision of other engineer units (such as the airborne engineer combat group (TOE 5-52), engineer combat battalion, airborne (TOE 5-195), and the engineer light

equipment company, airborne (TOE 5–54)) for tasks in bridge construction, debris removal, erection of barriers, mapping, survey, camouflage, and deception.

(2) The earthmoving capability of the airborne engineer battalion is extremely limited. Projects involving more than a minimum amount of earthwork require nondivisional support. The airborne light equipment company is organized and equipped to provide this support.

(3) Nondivisional engineer units normally are placed in direct support of the division. However, these units are attached when the mission necessitates close command control in execution. River crossings, barrier demolitions tasks, or use of ADM are examples of such situations. All engineer combat support provided to the division is coordinated by the division engineer.

i. The airborne division engineer battalion or its elements may participate in stability operations. By such participation, the battalion supports divisional elements engaged in stability missions. In independent operations it will support host country (HC) or US forces already in-country. For details concerning employment of the battalion in stability operations see paragraphs 5–39 through 5–49.

5–2. Standing Operating Procedures

Standing Operating Procedures (SOP) reduce the number, length, and frequency of orders. They establish the regular procedure to be followed in the absence of specific instructions. An SOP is prepared for the battalion and all its operating elements. FM 5–135 contains an example SOP for a divisional engineer battalion.

★5–3. Security

Each commander is responsible for the security of his unit. Security includes all measures taken by a commander to protect his unit against enemy interference, surprise, and observation. The measures adopted should be appropriate to the threat. As the threat increases, greater security measures are required to protect troops and equipment in bivouac, during movement, and at worksites. Work parties normally are responsible for furnishing their own security. Occasionally, however, they may be protected by infantry elements to free the work parties to complete the engineer mission. Organic weapons can provide some protection against aircraft as outlined in appendix E. A detailed discussion of active and passive air defense measures is contained in FM 44–1. Communications security is covered in FM 32–5.

Section II. ADMINISTRATIVE MOVEMENTS

5–4. Engineer Work in General

a. Type of Work. The division usually needs engineer support when it moves administratively. A move may be made by motor, rail, water, or air. During movements, engineer work generally consists of the following:

(1) Providing facilities and assistance during loading and unloading of divisional elements at point of departure and at destination.

(2) Maintaining roads and bridges en route.

(3) Preparing the new area to receive the unit. This involves providing or improving facilities.

b. Employment. Engineers provide assistance by keeping some engineers at the point of departure until the bulk of the division has moved; furnishing an engineer advance party to prepare the new area; and sending some engineers with each major echelon moving independently. During administrative movements, engineers normally remain under control of the battalion commander. In general, engineer assistance is limited to work which benefits the division as a whole or to work for which engineers are better trained and equipped than other troops. Supported units provide their own facilities and labor as far as practicable.

5–5. Engineer Work at Departure Point

a. Type of Work. Engineers at departure points may—

(1) Construct or strengthen ramps and loading platforms.

(2) Construct or improve routes of approach.

(3) Construct or improve preloading assembly areas.

(4) Provide technical assistance to troops of other arms to load and lash equipment.

b. Loading Facilities. Every effort is made to choose departure points that require only a minimum of new construction and improvement. In most administrative air movements, terminal type facilities for loading, unloading, and intransit handling of cargo and personnel are utilized. There will be situations, however, in which load-

ing ramps and platforms have to be built. In many cases, the engineer battalion will coordinate closely with the airborne division support command in this phase of a division administrative movement.

5–6. Engineer Work on Roads

a. Engineer Reconnaissance. Engineers make a detailed route reconnaissance before a major motor march. The engineer must be able to provide the following information:

(1) Load capacities of roads and bridges, and overhead clearance.

(2) Estimate of time and effort necessary to put required routes in condition to support division loads.

c. Liaison.

(1) Liaison between supporting units must be maintained during the attack to assure cooperation and coordination between all units participating in the operation.

(2) The assistant division engineer is the chief liaison agent between the airborne engineer battalion and division headquarters. Liaison functions between the supporting engineer companies and the brigades are usually performed by the company executive officer or other individual designated by the company commander.

5–24. Engineer Duties in the Attack

Typical engineer duties in the attack include—

a. Conducting reconnaissance.

b. Assisting in the preparation of traffic circulation plans.

c. Assisting forward movement of infantry and supporting arms by repairing roads, constructing expedient bridges, and removing obstacles.

d. Assisting in locating, marking, and removing mines, to include chemical mines.

e. Assisting in flank security through the use of demolitions (including ADM), minefields, to include chemical and flame, and other obstacles.

f. Constructing arm airfields for divisional aircraft.

g. Constructing or rehabilitating airlanding facilities, air delivery facilities, drop zones, and extraction zones for assault type cargo aircraft.

h. Operating water points.

5–25. Engineer Reconnaissance

a. Engineer reconnaissance during the movement to contact is performed initially by the reconnaissance teams from battalion headquarters and by reconnaissance elements from the engineer units supporting the infantry. These teams provide the division and the brigades early with reliable information concerning the terrain over which the units is to advance.

b. Engineer reconnaissance during the movement to contact should include information on—

(1) Serviceability and types of roads.

(2) Location of critical points.

(3) Alternate routes.

(4) Mines, to include chemical and flame.

(5) Bridges and river-crossing sites.

(6) Suitable sites for landing zones, drop zones, and extraction zones.

(7) Locally available construction equipment and materials.

(8) Water sources.

(9) Estimates of engineer effort required.

(10) Recommended traffic circulation.

(11) Obstacles to include radiological contamination.

★*c.* Engineer reconnaissance information in the field should be reported in the formats outlined in FM 5–36.

5–26. Pioneer Work Done by Other Arms

Because there are seldom enough engineer troops available to do all the pioneer work necessary to assist the advance of the infantry and supporting arms, the other troops do as much of it as possible to help themselves. All troops are trained in the installation and removal of mines. Infantry troops do much of their own pioneer work with technical assistance from the supporting engineer companies.

Section VI. THE DEFENSE

5–27. Introduction

a. After assault objectives have been seized in an airborne operation, the airborne force normally suspends offensive operations temporarily to secure and organize the objectives. The time required will vary with the assigned mission, the size and composition of the force, enemy reaction, and the type of operation expected.

b. Defense of the airhead is generally a variation of the area defense. The defense envisions organizing and occupying strongpoints on dominant terrain along the airhead line to cover main routes of approach into the airhead; covering unoccupied terrain between defended localities and natural obstacles by fire, mines (to include chemical and flame), and other artificial obstacles; employing appropriate passive air defense measures to avoid air attack, with provisions to actively engage attacking aircraft in self-defense; conducting continuous and intensified reconnaissance and surveillance during the hours of darkness; forming a reserve, and establishing priorities for designation of new or additional reserves. Or-

ganized defensive forces are employed to blunt and stop enemy attacks; mobile reserves are deployed to reinforce or block in threatened areas; and counterattack forces are employed in spoiling attacks or in attacks to destroy the enemy forces or eject them from the airhead. The shape of the airhead affords the airborne division interior lines of communication, facilitating shifting of troops and commitment of reserves. Reserves are held in positions of readiness prepared to counterattack, to occupy defense positions, or to execute blocking missions. Positions are prepared in depth within the capabilities of the airborne unit. The airhead defensive line must provide adequate space for maneuver, protection of critical installations, and airlanding or air-evaluation operations.

5–28. Engineer Functions in the Defense

Defensive positions usually are laid out and constructed by the troops which are to occupy them. Engineers may be used to prepare alternate or supplementary positions and to perform such duties as—

a. Repairing, maintaining, and improving roads for mobile reserves and counterattack forces; providing access to defensive positions and supply and evacuation points; and recommending traffic circulation plans.

b. Preparing barrier plans and assisting in their implementation. Laying minefields and advising other units on their use. Preparing demolitions.

c. Assisting in the construction of command posts, observation posts, and obstacles of all types. Assisting in the organization of the ground and the preparation of defensive positions.

d. Providing engineer intelligence.

e. Providing technical assistance in camouflage.

f. Engaging in limited ground combat.

g. Improving and maintaining airlanding and air delivery facilities.

h. Conducting reconnaissance.

i. Operating water points.

★*j.* Emplacing surveillance, target acquisition, and night observation (STANO) devices in conjunction with engineer-related projects.

5–29. Barrier Plan and Obstacles

Because of its lack of tanks and armored vehicles, the airborne division is extremely vulnerable to armor attack. Among other measures, rapid erection of obstacles reduces this vulnerability.

a. Barrier plans are developed concurrently with other tactical plans and are planned and executed by all echelons of command. However, only corps and higher commanders have the authority to employ barriers on an extensive scale. This authority may be delegated to division and comparable commanders. The division engineer prepares terrain and barrier studies for G2, and advises G3 on the means and extent of augmenting natural obstacles. He plans and supervises the technical aspects of barrier employment and prepares portions of the barrier (and denial) plan under the supervision of the division G3. Division barrier and obstacle planning usually is supplemented by detailed planning of tactical obstacles at brigade level.

b. Construction of obstacles for close-in defense and security is the responsibility of the unit commander. These obstacles may be integrated into the barrier plan of the division or higher command. Normally each unit constructs that part of a barrier system which lies within its area of responsibility.

c. The airborne division engineer battalion assists other devision elements with technical advice, supervision, and construction effort. It is responsible for siting and constructing individual obstacles (in addition to those in its own area of responsibility) when one or more of the following conditions exists:

(1) Special skills and equipment are required.

(2) Exposed flanks or rear require protection.

(3) The command as a whole will benefit.

(4) The obstacles must be prepared before the arrival of the troops who are to occupy the area.

(5) The obstacles lie outside the area of responsibility of any particular unit.

★*d.* Obstacle construction is made easier by the use of the nuclear and nonnuclear demolition target folders explained in appendix C. Prepared in advance for all planned demolition and denial targets in the barrier and denial plans, these folders give the target locations, required explosives, orders for preparing and firing, and the demolition report.

★*e.* To ease the logistic burden inherent in airborne operations, maximum use must be made of

locally available materials for obstacle construction. Atomic demolition munitions may be used to create obstacles. Minefields, within the logistic capability, are used in likely armor approach routes. When they become available, aerially delivered antitank mines may affect the quantity of barrier materials that must be delivered into the airhead. For details on barriers see FM 31–10.

★*f*. STANO devices employed in conjunction with obstacles will increase the surveillance capabilities over the entire barrier. Certain STANO devices, including unattended ground sensors, may be emplaced during obstacle construction and barrier preparation. The obstacle can also be seeded aerially with these devices. When dropping the devices from overflying aircraft, certain considerations must be made.

(1) Although this method may be more rapid than hand emplacement, it results in less exact ground positioning.

(2) The possibility of emplacing damaged or malfunctioning devices increases as the altitude from which the devices are dropped increases.

5–30. Defense Against Nuclear and Chemical, Biological, and Radiological (CBR) Attack

a. Normal defensive measures are employed with emphasis on individual protective measures and unit radiation exposure control. (For details see FM 21–40 and FM 3–12.) Particular stress is placed on the importance of deep foxholes and the provision of overhead cover. The airborne division engineer battalion conducts the following tasks in defensive planning for nuclear or CBR attack:

(1) For the division:

(*a*) Surveys area for suitable shelters and assists in planning and constructing protective facilities for key installations.

(*b*) Selects alternate water points.

(*c*) Selects and prepares an alternate bridge site or bypass for each bridge required.

(2) For the battalion:

(*a*) Disperses unit personnel, equipment, and supplies consistent with operational practicability.

(*b*) Organizes unit first aid, rescue, and evacuation teams.

(*c*) Prepares a CBR defense SOP based on that of the division.

b. In the event of a nuclear detonation or a CBR attack, the airborne division engineer battalion accomplishes the following:

(1) For the division:

(*a*) Decontamination of essential areas or of exit routes required for evacuation to safe areas.

(*b*) Construction and posting of signs for unsafe areas.

(*c*) Firefighting missions.

(*d*) Clearance of debris from essential routes and airlanding facilities.

(*e*) Production of maximum amount of potable water.

(*f*) Such other engineer tasks as are required

(2) For the battalion:

(*a*) First aid, rescue, and evacuation.

(*b*) Operation of personnel and equipment decontamination stations.

5–31. Defense Against Airborne Attack, Guerrilla Action, and Infiltration

Within its area of operation, the airborne division engineer battalion establishes an observation and warning system and local security adequate for defense against enemy airborne, guerrilla, and infiltration tactics. The battalion also may be called on to construct obstacles for the devision to use as a deterrent to such enemy tactics.

Section VII. DENIAL OPERATIONS

5–32. Introduction

A denial operation is designed to prevent or hinder the enemy's use of or benefit from an area, personnel, facilities, or material. It may include the destruction, removal, and contamination of equipment and supplies, or the erection of obstructions. Denial operations are basically strategic in concept. Staff responsibilities for denial operations plans are the same as for barrier plans. In the devision, denial operations normally are incorporated in the barrier plan. All troops participate in denial operations, particularly in the removal or destruction of organic equipment and supplies, procedures for which are normally included in unit SOP. Large-scale demolitions, and denial targets that are technical in character, are usually assigned to the divisional engineer battalion.

★5–33. Denial by Destruction

All possible methods of destruction are used. The most common are burning, flooding or drenching,

mechanical (breaking with a sledge hammer), chemical and radiological contamination, and use of explosives including ADM and projectiles (small arms, artillery, and bombs). Demolition and destruction of major end items of equipment should be accomplished in accordance with instructions in the operators technical manual. Nuclear and nonnuclear demolition target folders are prepared in advance so that destruction may be executed at the desired time. Personnel to destroy each item are designated in advance, and necessary supplies are obtained and stored at convenient locations. The circumstances under which destruction is to take place are definitely prescribed; and, if orders for destruction are to be issued, the means of transmission are provided. According to the Rules of Land Warfare of the Geneva Convention, medical supplies will not be destroyed intentionally but other supplies that cannot be evacuated are destroyed.

5–34. Denial by Removal

Evacuation of material is as much a part of denial operations as destruction. All possible military supplies and equipment are evacuated. Evacuation is started early and conducted in accordance with prepared priority lists. Every available means of transportation is used to capacity.

5–35. Atomic Demolition Munitions

When augmented with ADM teams from the TOE 5–570-series, the airborne division engineer battalion may use atomic demolition munitions in denial operations. With ADM, it is possible to destroy targets that would be difficult or impossible to destroy otherwise. Denial targets suitable for the employment of ADM are airfields, defiles, underground installations, and tunnels. Details on the employment of ADM are contained in FM 5–26.

Section VIII. RIVER-CROSSING OPERATIONS

5–36. Introduction

a. The airborne division, or elements of the division may, when suitably equipped, conduct river-crossing operations as follows:

(1) During the initial establishment of the airhead.

(2) While conducting link-up with friendly forces.

(3) While conducting aggressive reconnaissance from the objective area.

(4) As part of a raid from the objective area.

(5) While expanding the airhead as a means of providing more space for additional airlanded elements.

(6) As a part of normal ground operations following an airborne operation.

b. River lines and the possible requirement for river crossings during the early stages of an airborne assault must be carefully considered when the objective area and the airhead line are selected during the planning phase. Wide rivers provide excellent natural obstacles as a part of the airhead line, but when located beyond this area they may require airborne elements to conduct river-crossing operations.

5–37. Capabilities

The airborne division engineer battalion has no organic stream-crossing equipment. However, personnel of the battalion have the technical training to construct standard military floating and fixed bridges. Expedient construction may be practical under certain conditions for hasty crossings of narrow gaps.

5–38. Conduct of River-Crossing Operations

a. The airborne engineer battalion can provide hasty crossings of unfordable streams and small rivers if bridging is delivered to the constructing unit.

b. Deliberate river-crossings of wide streams must be supported by additional troops and equipment. The airborne division engineer companies cross with the airborne brigades to provide support on the far shore. Corps or army engineer troops furnish the necessary equipment and construction crews to accomplish the bridging mission and all near shore support with the exception of engineer regulating points (ERPs), which are the responsibility of the divisional engineers. The conduct of river-crossing operations is explained in detail in FM 31–60.

★*c.* STANO devices may be used to complement the jobsite security and bridge protective measures.

Section IX. STABILITY OPERATIONS

5–39. General

Stability operations are those types of internal defense and internal development operations and assistance provided by the Armed Forces to maintain, restore, or establish a climate of order in which responsible government can function effectively and without which progress cannot be achieved. Stability operations include advisory assistance operations, intelligence operations, civil affairs operations, psychological operations, tactical operations, and others designed to foster growth and forestall or resolve internal conflict within a nation.

5–40. The Environment

In stability operations, many factors contribute to making the environment different from that of limited or general war. Among these factors are—

a. The guerrilla attempts to select terrain which offers him an advantage by limiting the mobility of conventional forces.

b. Forces usually are dispersed over an extremely wide area and operations are oriented towards control over the population of an area rather than establishment of a front.

c. The adversary generally is elusive, hard to identify, highly trained in the techniques of guerrilla warfare, and well motivated.

d. Gaining and maintaining the active support of the population is decisive in determining the outcome of the conflict. The activities of military units are thus directed toward obtaining the support of the population, and each operation, whether tactical, logistical, or civil-military, must be evaluated for its impact on the population.

5–41. Role of the Engineers

Divisional engineer battalions or their elements will support the devision or divisional elements engaged in stability operations. Divisional engineers may also support the host country through independent operations. Engineer combat elements maintain their organizational integrity, but may be organized provisionally into task forces, depending upon the particular engineering skills and equipment required. For a general discussion of engineer units in stability operations, see FM 31–22, FM 31–23, and FM 5–1.

5–42. Engineer Capabilities

Engineer combat elements in a stability role may help a host country to counter insurgency by—

a. Providing traditional engineer assistance to indigenous military forces or to US forces committed to stability operations.

b. Providing training assistance and advice to host country engineer forces.

c. Planning, organizing, and supervising construction projects to be carried out by indigenous personnel in accordance with US or host country civilian or military programs.

d. Making engineer surveys to support engineer projects and to provide a basis for increased engineer assistance should the insurgency escalate.

★*e.* Providing assistance in military civic action projects (digging wells, building schools, water irrigation systems, land clearing and reclamation, constructing utility systems, building and maintaining roads and bridges, etc.) to assist the indigenous people and encourage their support of the host country forces. Land clearing operations in heavily forested or jungle areas will require support of the specialized engineer land clearing company (TOE 5–87). For operational details, see TM 5–330, TM 5–227, and FM 5–1.

5–43. Special Considerations

When division engineer battalions are committed to stability operations, various problems and considerations not normally associated with conventional engineer operations will arise. Among these are the following:

a. Since units are usually dispersed over extremely wide areas, command supervision, to include training, maintenance, and other unit activities, will be much more difficult.

b. Because of the nature of stability operations, the critical need for numerous construction projects, and the usual lack of indigenous engineering skills, will create an especially heavy demand for engineer unit skills and knowledge.

c. With all engineer activities and projects generally susceptible to insurgent attack at any time, engineer unit commanders must insure that—

(1) Personnel are fully trained in the use of all unit weapons and are continually alert to possible surprise insurgent attack.

(2) Defense measures are taken around all engineer unit projects and activities.

d. Small unit commanders will be required frequently to make decisions based upon their own judgments, considering the situation at hand, rather than upon specific guidance and directions received from higher headquarters. The imagination and initiative of individual engineer commanders will contribute especially to the effectiveness of the engineer effort in stability operations.

5–44. Community Relations

Division engineer units will be required to undertake the following types of community relations in stability operations:

a. Liaison with local authorities and civilian groups, participation in local civilian activities, and organization of activities with indigenous military units.

b. Participation in programs to reduce friction arising from the presence of US forces.

c. Familiarizing US personnel with local customs and insuring the proper conduct of troops toward the host country populace.

d. Community relations projects designed to improve relationships between the US military and local civilian groups are very short-term projects that involve quick reaction to requests and observed needs.

5–45. Civic Action Considerations

Military civic action is the use of preponderantly indigenous military forces on projects useful to the local population at all levels in such fields as education, training, public works, agriculture, transportation, communications, health, sanitation, and others contributing to economic and social development, which would also serve to improve the standing of the military forces with the population. These operations include support for the US Agency for International Development (USAID) and other US civilian programs in the host country.

a. Airborne engineer units can best support that portion of the military civic action program which requires assistance and planning in the construction of utilities, structures, and other similar facilities for the benefit of the civil population. Engineer units are suited by their organization, equipment, and skills to undertake such tasks; however, the local civilian population must participate in these projects if they are to gain knowledge and experience needed to perform similar tasks in the future. Engineer units can support military civic action best by providing teams to advise and assist during the progress of work. Airborne engineer units are capable of supporting the many military civic action missions; however, when technical assistance and construction beyond their capabilities are required, engineer construction units must be employed. (See FM 5–162, FM 31–16, FM 31–73, FM 41–5, FM 41–10, and FM 100–20.)

b. Typical military civic action projects in which engineer units may participate are—

(1) Construction of medical, educational, governmental, religious, recreational, and community facilities.

(2) Rehabilitation and construction of public utilities such as powerplants and water production facilities.

(3) Development and rehabilitation of transportation facilities to include roads, bridges, airfields, ports and navigable waterways.

(4) Assistance in the development of agriculture and natural resources such as timber, building materials, fuels.

(5) See FM 31–22 and FM 31–22A for additional tasks that may be performed by engineer combat units.

5–46. Tactical Operations

The doctrine for employment of airborne engineer units in limited and general warfare offensive and defensive operations applies with modification to internal defense situations. If the insurgency has escalated to include guerrilla or mobile warfare, internal defense tactical operations will include counterguerrilla and mobile warfare activities. General warfare tactics and techniques must be modified to fit the special requirements of the operational environment and the nature of the insurgent threat. When supporting tactical operations against insurgent forces, the airborne division engineer battalion must take advantage of its superior flexibility and mobility.

a. Since airborne engineer units often will be supporting tactical forces in isolated locations, they may be required to assist in the static defense of the village, outpost, camp, or similar installation in which they are quartered. Airborne engineer units may also be designated as reserves and required to provide defense of an installation while the installation's main defense force is aid-

ing a similar installation under attack. Types of tasks that airborne engineer troops may perform in support of tactical operations in internal defense are essentially the same as for conventional warfare.

b. The scope of engineer support for tactical operations will be considerably increased, particularly in underdeveloped areas of the world. Engineer units should be prepared to furnish more than the "normal" amount of tactical support and assistance in such fields as water purification, route maintenance, airstrip and helipad construction; bridging and construction of hasty fortifications; and mine clearing and demolitions. This increased scope of engineer support may require that the units be augmented by teams from the TOE 5–500-series.

c. Since the airborne engineer battalion is well suited to support heliborne operations, it may be used extensively to support other US or host country military heliborne operations on a mission basis.

d. When supporting tactical internal defense operations, the airborne engineer company, platoon, and squad may often operate independently of their parent unit or at long distances from it. This will increase the requirement at lower echelons for independent decisions, initative, and technical knowledge.

e. When subordinate units (companies, platoons, and squads) are widely separated to insure competent support of tactical operations, additional liaison and supervisory personnel may be required. In internal defense operations, the engineer company or platoon may be supporting small US or host country forces in isolated areas highly susceptible to insurgent attack. In this case, unit security measures assume vital importance and all personnel may be organized into combat elements. No rear echelon is organized; personnel normally in the rear echelon may be organized into combat elements to provide CP security and defensive fire support (to include indirect fire), or they may form all or part of the installation reserves. Engineer units operating this way may be provided additional crew-served weapons such as the M60 LMG, 60mm mortar, and 81mm mortar.

5–47. Advisory Assistance

a. The airborne division engineer battalion may be required to furnish specialized mobile training teams (MTT) and train counterpart armed or paramilitary forces in branch or branch immate-

PART THREE

ENGINEER BATTALION, AIRMOBILE DIVISION

CHAPTER 6

INTRODUCTION

Section I. THE AIRMOBILE DIVISION

6–1. Mission

The mission of the airmobile division is to provide reconnaissance and security for larger units; to participate in stability, low-intensity, and mid-intensity operations; and to control an area including its population and resources.

6–2. Organization

The airmobile division (fig. 6–1) consists of a command, staff, combat support, and combat service support structure, and nine maneuver battalions (airmobile infantry). In organizing the division for combat, the division commander groups appropriate elements of the division under its three brigades and other control headquarters in types and numbers appropriate to each control unit's specific mission.

6–3. Capabilities and Limitations of the Airmobile Division

a. The airmobile division can—

(1) Conduct airmobile operations alone or as a part of a larger force.

(2) Conduct operations in the enemy's rear, employing vertical envelopment techniques.

(3) Disperse over extended distances and concentrate rapidly from widely separated areas.

(4) Exploit success to include the effects of nuclear, chemical, and conventional fires.

(5) Conduct covering force operations.

(6) Conduct mobile defense operations when augmented by combat, combat support, and combat service support elements.

(7) Operate as a mobile counterattack force.

(8) Conduct surveillance, reconnaissance, and target acquisition over wide areas.

(9) Conduct screening operations over extended frontages.

(10) Operate without ground lines of communication more effectively than other divisions.

(11) Bypass difficult terrain and obstacles with greater ease than other divisions.

(12) Conduct riverine operations.

| ★(13) Employ organic aerial field artillery and other attack helicopters throughout the area of operations.

★(14) Assist in establishing bridgeheads for river-crossing operations.

b. The airmobile division has the following limitations:

(1) Limited ground vehicular mobility.

(2) Sensitivity to adverse weather conditions and aircraft availability.

(3) Requirement for a large, continuing amount of logistical support, particularly aircraft maintenance, aircraft fuel, and aircraft lubricants.

(4) Lack of organic medium and heavy field artillery fire support.

(5) Limited protection defense against armor.

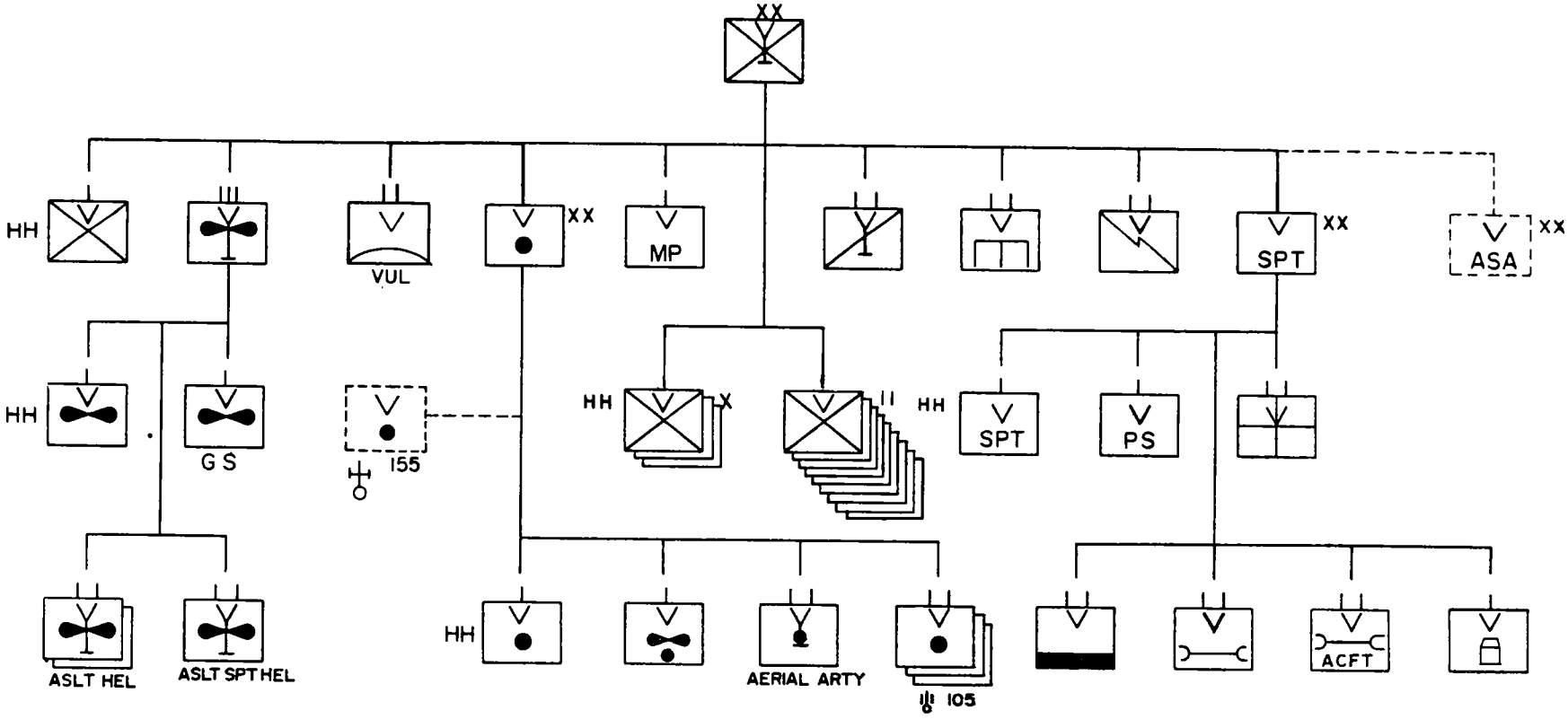
(6) Limited protection against nuclear, biological, chemical and conventional fires.

(7) Less defense against air attack than other divisions.

(8) Greater requirement than other divisions for engineer support to prepare landing zones and construct and maintain base airfields.

6–4. Methods of Operation

a. The airmobile division's capability for aerial movement gives it an area of interest and influ-



★*Figure 6–1. Organization chart, airmobile division.*

ence greatly exceeding that of conventional divisions. Effective use of this capability implies wide dispersion of units and greatly increased dependence on mission type orders, standing operating procedures, and radio communications.

b. The airmobile division normally establishes a division base of operations to facilitate control and coordination of the elements necessary to support division operations. As a minimum, the base of operations will contain elements of division artillery, the support command, the aviation group, and an instrumented airfield. Additional facilities and elements that may be located within the area are the division main command post; the division reserve; the division rear echelon; combat support; and combat service support units. Considerations in locating the base of operations include—

(1) Adequate landing and dispersal areas for aircraft.

(2) Adequate internal surface routes.

(3) Defense of the area.

(4) Location of army and corps support elements.

(5) Ability to establish adequate communications for command and control.

c. Brigade bases of operations are established to support and control brigade operations. Facilities included and location considerations are similar to those for the division base of operations.

Section II. THE ENGINEER BATTALION, AIRMOBILE DIVISION

★6–5. Mission

The mission of the engineer battalion, airmobile division, is to increase the combat effectiveness of the airmobile division by providing combat engineer support and performing infantry combat missions when required.

★6–6. Assignment and Organization

The engineer battalion, airmobile division, also referred to in this manual as the airmobile division engineer battalion, is organic to the airmobile division, TOE 67. The battalion is organized under TOE 5–215 and consists of a headquarters and headquarters company and four engineer companies (fig 6–2).

★6–7. Capabilities

a. At TOE Level 1, the engineer battalion, airmobile division provides:

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Construction, repair, and maintenance of roads, bridges, fords, and culverts.

(3) Construction, repair, and maintenance of airlanding facilities for Air Force medium cargo aircraft and all Army aircraft.

(4) Advice and assistance to other troops in the preparation of fortifications and obstacles.

(5) Support for camouflage and deception activities by accomplishing significant construction tasks and providing technical advice on minor construction aspects of both.

(6) Engineer reconnaissance and limited production of engineer intelligence.

(7) The combat engineer elements that operate as part of the combined arms team.

(8) Personnel and equipment for the purification of water for the division.

(9) Locally available materials for construction, fortifications, and camouflage.

(10) A unit to conduct infantry combat missions when required.

b. The columns under Levels 2 and 3 adapt this table for reduced operational capabilities, decreasing strength to about 90 percent for Level 2 and 80 percent for Level 3.

c. This unit is not adaptable to Type B organization.

d. The columns designated by Levels 1 through 3 are designed to relate to the categories established in AR 220–1 and AR 135–8.

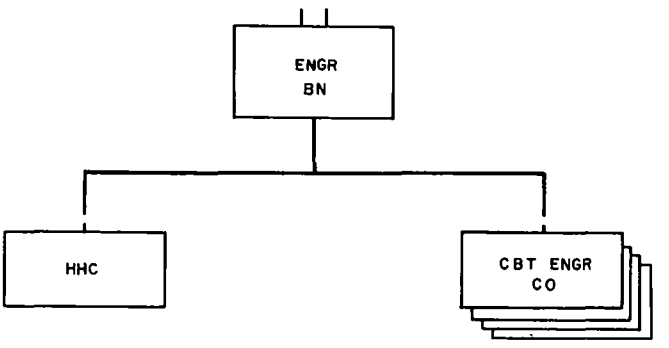


Figure 6–2. Organization chart, engineer battalion, airmobile division.

e. The capabilities of this unit are increased to the extent provided by the personnel and equipment included in the separate SRC. When required, the ADM augmentation capability may be further increased by the attachment of TOE 5–570 cellular type ADM teams.

f. Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

g. This unit performs organizational maintenance on its organic equipment and provides technical inspection and on-site maintenance in conjunction with this capability.

i. This unit depends on the AG company for personnel service and on the finance company for financial services.

★6–8. Limitations

a. During airmobile operations, the battalion depends on support aircraft to move its equipment, supplies, and personnel. Aircraft support must be continuous throughout the mission.

b. Unless furnished additional fire support by field artillery, infantry heavy weapons, or armed aircraft units, the battalion's capability for sustained infantry combat is limited.

c. The total potable water production capacity of the battalion is 3360 gallons per hour. By contrast, in the infantry, mechanized infantry and armored division engineer battalions, this capacity is 7,500 gallons per hour.

★6–9. Mobility

a. This unit is 70 percent mobile in organic vehicles.

b. This unit is 100 percent airmobile in divisional aircraft except for one forklift and one wrecker located in TOE 5–216, HHC.

c. This unit is 100 percent air transportable in US Air Force aircraft.

6–10. Methods of Operation

a. One or more combat engineer companies may be placed in direct support of, or attached to, an airmobile infantry brigade for an airmobile assault. Equipment and personnel of headquarters and headquarters company and supporting nondivisional units are employed to reinforce the combat engineer companies as required. These elements may be attached to, or placed in support of, the combat engineer companies.

b. One of the battalion's primary missions is the construction and maintenance of forward airfields and helicopter staging areas and the construction of landing zones. Some of this work may take place during the assault phase of an airmobile operation. The battalion may also be required to provide direct engineer support, such as construction or improvement of artillery bases; construction of command, fire direction and communications bunkers; and demolition (or advice to other personnel engaged in demolition) of obstacles, enemy base camp areas and cache sites, including bunker and tunnel complexes. The battalion is also responsible for the maintenance of main supply routes (MSR) and lines of communication (LOC) within divisional base camp and for coordinating with supporting nondivisional engineers in regard to MSRs and LOCs in the divisional areas of responsibility. Reinforcement may be by any appropriate type of nondivisional engineer unit capable of being airlanded or airdropped, such as the airborne engineer light equipment company (TOE 5–54) and the airborne engineer combat battalion (TOE 5–195).

c. In stability operations, elements of the airmobile division engineer battalion may be assigned to political subdivisions such as regions, provinces, districts, or villages on an area or task basis.

Section III. COMMUNICATIONS FOR THE AIRMOBILE DIVISION ENGINEER BATTALION

6–11. Communications

The airmobile division engineer battalion uses a combination of radio, wire, visual, sound, and messenger communications to provide as many means of transmitting and receiving messages as conditions permit. Its communications procedures are the same as those of other divisional engineer battalions, which are described in FM 5–135. Wire communications are used whenever possible, but the battalion's widely dispersed operations normally preclude extensive use of wire between battalion elements. Engineer companies enter the signal system of the brigade or task force they support. Figures 6–3 and 6–4 show the airmobile engineer battalion's radio net; and figure 6–5 its wire net.

6–12. Communications Section

a. Under the direction of the battalion communications officer, the communications section of headquarters company—

(1) Supervises the operation of the battalion communications system.

(2) Installs wire lines to companies and staff sections when location, time, and the situation permit.

(3) Operates the battalion message center and switchboard, when required, and provides messenger service.

(4) Operates panel displays and message pickup facilities.

(5) Provides an FM radio station that normally operates as the NCS for the battalion command net. When directed by the battalion communications officer, this station operates as a relay or retransmission station to increase the battalion's overall FM radio communications capability. When operated as a retransmission station, the station's NCS function is transferred to the battalion S3 radio station (fig 6–3).

(6) Operates a SSB radio station for the engineer battalion in the division administration/logistics net #4 (SSB RATT) and in the division command net #1 (SSB RATT).

(7) Performs organizational maintenance on assigned communications equipment, and furnishes maintenance support to other elements of the battalion when required.

b. The characteristics of radio equipment organic to the battalion are listed in appendix F.

6–13. Engineer Company Communications

The company commander is responsible for the efficient functioning of his unit's communications system. Company headquarters personnel—

a. Supervise operations of the company communications system.

b. Install wire lines to platoons when time and the situation permit.

c. Operate the company message center and switchboard.

d. Operate a radio station at the company CP. Normally act as the NCS for the company net (FM voice) and operate the company station in the battalion command net (FM voice). As directed, monitor or operate in the appropriate FM net of a supported unit (fig 6–4).

★6–14. Communciations Security and Electronic Warfare

Communications security measures and electronic warfare doctrine are covered in paragraphs 2–16 and 2–17.

6–15. Aircraft Communications Support

The communications capability of the airmobile division and its subordinate elements is increased greatly by use of organic aircraft as airborne radio relay stations. On occasion, aircraft also can be used for message courier service. Engineer battalion requirements for aircraft communications support should be coordinated through proper channels with the division aviation officer and division signal officer.

Section IV. COMBAT SERVICE SUPPORT FOR THE AIRMOBILE DIVISION ENGINEER BATTALION

6–16. Combat Service Support

Combat service support for the engineer battalion is provided by the division support command. This support is discussed in FM 5–135, FM 29–50, FM 54–2, and briefly below.

6–17. Administration

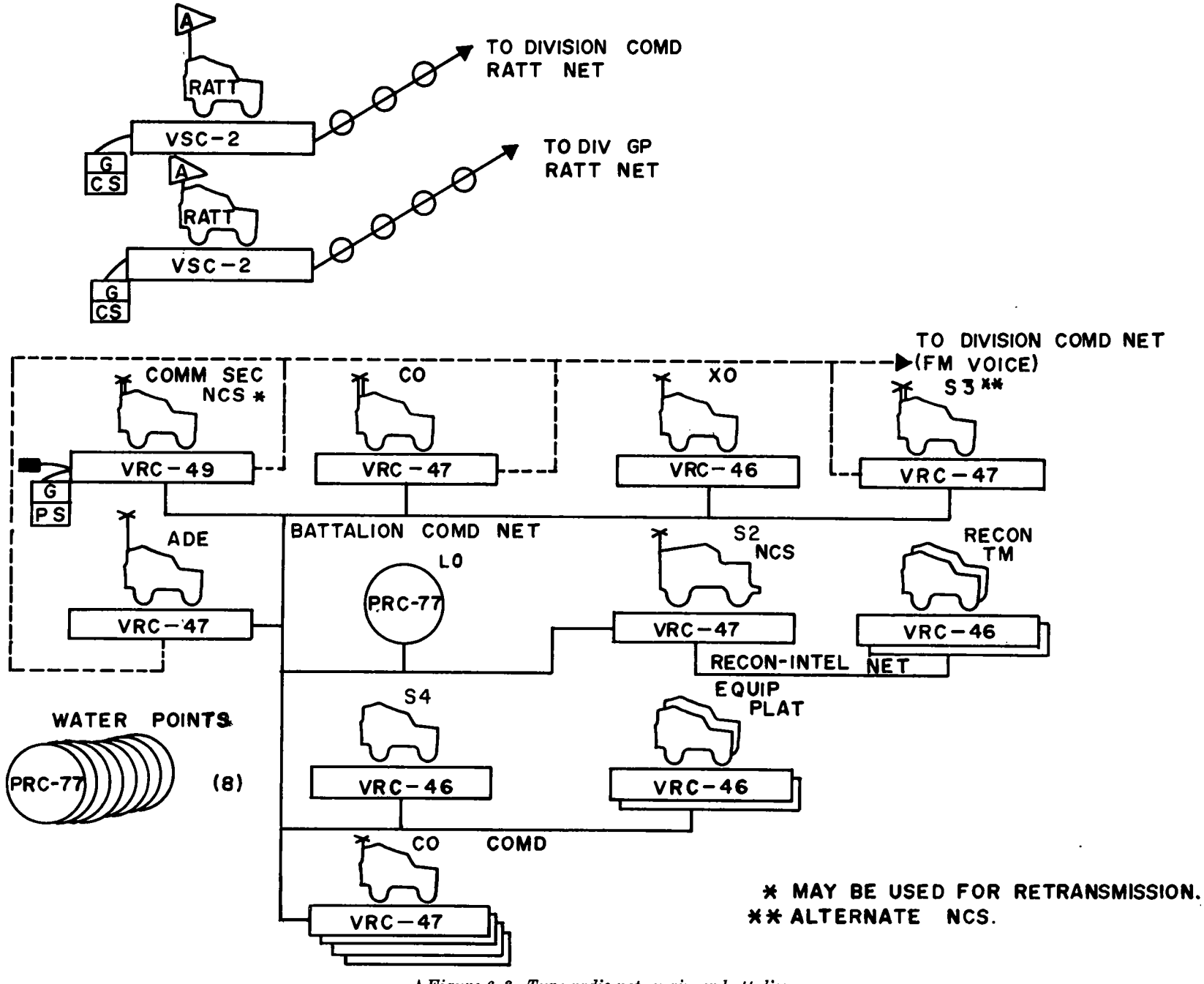
Personnel administration is provided by the administration company of the division support command.

6–18. Supplies

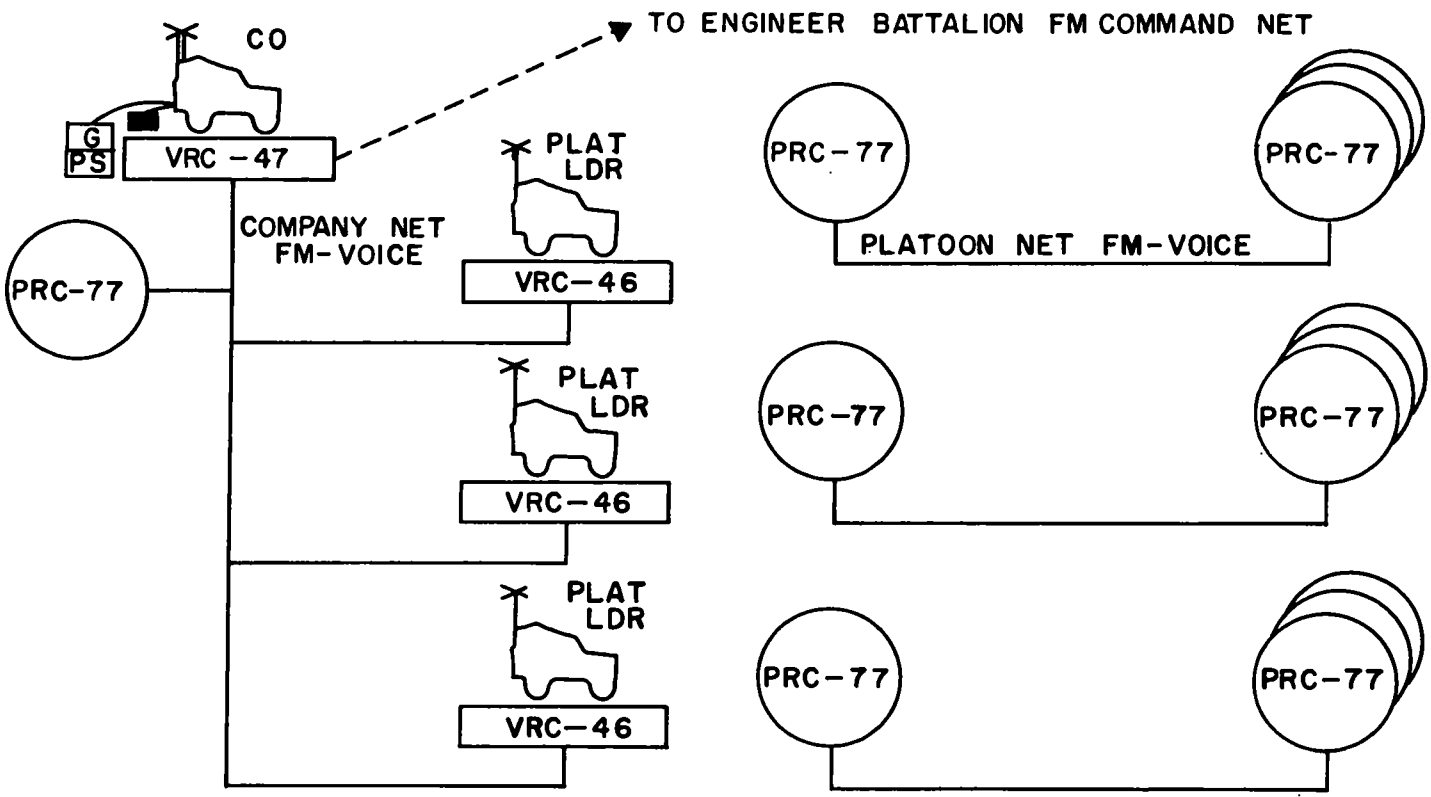
Supply procedures in the airmobile division engineer battalion are generally the same as those for other division engineer battalions. However, for airmobile operations the following are additional supply considerations:

a. Normally all supplies are airlifted into the objective area. Therefore, great care must be exercised in deciding which supplies and equipment are essential for engineer operations, in the area, and fullest use must be made of supplies and equipment that are available locally.

b. Construction supplies and equipment should be prepackaged, where possible, and delivered directly to jobsites or to landing or drop zones nearest the using engineer units.



★*Figure 6–3. Type radio net, engineer battalion, airmobile division.*



★*Figure 6–4. Type radio net, combat engineer company, engineer battalion, airmobile division.*

6–19. Maintenance

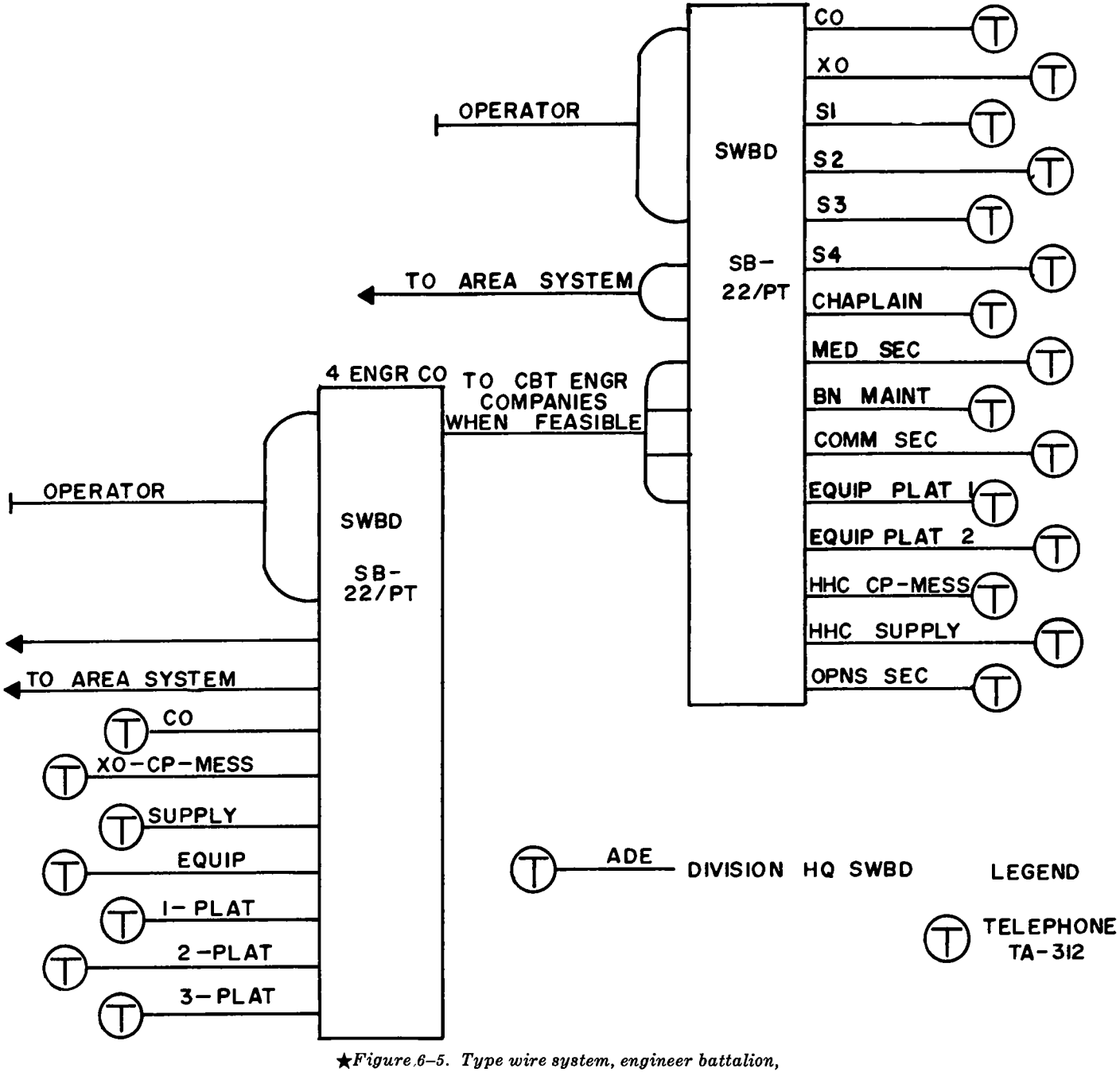
Organizational maintenance on wheeled vehicles and construction equipment is performed by the airmobile division engineer battalion. Direct support maintenance, to include a limited recovery and evacuation capability, is provided by the forward support detachments of the maintenance battalion of the division support command.

6–20. Transportation

The airmobile engineer battalion's means of surface transport is limited. On occasion, it may be supplemented by usable enemy military and civilian motor vehicles found within the division area of operations.

★6–21. Medical Service

Battalion medical service is supervised by the battalion medical operations officer. Aid men from the battalion medical section support combat engineer companies as needed. If the battalion fights as infantry, the medical section of the battalion headquarters company should be reinforced to provide one company aid man per platoon and one senior company aid man per company. Since evacuation normally is by division air ambulance, the battalion aid station should be as close to airlanding facilities as possible. Patients are evacuated to the division-level medical service provided by the support command's medical battalion. Brigades are provided division-level medical service by supporting medical companies of the division medical battalion; each of which has an evacuation platoon that may have division air ambulances attached. An engineer company supporting a brigade or task force depends upon the supported unit for division level medical service. Patients may occasionally be evacuated from forward combat areas in nonmedical aircraft returning from supply or other unit support missions.



★*Figure 6–5. Type wire system, engineer battalion, airmobile division.*

CHAPTER 7

HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER BATTALION, AIRMOBILE DIVISION

Section I. ORGANIZATION AND CAPABILITIES

★7-1. Organization

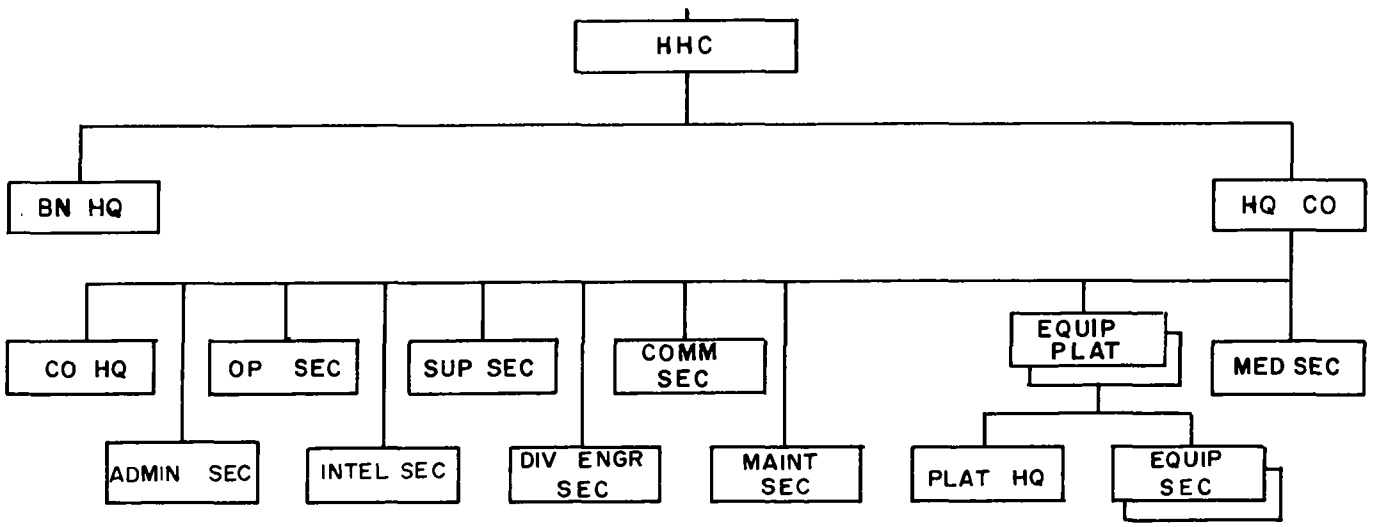
Headquarters and headquarters company of the airmobile division engineer battalion is organized under TOE 5-216 and consists of two elements; a battalion headquarters and a headquarters company (fig 7-1).

a. Battalion Headquarters. The battalion headquarters consists of:

(1) Battalion commander (also division engineer).
(2) Executive officer.
(3) Assistant division engineer.
(4) S1.
(5) S2.
(6) S3.
(7) S4.
(8) Engineer equipment officer.
(9) Chaplain.
(10) Communications officer.
(11) Sergeant major.
(12) Medical operations officer.

b. Headquarters Company. Headquarters company consists of a company headquarters, two equipment platoons, four equipment sections, and personnel to man the following battalion headquarters sections:

(1) Administration.
(2) Operations.
(3) Intelligence.
(4) Communications.
(5) Division engineer.
(6) Supply.
(7) Maintenance.
(8) Medical.



★*Figure 7-1. Organization chart, headquarters and headquarters company, engineer battalion, airmobile division.*

★7–2. Capabilities

a. At TOE Level 1, the headquarters and headquarters company can provide—

(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 intelligence for the engineer battalion and for the division.

(3) Up to eight water purification teams for the division of which up to six must be emplaced and resupplied by divisional aircraft.

(4) Unit level medical service for the battalion, to include medical care and evacuation, establishment of an aid station, and furnishing company aid men.

(5) Radio and wire communications for the battalion.

(6) Engineer equipment support for subordinate units.

b. The columns under Levels 2 and 3 adapt this table for reduced operational capabilities, decreasing strength to about 90 percent for Level 2 and 80 percent for Level 3.

c. This unit is not adaptable to Type B organization.

d. The columns designated by Levels 1 through 3 are designed to relate to the categories established in AR 220–1 and AR 135–8.

e. Augmentation: The capabilities of this unit are increased to the extent provided by the augmentation personnel and equipment. When required, the ADM augmentation capability may be further increased by the attachment of TOE 5–570 cellular type ADM teams.

f. Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

g. This unit provides organizational maintenance for its organic equipment; organizational maintenance of power generation equipment for subordinate units; and battalion-level maintenance of engineer equipment for subordinate units.

h. This unit depends on the adjutant general company for personnel services and on the finance company for financial services.

★7–3. Mobility

a. This unit is 60 percent mobile in organic vehicles.

b. The company is 100 percent airmobile in divisional aircraft except for one forklift and one wrecker.

c. This unit is 100 percent airportable in US Air Force aircraft.

Section II. METHODS OF OPERATION

7–4. Battalion Headquarters

a. The battalion commander has two roles. He is both the commanding officer of the engineer battalion of the airmobile division and the division engineer on the division special staff.

b. The duties of the commanding officer and his staff and the functions of the staff sections of the battalion are discussed in FM 5–1, FM 101–5, AR 611–101, AR 611–112, and AR 611–201.

c. Conforming to the policies and desires of the division commander and the division engineer, the assistant division engineer (ADE) relieves the division engineer of many routine duties at division headquarters. The ADE supervises the functions of the division engineer section which is located in the division headquarters. The division engineer section also furnishes the engineer element to the division tactical operations center (DTOC).

7–5. Headquarters Company

The headquarters company contains virtually all the construction equipment and combat service support elements of the battalion. Therefore, it becomes involved in all missions and tasks assigned to the battalion. This requires the company commander and his key personnel to maintain close liaison with the staff sections and supported elements. Elements of the company, such as water purification teams, medical aid men, and various groupings of construction equipment and operators, may be attached to or placed in support of any of the battalion's combat engineer companies. Allocation of the company's resources is made by the battalion commander on the recommendation of the battalion staff.

Section III. THE EQUIPMENT PLATOONS

★7–6. Organization and Equipment

Two equipment platoons with two equipment sections each are organized as part of the headquarters and headquarters company. Equipment available in these platoons includes graders, scrapers, grass cutters, light compaction equipment, 2½-ton dump trucks, wheeled and full tracked tractors, scoop loaders, and wheel-mounted cranes.

★7–7. Capabilities

Capabilities of the platoons include—

a. Providing engineer construction equipment and operators to the engineer companies.

b. Providing technical assistance and advice to the supported units on the use and capabilities of the equipment.

c. Assisting the headquarters and headquarters company in planning and directing employment of platoon equipment.

d. Supervising the movement of platoon equipment to and from jobsites.

e. Providing 2-shift operation with earthmoving equipment in the platoons. This normally will take the form of two 10-hour work shifts and 4 hours of maintenance in each 24-hour period. Transporting equipment by Army helicopter is done by sectionalizing the heavy equipment. Appendixes G and I give additional pertinent information.

★7–8. Employment

All construction equipment within the battalion, except for airmobile tractors with backhoes and ½-cubic-yard front loaders, paving breakers, tool sets, chain saws, and some 2½-ton dump trucks, is concentrated in the equipment platoons. On the basis of recommendations of the S3 and the engineer equipment officer, the battalion commander allocates platoons, sections, or separate pieces of equipment and operators to subordinate units. Whenever possible, such allocation will be made as a complete platoon, section, or element drawn from a single platoon, and will include supervisors drawn from the parent platoon. Elements so allocated normally will be either attached to, or placed under, the operational control of one of the combat engineer companies for the performance of a specific mission. Upon completion of the mission, they revert to control of the headquarters company.

CHAPTER 8

THE COMBAT ENGINEER COMPANY, ENGINEER BATTALION, AIRMOBILE DIVISION

8–1. Mission

The mission of the combat engineer company, engineer battalion, airmobile division is to—

a. Provide combat support for the engineer battalion, airmobile division, by accomplishing general and special engineer tasks.

b. Perform infantry combat missions when required.

8–2. Organization

The combat engineer company is organized under TOE 5–217 and consists of a company headquarters and three identical engineer platoons. Each platoon consists of a platoon headquarters and three identical engineer squads (fig 8–1).

★8–3. Capabilities

a. At TOE Level 1, the combat engineer company can—

(1) Accomplish combat engineer tasks, and provide limited additional engineer support.

(2) Establish roadblocks and barriers by emplacement of obstacles, including mines and boobytraps, and demolition of bridges and structures.

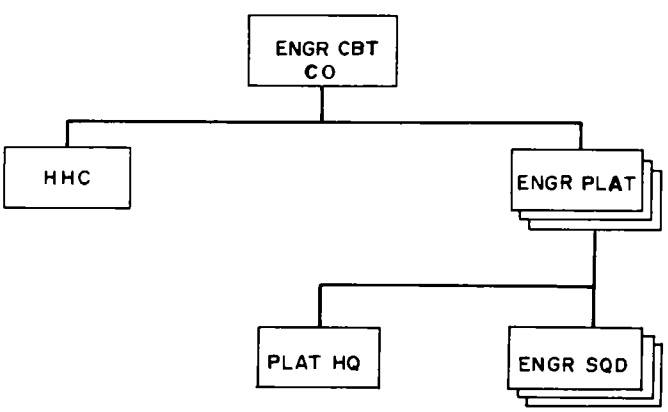


Figure 8–1. Organization chart, combat engineer company, engineer battalion, airmobile division.

(3) Construct, repair, and maintain airlanding facilities for Air Force medium cargo aircraft and all Army aircraft, with equipment support from headquarters company.

(4) Make expedient bridge repairs.

(5) Destroy equipment, supplies, structures, and material by burning or demolition.

(6) Conduct infantry combat operations when required.

b. The columns under Levels 2 and 3 adapt this table for reduced operational capabilities, decreasing strength to about 90 percent for Level 2 and to 80 percent for Level 3.

c. This unit is not adaptable to Type B organization.

d. The columns designated by Levels 1 through 3 are designed to relate to the categories established in AR 220–1 and AR 135–8.

e. Augmentation: The capabilities of this unit are increased to the extent provided by the augmentation personnel and equipment indicated in TOE 5–217.

f. Individuals of this organization can engage in effective, coordinated defense of the unit's area or installation.

g. This unit provides organizational maintenance on its wheeled vehicles, and on engineer and communications equipment. It is dependent upon HHC, engineer battalion, airmobile division, for organizational maintenance of power generation equipment.

h. This unit depends on the adjutant general company for personnel services and on the finance company for financial services.

★8–4. Limitations

The combat engineer company depends on the headquarters company or other engineer units supporting the battalion for construction equipment support and on the supported unit for

combat service support. It also depends on divisional aviation units for airmobility. Mess support is provided by company mess personnel of each company headquarters.

8–5. Mobility

a. This unit is 90 percent mobile in organic vehicles.

b. This unit is 100 percent airtransportable in US Air Force aircraft.

c. This unit is 100 percent airmobile in divisional aircraft.

8–6. Methods of Operation

The company carries out missions and assignments as directed by the battalion commander. It often is reinforced with construction equipment and operators from the equipment platoons of the headquarters and headquarters company to accomplish certain specific tasks. During the assault landing, the company may be required to construct hasty landing zones in the objective area to accommodate cargo (transport), utility, and heavy lift helicopters supporting the airmobile force. Additionally, the company as a unit, or one of its platoons, may be required to construct field artillery fire bases and infantry forward operating and resupply bases in support of a task force. When in support, specific missions or task assignments for the combat engineer company are directed by the supported unit or task force commander on the basis of the tactical plan and the staff planning and recommendations of the engineer company commander acting as the unit engineer. When required, engineer troops are inserted into normally inaccessible areas through the use of rappelling techniques and troop ladders.

8–7. The Engineer Platoon

a. The platoon usually is employed as part of a company. However, for specific short duration missions, the platoon, reinforced by equipment from company or battalion headquarters, may be placed in direct support of an airmobile infantry battalion or task force of comparable size. For missions of longer duration and where distances between the platoon and its parent company are greater, attaching the platoon to the supported unit improves command and control. Responsibilities of the supporting and supported unit commanders differ with each mission and with the type of support provided.

b. When the platoon becomes a part of a task force as a result of attachment or direct support roles, the platoon leader becomes the engineer staff officer for the support task force. He advises the commander on employment of the engineer platoon. To insure the most effective and economical use of the division's engineer effort, such platoons should revert to the control of the engineer company as soon as possible.

8–8. The Engineer Squad

Because of the limited capability of the engineer squad, it is employed, when possible, as part of its parent platoon. When the squad is supporting a small task force, or when platoon jobsites are widely dispersed, it may be given an independent mission. A typical independent mission would be squad support of an infantry company conducting a raid. In this instance the squad would normally be attached to the supported unit. The squad, however, is most effective when working with the platoon, because this assures close control and support of its efforts.

CHAPTER 9

COMBAT AND COMBAT SUPPORT MISSIONS ★(NATO STANAG 2123, ABCA SOLOG 125)

Section I. COMBAT MISSIONS

9–1. General

General information on engineer employment is found in the FM 100- and FM 101-series. These roles are expanded and explained in FM 5–1 and FM 5–135. This chapter discusses the roles and missions of the airmobile division engineer battalion as they compare with other divisional engineer battalions.

9–2. Combat Missions

Engineer units participate in all forms of land combat. The dispersed nature and fluidity of airmobile operations is such that elements of the airmobile engineer battalion probably will conduct infantry type operations more frequently than other types of divisional engineer battalions will. The engineer battalion may be required to build airlanding facilities and defend the worksite against enemy attacks and counterattacks.

9–3. Combat Capabilities

Recognizing the increased combat role of the airmobile engineer battalion, each squad is provided with a light machinegun for increased firepower. The engineer squad is designed to provide two fire teams, plus a driver for transportation of the squad's equipment.

9–4. Combat Limitations

Due to organizational differences, an engineer unit has less combat power than an infantry unit of similar size. If employed in infantry type operations, an engineer unit would normally be assigned a smaller frontage than an infantry unit of corresponding size. Further, additional fire support, such as mortars and artillery, must be furnished by the force commander.

9–5. Reorganization for Combat

a. When assigned a combat role or when the engineer mission may require fighting, the normal battalion organization is changed to provide more effective use and control of crew-served weapons and security of equipment not needed for combat. Changes also provide for the special requirements of command, communications, and supply in combat.

b. The extent of modification for combat varies with the size of the unit, the time available, and the mission. Reorganization normally consists of dividing the unit into a forward echelons, composed of the personnel and equipment needed to accomplish the combat mission, and a rear echelon that includes all equipment and personnel not directly essential to the mission.

Section II. COMBAT SUPPORT MISSIONS

9–6. General

a. The primary mission of the battalion is to provide combat support to the airmobile division. In some circumstances, such as development of a base of operations in stability operations, the battalion may be called upon to perform combat service support missions. Normally, such missions will be of the same general type as the more common combat support missions. They will not be considered separately in this manual.

b. Typical combat support missions for the airmobile division engineer battalion include the following:

(1) Construction and maintenance of forward and battle area airlanding facilities for Air Force medium cargo aircraft and all Army air-

craft. Construction of landing zones for helicopters.

(2) Construction of obstacles and barrier systems, to include installation of STANO devices.

(3) Breaching of barriers.

(4) Bridging.

(5) Construction and maintenance of roads.

(6) General construction.

(7) Employment of atomic demolition munitions (ADM) (when augmented by an attached ADM team TOE 5–570).

(8) Water supply.

(9) Technical assistance in camouflage and deception operations.

(10) CBR decontamination assistance.

(11) Technical assistance to other division units.

(12) Construction of artillery forward fire bases and infantry forward operating and resupply bases.

9–7. Airlanding Facilities

a. The key to the success of airmobile operations may often be the ability of the engineer battalion to rapidly construct or improve airlanding sites for both rotary and fixed wing aircraft. Planning for a forward airfield will provide for early entry of a security force and a pathfinder element for air traffic control. When required, an engineer unit will be introduced with these elements to improve the landing area.

b. In tactical operations, initial airlanding facilities will be of a minimal type that can be constructed in a short time. Usually, these facilities are constructed by engineers who land in the area in assault helicopters with necessary equipment support. Initial construction activities usually are limited to clearing trees and other obstacles affecting landing approach, leveling, clearing of ground obstacles and debris, and improving the bearing surface. Dust control may be a major problem. Under certain climatic conditions dust palliatives, metal landing mats, or membrane surfacing materials will be required.

c. The large number of aircraft organic to or supporting the airmobile division require great quantities of aviation fuel, oil, and lubricants. Storage areas must be at or near the landing sites. Each refueling area for aircraft will also provide resupply of class V items and maintenance of aircraft, radios, and armament. Engineer effort will be required at these points for site clearing, leveling, and construction of protective berms. Construction performed is the minimum necessary to accomplish the mission.

d. For further details on the construction of airlanding facilities and use of dust palliatives, see TM 5–330, DA Pam 525–5, and appendix B.

9–8. Barriers and Obstacles

a. Like the airborne force, the airmobile force is most vulnerable to attack by enemy armor. Initially, one of the primary defenses against enemy armor is tactical air support provided by US Air Force, Navy, or Marine air units. Armed Army helicopters with mounted antitank weapons are used to maximum advantage. However, at night and when visibility is limited, tactical air and armed helicopter support may not be available. Strongpoints along the combat outpost (COP) strengthen their defense through the use of natural obstacles such as rivers, swamps, woods, built-up areas, hills, gullies, ditches, and other terrain features, augmented by minefields, wire entanglements, tank traps, demolitions, and persistent-effect chemical agents. Antitank weapons, when available, are located in depth along avenues of approach favorable to enemy armor.

b. During the assault phase of an airmobile operation, engineer units seal off avenues of enemy approach on flanks with roadblocks and mines. During the defensive phase, the barrier plan may be implemented. Barriers are employed primarily to delay, disrupt, or canalize the enemy's forward movement and to increase his vulnerability to defensive fires and counteroffensive action. Engineers advise troop commanders on the manufacture and erection of artificial obstacles and minefields to augment natural terrain features. Where possible, local resources and material are used in the construction of artificial obstacles. When they become available, aerially delivered antitank mines may affect the quantity of barrier materials that must be delivered into the objective area. See FM 20–32A for details on aerially delivered mines. In some situations, additional engineer support by nondivisional engineers may be required to aid the force in organizing the ground against hostile armor forces. For details on barries, see FM 31–10.

9–9. Destruction, Breaching, and Passage of Obstacles

a. Airmobile operations are characterized by great speed and surprise. They are usually relatively independent of terrain influences such as

obstacles that restrict surface operations. The engineer role of obstacle removal in combat should decrease in airmobile operations.

★*b.* Before any operation begins, an engineer study of the terrain, bridges, routes of communication, and obstacles should be made. Additional information may be obtained from previously prepared nuclear and nonnuclear demolition target folders (appendix C). The most profitable source of information is ground reconnaissance, but many airmobile operational areas will be beyond the reach of ground patrols; therefore, considerable reliance must be placed on aerial reconnaissance and photographs.

c. The engineer unit commander should advise the force commander on how best to overcome any obstacles encountered. The engineer effort available to the force should be directed toward rapid construction and maintenance of selected routes into and through existing gaps and defiles. If bypassing is not possible, the obstacle must be breached or bridged.

9–10. Bridging

a. Although the airmobile division engineer battalion has no organic bridging capability, personnel of the battalion are trained in the assembly of both fixed and floating bridges. When supplemented by engineer bridge companies from either corps or army, the battalion can erect bridging required by the division's mission. The battalion is capable of designing and constructing timber trestle bridges from native materials with no additional support.

b. The airmobile division normally will fly over river lines and other obstacles requiring bridges. This will decrease the requirement for bridge construction in this type of unit.

c. The airmobile division is especially suited to stability operations. Engineer bridging functions in stability operations generally are characterized by pioneer type tasks accomplished with native materials and limited equipment. To fulfill his role in this type of an operation, the engineer must be thoroughly familiar with all kinds of stream-crossing expedients, such as bamboo rafts, suspended walkways used in mountains, hand-operated ferries, and suspension bridges.

9–11. Construction and Maintenance of Roads

Construction and maintenance of roads in airmobile operations normally will be limited to those required within the division and brigade bases of operation. New roads usually will be limited to types requiring minimum construction effort. In some areas, dust control may be a major problem; the use of dust palliatives should be considered in all road construction. The divisional engineer battalion should be relieved of its airfield and route maintenance responsibilities by corps or army troops as soon as possible so that it can concentrate on assisting combat elements of the division.

9–12. General Construction

The engineer battalion will be required to accomplish various general construction tasks in support of the division. Accomplishment will depend largely on the equipment, personnel, and time available. Typical tasks are—

a. Clearing dispersed areas for POL, ammunition, rations, and other supply points.

b. Excavating or clearing for shelter sites and emplacements.

c. Constructing command communications bunkers.

d. Prefabricating and assembling pallets for storage, transportation, and flooring.

e. Constructing airfield control towers and other needed structures.

f. Extracting, processing, and stockpiling available native resources.

9–13. Atomic Demolition Munition (ADM)

a. The airmobile division engineer battalion does not have an organic ADM section for the employment of atomic demolition munitions. It relies on nondivisional sources to provide the necessary ADM teams (TOE 5–570) as the situation requires. The battalion does normal ADM planning and supervises the execution of ADM emplaced by attached or supporting teams.

b. When their use is authorized, ADM may be employed to great advantage in cratering, tree blowdown, creating landslides and other obstacles to ground movement during offensive and defensive operations. Such use can also aid in reducing time, manpower, and logistic support necessary to accomplish barrier and denial missions. (See FM 5–26 for doctrine and employment procedures for ADM.)

9–14. Water Supply

a. The airmobile engineer battalion is authorized eight water purification sets capable of pro-

viding eight water points simultaneously. In an airmobile operation, all eight sets may be committed because of the widely scattered area in which the division will operate and the small capacity of the equipment authorized. Support may be required from corps and army engineer units. On departure for an operation, troops should carry with them full canteens and unit water containers. It may be many hours before water purification equipment can be airlifted to the operational area. Normally, one water point will be established in the division base of operations area under control of the engineer battalion S4 and one in each brigade base area attached to the supporting forward service supply element. Within such base areas, units draw water from the nearest water point using their own ground transportation. Water distribution to units positioned away from such base areas is the responsibility of the supply and service battalion and is accomplished in conjunction with the delivery of rations. Due to the logistics burden of transporting large quantities of water long distances by air, troops in airmobile operations must be constantly aware of the need for conserving water and should use potable water only for drinking and cooking.

b. As soon as brigade and divisional operating bases are established, water is supplied by nondivisional engineer sources and the water points of the airmobile engineer battalion are deployed to forward battalion fire bases and landing zones.

9–15. Camouflage and Deception

In fast moving situations typical of airmobile operations, it is doubtful if time will allow extensive artificial camouflage and deception operations, but as much effort as possible must be made to conceal the individual Soldier, unit locations, and dispositions. (See FM 5–20 for information on camouflage principles and techniques.) At division level the G2 is responsible for the intelligence aspects, and the G3 for supervising the preparation of plans for camouflage and deception operations. The engineer plans and supervises engineer operations pertaining to significant construction tasks in support of camouflage and deception activities and furnishes technical advice on minor construction aspects pertaining to either activity.

9–16. CBR Decontamination Assistance

The engineer battalion may be directed to furnish equipment support to other division units in CBR decontamination operations. When so directed, the battalion employs available personnel and equipment to decontaminate specified areas, critical materiel, or installations by methods outlined in TM 3–220.

9–17. Technical Assistance to Other Division Units

Military engineering, in its broadest sense, includes some pioneering tasks which can be accomplished by the troops of all arms and services. In airmobile operations, the engineer battalion will be required to operate in many widely dispersed locations, frequently taxing its capabilities to the utmost. All units of the division will be required to perform some pioneering tasks which may include site clearing, removal of obstacles, placing obstacles along avenues of approach, or constructing expedient roads and bridges. For example, the engineer battalion is authorized gasoline-driven chain saws and three electric pioneer sets. In an operation where rapid site clearance is essential, engineer soldiers may operate the chain saws while other troops carry away the timber. Training of all units of the airmobile division should stress pioneer construction tasks.

APPENDIX A

REFERENCES

A–1. Department of the Army Pamphlets (DA Pam)

310-series	Military Publications Indexes.
525–3	Military Operations—Military Engineering—Lessons Learned.
525–5	Military Operations; Dust Control; Lessons Learned.
750–1	Commanders' Guide of Preventive Maintenance Indicators.

A–2. Army Regulations (AR)

310–25	Dictionary of United States Army Terms.
611–101	Manual of Commissioned Officer Military Occupational Specialties.
611–112	Manual of Warrant Officer, Military Occupational Specialties.
611–201	Enlisted Military Occupational Specialties.

A–3. Field Manuals (FM)

1–15	Divisional Aviation Battalion, Group, and Brigade.
1–100	Army Aviation Utilization.
3–12	Operational Aspects of Radiological Defense.
5–1	Engineer Troop Organizations and Operations.
5–26	Employment of Atomic Demolition Munitions (ADM).
5–35	Engineer's Reference and Logistical Data.
5–135	Engineer Battalion, Armored, Infantry, and Infantry (Mechanized) Divisions.
5–142	Nondivisional Engineer Combat Units.
5–144	Engineer Amphibious Units.
5–162	Engineer Construction and Construction—Support Units.
7–20	The Infantry Battalions.
20–32	Landmine Warfare.
20–32A	Landmine Warfare (Scatterable Mines)
21–40	Chemical, Biological, and Nuclear Defense.
21–75	Combat Training of the Individual Soldier and Patrolling.
31–10	Denial Operations and Barriers.
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.
(S) 31–22A	U.S. Army Counterinsurgency Forces (U).
31–23	Stability Operations, U.S. Army Doctrine.
31–25	Desert Operations.
31–60	River-Crossing Operations.
31–70	Basic Cold Weather Manual.
31–71	Northern Operations.
31–72	Mountain Operations.
31–73	Advisor Handbook for Stability Operations.
31–75	Riverine Operations.
33–1	Psychological Operations—U.S. Army Doctrine.

41–5	Joint Manual for Civil Affairs.
41–10	Civil Affairs Operations.
44–1	U.S. Army Air Defense Artillery Employment.
44–2	Air Defense Artillery Employment, Automatic Weapons M42/M55.
54–2	The Division Support Command and Separate Brigade Support Battalion.
55–30	Army Motor Transport Operations.
57–1	U.S. Army/U.S. Air Force Doctrine for Airborne Operations.
57–35	Airmobile Operations.
61–24	Division Communications.
61–100	The Division.
100–5	Operation of Army Forces in the Field.
100–10	Combat Service Support.
(C) 100–20	Field Service Regulations Operations—Internal Defense and Developments (IDAD) (U).
101–5	Staff Officers' Field Manual; Staff Organization and Procedure.
101–10-series	Staff Officers' Field Manual, Organization, Technical and Logistical Data.

A–4. Technical Manuals (TM)

3–220	Chemical, Biological, and Radiological (CBR) Decontamination.
5–227	Design and Techniques for Military Civic Actions.
5–330	Planning and Design of Roads, Airbases and Heliports in the Theater of Operations.
5–331E	Utilization of Engineer Construction Equipment, Vol E, Engineer Special Purpose and Expedient Equipment.
5–530	Materials Testing.
5–700	Field Water Supply.
10–500-series	Manuals covering the airdrop of supplies and equipment; rigging of particular items of equipment.
38–750	The Army Maintenance Management System (TAMMS).
55–450–8	Air Transport of Supplies and Equipment: External Transport Procedures.
55–450–11	Helicopter External Loads rigged with Air Delivery Equipment.
55–450–15	Air Movement of Troops and Equipment (Nontactical).
57–220	Technical Training of Parachutists.

A–5. Tables of Organization and Equipment (TOE)

5–25	Engineer Battalion; Airborne Division.
5–26	Headquarters and Headquarters Company, Engineer Battalion, Airborne Division.
5–27	Engineer Company, Engineer Battalion, Airborne Division.
5–35	Engineer Combat Battalion, Army or Corps.
5–52	Airborne Engineer Combat Group.
5–54	Engineer Light Equipment Company, Airborne.
5–87	Engineer Land Clearing Company.
5–195	Engineer Combat Battalion, Airborne.
5–215	Engineer Battalion, Airmobile Division.
5–216	Headquarters and Headquarters Company, Engineer Battalion, Airmobile Division.
5–217	Combat Engineer Company, Engineer Battalion, Airmobile Division.
5–500	Engineer Administrative and Headquarter Teams.
5–560	Engineer Civic Action Teams.
5–570	Engineer Combat Support Teams.
33–500	Psychological Operations Organizations.
41–500	Civil Affairs Organizations.
57	Airborne Division.
67	Airmobile Division.

ments, therefore, must share the responsibility for site selection and consider it from the tactical standpoint.

B–9. Engineer Considerations

In site selection, the engineer is interested in the characteristics of the area of operations. Some of the factors he considers are—

a. Terrain in the objective area, with particular emphasis on the following:

(1) Airfields that can be seized intact or rehabilitated.

(2) Superhighways, beaches, or other areas of reasonably well-compacted soil.

(3) Soil characteristics, relief, and vegetation.

(4) Extent and nature of obstacles in the landing area.

(5) Terrain studies of each site or area.

(6) Current aerial photographs.

(7) Drainage characteristics and effects of weather on soil conditions.

(8) Condition of the road net.

(9) Existing construction materials and natural materials in the objective area.

b. Time limitation on airlanding facility construction caused by tactical considerations.

c. Means available for delivering construction equipment and supplies to construction sites.

d. Provision of facilities for refueling, servicing, and parking aircraft. Dispersion and camouflage of these facilities is also necessary. These construction tasks include leveling, clearance of obstacles, runway final grading and, possibly, surfacing.

B–10. Site Plans

Normally the engineer is furnished standard designs for the various facilities his unit will construct in the airhead. However, these designs must frequently be altered to meet time and material limitations or the limitations imposed by local geography, area or obstruction characteristics. Designs may be altered within the limitations prescribed by the headquarters directing the mission. Changes exceeding these limitations must be approved by that headquarters before work starts. When all changes have been considered, a special engineering site plan is prepared for each facility to be constructed in the airhead. As an example, a special engineering site plan for an airfield in the airhead would contain as a minimum:

a. Location of the airfield.

b. Type and capacity.

c. Expected life.

d. Plan views and sections for the airfield altered to meet the local characteristics of the area.

e. Soil characteristics.

f. Detailed criteria for the runway, including its length, width, grade, and shoulders; glide angle; taxiways; aprons; surfacing; and other airfield features for the specific type of airfield.

Section III. OTHER CONSIDERATIONS

B–11. Criteria

Initial airlanding facilities are established on acceptable minimum criteria based primarily upon operational necessity and aircraft characteristics. A minimum criteria airlanding facility is one that provides the minimum dimensional and bearing capacity requirements for a specific aircraft at a specific landing weight and the expected number of sorties per day. Detailed information on requirements is contained in TM 5–330.

★B–12. Battalion Capability

Both the airborne and airmobile divisional engineer battalions have a limited capability for construction improvement and rapid repairs (using runway crater repair kits) of airlanding facilities. This capability is designed to meet the requirements for limited facilities in the initial stages of airborne or airmobile operations. Neither battalion can do extensive construction work on airlanding facilities and simultaneously provide other types of combat engineering support to its parent unit. The requirements for both types of support must be considered together because the divisional engineer battalion may require support by nondivisional units.

B–13. Construction Support

The engineer construction support required will depend upon the type and amount of work to be

accomplished, the schedule of operations, and the criteria for the facilities. The Engineer Combat Battalion (Airborne) (TOE 5–195), and the Engineer Light Equipment Company, Airborne (TOE 5–54), are specifically designed to support airborne and airmobile operations. The Engineer Combat Battalion, Army (TOE 5–35) and the nonairborne version of the Engineer Light Equipment Company (TOE 5–58) may also be used in support of either divisional battalion.

B–14. Soil Trafficability

a. Soil bearing capacity is a prime consideration in construction of airlanding facilities, roads, and other facilities. Since the environment and the situation often will limit the deliberate selection and manipulation of soil bearing capacities, the airborne and airmobile engineers must be able to determine relative soil bearing values. The principal means of doing this in these units is through use of the airfield cone penetrometer which is available at platoon level in both battalions. TM 5–530 and TM 5–330 describe more rigorous testing methods that may be used if the situation permits.

★B–15. Effects of Sand or Dust on Aircraft Operations

a. Operation of rotary and fixed wing aircraft in numerous areas of the world having a sand or dust environment presents serious and continuing problems for aviation and engineer units in the field. Rotor wash on dusty or sandy surfaces can cause loss of visual contact with the ground during landing and takeoff. Sand and dust can also pollute fuel and cause excessive wear or damage to rotor blades, turbine engines, or other aircraft components. Thus a requirement exists for continued dust control by engineer units in the field, especially in areas subjected to rotor wash from helicopters; jet blast and prop wash from cargo, surveillance, and fighter planes; and grinding action of wheeled vehicles. The engineer commander engaged in airmobile operation must be aware of the action to be taken to control dust around helipads, heliports, landing zones, airfields, and roads. DA Pam 525–3 contains information on recommended sizes of dust control treated areas adjacent to traffic areas and on methods for treating them.

b. Various dust palliatives are currently available. These palliatives are listed in DA Pams 525–3 and 525–5 and in TM 5–330. Guidance on the selection of material, equipment, and the techniques that give maximum effectiveness; expedient equipment for dust-control operations; troop training in dust-control operations; and guidance for preventive control and discipline in dust-controlled areas are also covered in these three publications.

B–16. Use of Surfacing Materials

The logistical burden imposed by the use of landing mats for surfacing limits their use. However, in areas where trafficability is generally poor and the weather is frequently or periodically very rainy, airfield surfacing will be required, especially to support heavy transport and tactical support aircraft. Landing mats still meet this requirement best. Membrane surfacing has proved very helpful in controlling dust and assisting in waterproofing, but it does not add strength to the underlying soil. TM 5–330 discusses both mats and membranes.

APPENDIX C

★NON-NUCLEAR DEMOLITION TARGET FOLDER

DETAILS OF AGREEMENT STANAG 2123

NON-NUCLEAR DEMOLITION TARGET FOLDER

AGREEMENT

1. The NATO Armed Forces agree to use the non-nuclear demolition target folder described in this Agreement for all non-nuclear demolitions and denial targets planned in barrier and denial plans. It is further agreed that the format attached at annex A (DofA) is to be used for the non-nuclear demolition target folder whenever time and conditions permit.

FORMAT

2. The non-nuclear demolition target folder must have a strong, durable cover and be bound so that pages with maps, stores lists, report forms, etc., can be easily removed. It is to be prepared in a pocket size, about 15 x 21 cm (6″ x 8¼″).

COMPOSITION

3. *a.* The non-nuclear demolition target folder consists of four parts:

(1) Location of targets.

(2) Supply of explosives and stores.

(3) Orders for preparing and firing.

(4) Demolition report.

b. The parts are to be in the order indicated above and in the pattern indicated in annex A (DofA). If additional information is considered necessary, it is to be inserted after the above parts in the appropriate place in the folder.

c. When there is insufficient space to enter the information, "insert pages" can be used. In such cases, the words "see page . . a" are inserted at the appropriate place. The insert page is placed immediately after the page to which it refers.

LANGUAGE

4. *a.* Situations could arise where the unit responsible for implementing a demolition is of a different nationality from the unit preparing the folder. It is therefore essential to produce the non-nuclear demolition target folder in a multilingual form.

b. The non-nuclear demolition target folder is to be prepared in the following languages:

(1) Language(s) of units concerned.

(2) Language of the host nation.

(3) One of the two official NATO languages.

c. All subject matter in the non-nuclear demolition target folder is to be completed in all languages agreed for the folder. Notes on maps, plans, sketches, etc., are to be in one language only, with a translation at the bottom of the page of relevant items in the other languages.

DETAILS

5. *a.* List of Explosives and Stores Required (Part (2c) of the Folder). The list given in the format is not intended to be exhaustive. It does indicate, however, a logical order or recording the various items. The list is to include only those items required for a particular target.

b. Special Technical Instructions (Part (3a) of the Folder). In the case of a major task, the size, composition and mission of the various parties employed on preparations are to be noted in paragraph 5—Organization of Work.

c. Mines (Part (3e) of the Folder). This part concerns only nuisance mines, if applicable, or protective mines laid to protect the target and does not mean barrier minefields. Barrier minefields are to be referred to in paragraph 7(b) of Part (3a) of the folder.

d. Demolition Report (Part (4) of the Folder). Paragraphs a. and b. are filled in when the folder is prepared. This sheet can be detached for use as a demolition report form upon completion of the demolition. Squared paper is provided at the back for making a sketch.

IMPLEMENTATION OF THE AGREEMENT

6. This STANAG will be considered to have been implemented when the necessary orders/instructions putting the procedures and format detailed in this Agreement into effect have been issued to the forces concerned.

APPENDIX D

CONSTRUCTION OF FIRE BASES

★D–1. Description of a Fire Base

The airmobile division engineer battalion is equipped to construct artillery fire bases in areas where ground transport is prohibitive. Especially in an unsophisticated environment, such as forest and jungle, these fire bases play an integral part in airmobile operations, both as command posts and artillery fire bases. The most frequently constructed fire base houses an infantry battalion command element, two infantry companies, a 105mm howitzer battery, and three to six 155mm howitzers. A fire base housing the above units consists of the following facilities: infantry TOC, artillery FDCs, four ammunition storage pits, garbage sump, command and control helicopter pad, logistics storage area and slingout pad, artillery firing positions, helicopter parking area and refuel point, and hardened personnel sleeping positions. Fire bases usually are surrounded by a protective berm with perimeter fighting bunkers, two or more bands of tactical wire, and a cleared buffer zone to provide adequate fields of fire for perimeter defense. If a local water source is available, an airmobile engineer water supply point may be established to provide water for the fire base and units in the local area.

D–2. Construction of a Fire Base

Construction of an airmobile fire base may be divided into three phases: combat assault and initial clearing, immediate tactical construction, and final defensive structures.

a. Phase I. Phase I, combat assault and initial clearing, consists of securing the fire base site and clearing an area large enough to accommodate CH–47 and CH–54 helicopters. The time required to complete this phase depends on the terrain at the fire base site. If the site is free of trees and undergrowth, or if these obstacles have been removed by artillery and tactical air fire preparation, combat engineers can move immediately to Phase II after the initial combat assault on the site. If the site is covered with foliage and trees, the security force and combat engineers may be required to rappel into the site from hovering helicopters. Depending on the density of the foliage on the site, completion of the initial clearing phase by combat engineers with demolitions and chain saws may take up to 3 hours.

b. Phase II. Phase II, immediate tactical construction, commences as soon as the cleared area can accommodate either medium or heavy lift helicopters. Two light airmobile dozers are lifted to the site and immediately employed clearing brush and stumps to expand the perimeter and to clear and level howitzer positions. Meanwhile, the combat engineers continue to expand the perimeter with chain saws, demolitions, and bangalore torpedoes. If sufficient area is available, a heavy airmobile dozer usually is committed to clearing a logistics storage area and slingout pad, then to expanding the perimeter and fields of fire. The backhoes are committed to excavating positions for the infantry TOC, artillery FDCs and, as soon as the perimeter trace is established, perimeter fighting bunkers. The immediate tactical construction phase is characterized by the coordinated effort of infantry, artillery, and engineer forces to produce a tenable tactical position by nightfall of the first day. At this time, helicopter traffic is very heavy as personnel, ammunition, barrier and bunker materials, rations, fuel, water, and artillery pieces are lifted to the site. Aircraft traffic and logistics input must be rigidly controlled to preclude nonessential supplies and aircraft from hampering the engineer effort. Therefore, a coordinated site plan and list of priorities for transportation and construction must be prepared and constantly updated. Priorities and the site plan are established by the tactical commander in coordination with the project engineer. As soon as a perimeter trace is established and the site can accept the logistics and artillery lifts, maximum effort is directed toward the defenses of the fire base. Combat engineers and the heavy dozer continue to push back the undergrowth to permit adequate fields of fire. The two light airmobile

dozers may be committed to construction of a 4-foot berm around the perimeter to protect against direct fire. Infantry troops are committed to constructing perimeter fighting bunkers at sites previously excavated by the backhoes and, assisted by combat engineers, begin erection of the first band of tactical wire, usually triple standard concertina. Artillery troops not committed immediately to fire missions prepare ammunition storage bunkers and parapets around each howitzer.

c. Phase III. Phase III, final defensive structures, is initiated as construction forces complete the immediate defensive structures. Combat engineers who are not placing the tactical wire or clearing fields of fire begin construction of the infantry TOC and artillery FDCs. Infantry and artillery troops are committed to the second band of tactical wire and to erecting personnel sleeping positions with overhead cover. Culvert half sections lend themselves to rapid construction of these positions. Phase III is usually a continuous process, involving constant improvement and maintenance; however, most protective structures, including sandbag protection of the TOC and personnel bunkers, are usually completed by the end of the fourth day. The controlling parameter in construction of a fire base is time; since the fire base is the first phase of the occupation of a hostile area, the battalion command center and the artillery pieces must be operational as soon as possible and protection against direct and indirect fire requires immediate attention. Several techniques have been developed to increase the efficiency and speed with which construction can progress. Among these are precut TOC structures and using culverts as molds for protective bunkers. However, the most effective technique yet adopted is a closely coordinated and controlled plan, outlining the location, priority and construction force for each phase of the mission. Construction and improvement of water points are also completed during this phase. With very limited water hauling equipment available, consideration should be given to siting the water point as near the fire base as practical.

APPENDIX G

AIRCRAFT CHARACTERISTICS

US ARMY AIRCRAFT

Aircraft	Maximum [1] External Cargo Cap. (lbs)	Useful load [2]	Payload Normal Mission [3]	Cargo Compartment (in.) Lgth	Cargo Compartment (in.) Wdth	Cargo Compartment (in.) Ht	Door Sizes (in.) wdth	Space Cu Ft	Normal Cruising Speed (Knots)	Endurance at Cruise + 30 min reserved (Hrs + mins)
★CH-21C [4]	5,000	5,401	3,000	240	50	62	45x59	422	70	2 + 09
CH-34 (CHOCTAW)	5,000	5,532	3,600	164	59	70	52x48	372	85–107	1 + 46
★CH-37B (MOJAVE)[4]	7,500	9,500	6,197	364	87	87	87x72	1,252	85	1 + 15
CH-47A (CHINOOK)	16,000	14,888	10,300	360	90	78	90x78	1,474	130	1 + 22
CH-47B	20,000	20,445	15,900	360	90	78	90x78	1,474	150	0 + 57
CH-47C	20,000	23,380	19,100	360	90	78	90x78	1,474	155	1 + 57
UH-1B (IROQUOIS)	3,000	3,865	2,372	60	80.5	54	48x48	140	75–95	1 + 46
UH-1C	3,787	4,700	2,027	60	80.5	54	48x48	140	92–110	1 + 58
UH1D/H	4,000	4,580	3,056	92	96	54	74x49	220	92–110	2 + 08
CH-54A (TARHE)	20,000	20,170	18,565	329	104.5	78	104.5 inches (Pod)	1,552	100–90	1 + 30

[1] Consult aviation commanders and FM 101-20-series for the correct data for each flight. Increase in payload requires decrease in range.

[2] *Useful load:* The load carrying capability of an aircraft. It includes the payload, crew and useable fuel and oil, required for the mission. Here it is the difference between "MAXIMUM ALLOWABLE GROSS WEIGHT" and the "BASIC WEIGHT". Thus, it is evident that a reduction of the fuel load will reduce the ENDURANCE and increase the PAYLOAD.

[3] *Normal mission:* Payload available computed under following conditions:

1. Fuel for 200 NM Range plus 30 minute reserve.
2. Flight altitude 2000′ MSL, standard temperature.
3. Take-off maximum gross weight (weight of crew included).

[4] Phased out.

APPENDIX J

ENGINEER EQUIPMENT AIRDROP DATA*

Item	FSN	Platform	Overhang (inches)	Rigged Length (inches)	Accompanying Load (pounds) Minimum	Accompanying Load (pounds) Maximum	Rigged Weight (pounds)	Remarks	References TM/TO
Crane Whl Mtd: 7 ton w/boom crane 24 ft w/blk tkle 9t		24′ Modular		288			18,884		10–500–48/13C7–24–21
Crane Shovel Attachments									
⅜ cu yd		8′ Modular		96			3,900		10–500–48/13C7–24–21
½ cu yd		6,000-lb Cargo		144			6,927		10–500–48/13C7–24–21
Floodlight Set Elec: ptbl 6 lights mst mtd 5 KW 120/208V (ARMY)		8′ Modular		96	152	1,382	2,520	Includes 152-lb accompanying load	10–500–35/13C7–40–11
Grader Road Motorized: dsl drvn 10,000 lb 12 ft blade									
M212	3805–223–9029	24′ Modular	9 Rear	297			18,234		10–500–25/13C7–1–15
M220	3805–801–4999	24′ Modular	28 Rear	316			19,053		10–500–25/13C7–1–15
Loader Scooptype: dsl drvn 4 whls 1½ cu yd									
M85	3805–679–6915	24′ Modular		288			17,958		10–500–94/13C7–31–21
933	3805–278–1245	20′ Modular	10 Rear	250			19,130		10–500–21/13C7–6–21
Pneumatic Tool and Compressor Outfit: 250 CFM trlr mtd									
RPV 250	3820–950–8584	16′ Modular	18 Rear	210			10,390		10–500–69/13C7–15–61

See footnote at end of table.

ENGINEER EQUIPMENT AIRDROP DATA* (Cont'd)

Item	FSN	Platform	Overhang (inches)	Rigged Length (inches)	Accompanying Load (pounds) Minimum	Accompanying Load (pounds) Maximum	Rigged Weight (pounds)	Remarks	References TM/TO
Roller Towed Sheeps foot 2 dr									
W-2	3895-250-6054	96- x 144-in. CEP	19 Rear	163			7,853		10-500-2/13C7-1-15
		6,000-lb Cargo	30 Rear	174			7,900		10-500-2/13C7-1-15
Scraper Earth Moving Towed: 7½ cu yd scoop									
Murray Model AR 775	3805-811-7671	24' Modular	3 Front	291			15,330		10-500-30/13C7-27-121
Tool Kit Pioneer Engineer Squad		12' Modular	20 Rear	164	500	750	3,793	Includes 720-lb accompanying load	10-500-91/13C7-8-31
		96- x 144-in. CEP	18 Rear	162	500	750	3,600	Includes 600-lb accompanying load	10-500-91/13C7-8-31
		6,000-lb Cargo	18 Rear	162	318	568	3,580	Includes 360-lb accompanying load	10-500-91/13C7-8-31
Tractor Full-Tracked Low Spd									
D-4	2410-843-6374	16' Modular	5 Front	197			20,158		10-500-21/13C7-6-21
D-6	2410-542-4206	20' Modular	10 Rear	250			18,800		10-500-21/13C7-6-21
D-6B	2410-926-0910	20' Modular		240			24,475		10-500-21/13C7-6-21
HD-6M	2410-983-8024	16' Modular	6 Rear	198			18,975		10-500-21/13C7-6-21
Tractor Whl Ind: dsl light DBP w/bulldoz scariff									
MRS 100	2420-792-6163	20' Modular	1 Front	241			19,000		10-500-84/13C7-6-71
Trailer Cargo: ¼-ton 2-wheel w/e									
M416	2330-706-5495	8' Modular	20 Rear	116	1,300	2,530	2,500	Includes 1,300-lb accompanying load	10-500-18/13C7-3-371

		70- x 90-in. CEP	27 Rear	117	525	1,175	1,986	Includes 960-lb accompanying load	10–500–2/13C7–1–15
		6,000-lb Cargo		144	2,150	4,650	5,230	Includes 3,360-lb accompanying load	10–500–2/13C7–1–15
Trailer Cargo: ¾-ton 2-wheel w/e									
M101	2330–738–9509	12' Modular	9 Front 9 Rear	162	1,500	2,500	3,780	Includes 1,500-lb accompanying load	10–500–13/13C7–3–51
		96- x 144-in. CEP	29 Rear	173	1,406	1,500	3,595	Includes 1,500-lb accompanying load	10–500–2/13C7–1–15
Trailer Cargo: 1½-ton 2-wheel w/e									
		12' Modular	22 Rear	166	0	3,000	7,030	Includes 3,000-lb accompanying load	10–500–2/13C7–1–15
							1 G–11A 3,695	w/o accompanying load	
		96- x 144-in. CEP	22 Rear	166	0	3,000	2 G–11A's 6,945	w/300-lb accompanying load	10–500–2–13C7–1–15
Trailer Tank: water 400 gallon 1½-ton 2-wheel w/e									
		12' Modular	20 Rear	164			6,960	Includes 400 gal of water	10–500–32/13C7–3–361
		96- x 144-in. CEP	22 Rear	166			6,846	Includes 400 gal of water	10–500–2/13C7–1–15
Truck Ambulance: ¼-ton 4x4 w/e									
M170	2310–835–8686	12' Modular	13 Front 4 Rear	161	Four 5-gal gas cans		4,400	Gas cans included in rigged weight	10–500–66/13C7–25–71
		96- x 156-in. CEP	5 Front 12 Rear	173	Four 5-gal cans of gasoline and ambulance equipment		4,576		10–500–2/13C7–1–15
M178	2310–782–6056	12' Modular	4 Rear	148	Three 5-gal gas cans		3,818	Gas cans included in rigged weight	10–500–66/13C7–25–71
		96- x 144-in. CEP		144	Three 5-gal cans of gasoline		3,780	Gas cans included in rigged weight	10–500–2/13C7–1–15
Truck Cargo: ¾ ton 4x4 w/winch w/e									
M37	2320–835–8323	16' Modular		192			7,659 w/winch		10–500–11/13C7–2–251

See footnote at end of table.

ENGINEER EQUIPMENT AIRDROP DATA* (Cont'd)

Item	FSN	Platform	Overhang (inches)	Rigged Length (inches)	Accompanying Load (pounds) Minimum	Accompanying Load (pounds) Maximum	Rigged Weight (pounds)	Remarks	References TM/TO
M37 cont.		96- x 192-in. CEP		192			7,108 w/winch		10-500-2/13C7-1-15
Truck Cargo: 2½ ton 6x6 w/e									
M34	2320-739-7545	24' Modular	11 Front	299	0	2,500	17,259 w/o winch	Includes 2,400-lb accompanying load	10-500-20/13C7-2-261
M35	2320-835-8463	24' Modular	11 Front	299	0	2,500	17,949 w/o winch	Includes 2,400-lb accompanying load	10-500-20/13C7-2-261
M35A1	2320-542-5633	24' Modular	11 Front	299	0	2,500	18,929 w/o winch	Includes 2,400-lb accompanying load	10-500-20/13C7-2-261
M211	2320-834-4507	24' Modular		288	0	2,400	18,426 w/o winch	Includes 1,920 lb accompanying load	10-500-20/13C7-2-261
Truck Cargo: 2½ ton 6x6 w/winch w/e									
M34	2320-835-8536	24' Modular	11 Front	299	0	2,500	17,674 w/winch	Includes 2,400-lb accompanying load	10-500-20/13C7-2-261
M35	2320-835-8464	24' Modular	11 Front	299	0	2,500	18,364 w/winch	Includes 2,400-lb accompanying load	10-500-20/13C7-2-261
M211	2320-834-4508	24' Modular		288	0	2,400	18,836 w/winch	Includes 1,920-lb accompanying load	10-500-20/13C7-2-261
Truck Dump: 2½-ton 6x6 w/winch w/e									
M59	2320-835-8597	20' Modular	15 Front 20 Rear	275			17,100 w/winch		10-500-20/13C7-2-261
M215	2320-834-4510	25' Modular		288			18,441 w/winch		10-500-20/13C7-2-261
M342A2	2320-077-1644	24' Modular	7 Rear	295			18,200 w/winch	Weight and C/G must be computed for truck w/winch	10-500-20/13C7-2-261

Truck Utility: ¼-ton 4x4 w/e								
M38A1	2320–835–8319	12′ Modular		144	Seven 5-gal gas cans	4,180	Gas cans included in rigged weight	10–500–10/13C7–10–151
		96- x 144-in. CEP	5 Front	149	Seven 5-gal cans of gasoline	4,268	Gas cans included in rigged weight	10–500–2/13C7–1–15
		6,000-lb Cargo	5 Front	149	Seven 5-gal cans of gasoline	4,395	Gas cans included in rigged weight	10–500–2/13C7–1–15
M151	2320–542–4783	8′ Modular	24 Front 14 Rear	134		3,088 w/ 1 G–11A 3,240 w/ 3 G–12D		10–500–10/13C7–2–451
		8′ Modular	24 Front 14 Rear	134	0	662	Must be computed	Accompanying load stowed in truck must not exceed 300 lbs	10–500–10/13C7–2–451
		96- x 96-in. CEP	24 Front 14 Rear	134		1 G–11A 2,988 3 G–12D's 3,140		10–500–2/13C7–1–15
Water Purification Equipment: trlr mtd		16′ Modular	7 Rear	199		7,281		10–500–49/13C7–7–11
Welding Shop: Cargo trlr mtd 300 Amp		12′ Modular	14 Front 22 Rear	180		8,850		10–500–32/13C7–3–361
		96- x 144-in. CEP	6 Front 24 Rear	174		5,815		10–500–2/13C7–1–15

* Note: Further information may be obtained from TM 10–500, TM 10–500–16, TB 55–46–1, TB 55–46–2, and SB 700–20.

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FIELD MANUAL
No. 5-136

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *15 October 1970*

ENGINEER BATTALIONS, AIRBORNE AND AIRMOBILE DIVISIONS

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PART ONE

INTRODUCTION

CHAPTER 1

GENERAL

1–1. Purpose

This manual is a guide for the battalion commander, his staff, company commanders, platoon leaders, platoon sergeants, and squad leaders in the organization and employment of the engineer battalions organic to the airborne and airmobile divisions.

1–2. Scope

a. This manual covers the organization, missions, capabilities, employment, and operations of the engineer battalions organic to the airborne and airmobile divisions. The airborne division engineer battalion (TOE 5–25) discussed in this manual should not be confused with the airborne engineer combat battalion (TOE 5–195), a nondivisional unit (see FM 5–142). Since the missions, employment, and operations, in other than airborne and airmobile operations, are similar to those of other divisional engineer battalions, this manual should be used in conjunction with FM 5–135 for complete coverage of other type operations. Appendix B provides information on airlanding facilities.

b. The discussions of missions, organization, personnel, and equipment are based on the latest issues of tables of organization and equipment (TOE) available at the time of writing. All references to TOE list only the basic numbers. DA Pam 310–3 should be consulted for latest letter suffixes to the basic numbers.

c. The contents of this manual, unless otherwise specified, apply to:

(1) General war, including consideration of employment of nuclear munitions and chemical, and radiological agents; and protection from nuclear munitions and chemical, biological, and radiological agents.

(2) Limited war.

(3) Cold war, to include stability operations.

d. This manual is in consonance with ABCA SOLOG 125, Minimum Potability Standards for Field Water Supply and NATO STANAG 2041, Operational Road Movement Orders, Tables and Graphs. A copy of SOLOG 125 is included as appendix C.

1–3. Recommended Changes

Users of this manual are encouraged to submit recommendations to improve its clarity or accuracy. Comments should be keyed to the specific page, paragraph, and line of text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding Officer, U.S. Army Combat Developments Command Engineer Agency, Fort Belvoir, Virginia 22060. Originators of proposed changes which would constitute a significant modification of approved Army doctrine may send an information copy through command channels, to the Commanding General, U.S. Army Combat Developments Command, Fort Belvoir, Virginia 22060, to facilitate review and followup.

PART TWO

ENGINEER BATTALION, AIRBORNE DIVISION

CHAPTER 2

INTRODUCTION

Section I. THE AIRBORNE DIVISION

2–1. Mission

The primary mission of the airborne division is the destruction of enemy military forces and the seizure or domination of critical land areas, their populations, and resources. In addition to its basic mission the division may be employed in stability operations.

2–2. Organization

The airborne division (fig. 2–1) consists of a command, staff, combat support, and combat service support structure and nine maneuver battalions (airborne infantry). The division commander, in organizing the division for combat, groups appropriate elements of the division under its three brigade and other control headquarters in types and numbers appropriate to each control unit's specific mission.

2–3. Capabilities and Limitations of the Airborne Division

a. The airborne division can—

(1) Conduct airborne operations alone or as a part of a joint force.

(2) Conduct operations deep in the enemy's rear, employing vertical envelopment operations.

(3) Conduct sustained combat operations when augmented by necessary combat, combat support, and combat service support units.

(4) Deploy rapidly by air.

(5) Conduct airmobile operations.

(6) Exploit success, to include the effects of nuclear, chemical, and conventional fires.

(7) Conduct riverine operations.

b. The airborne division has the following limitations:

(1) Requirement for large initial and continuing Air Force support when employed in an airborne role.

(2) Limited ground vehicular mobility.

(3) Less protection than other divisions against nuclear, biological, chemical, and conventional fires.

(4) Limited defense and protection against armor.

(5) Sensitivity to adverse weather conditions and aircraft availability when employed in an airborne role.

(6) Requirement for combat, combat support, and combat service support augmentation for sustained operations.

(7) Limited organic airlift capability.

(8) Lack of organic medium artillery fire support.

Section II. ENGINEER BATTALION, AIRBORNE DIVISION

2–4. Organization

The engineer battalion, airborne division, hereinafter called the airborne division engineer battalion (TOE 5–25), consists of a headquarters and headquarters company and three identical combat engineer companies (fig 2–2).

2–5. Mission

The primary mission of the airborne division engineer battalion is to increase the combat effectiveness of the airborne division by providing engineer combat support. The battalion may also undertake and carry out airborne infantry combat missions.

2–6. Equipment

All items of equipment of the battalion are listed

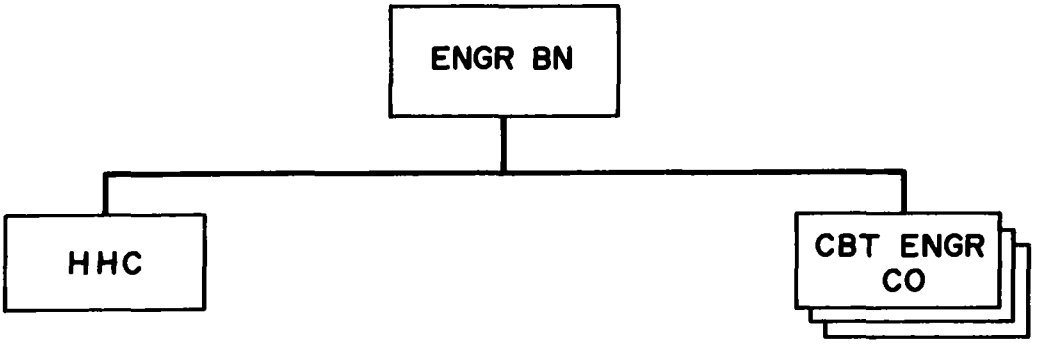


Figure 2–2. Organization chart, engineer battalion, airborne division.

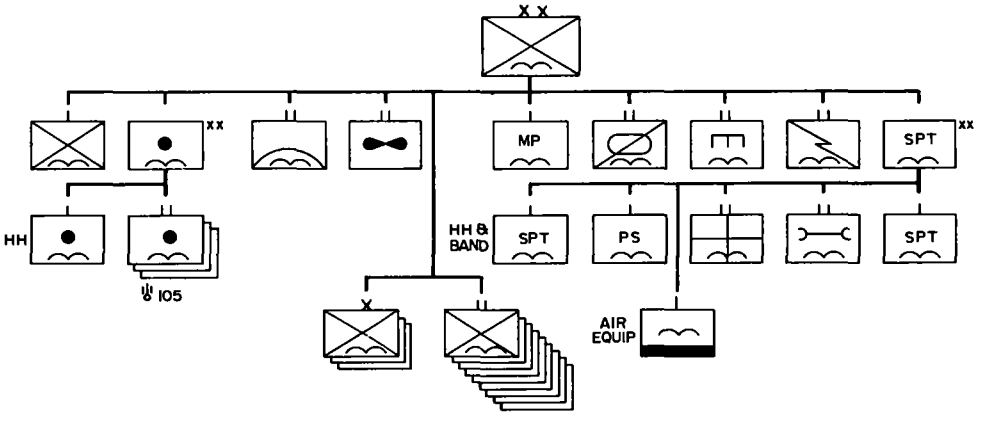


Figure 2–1. Organization chart, airborne division.

in the applicable TOE. Major items are treated in greater detail in the discussion of the elements of the battalion. All equipment is capable of being delivered by parachute or from landed medium transport or assault aircraft.

2–7. Mobility

The airborne division engineer battalion is 95 percent mobile in organic transportation and 100 percent air transportable in medium transport or assault aircraft. Army aircraft organic to the airborne division provide some degree of mobility throughout the division's area of influence and may be used by the battalion on a mission basis whenever they can expedite the accomplishment of the mission (FM 1–100).

2–8. Assignment

The airborne division engineer battalion is organic to the airborne division, TOE 57.

2–9. Capabilities

a. At TOE level 1, the airborne division engineer battalion provides:

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Engineer reconnaissance and production of engineer intelligence for the division.

(3) Limited construction, repair and maintenance of roads, bridges, fords and culverts to facilitate the movements of the division.

(4) Limited general construction works including construction of assault landing strips.

(5) Planning for the employment of atomic demolitions munitions (ADM). Preparation for and firing of ADM, as required, when TOE 5–570 cellular type ADM teams are attached.

(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 TOE 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. Members of this unit, except the chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

e. This unit has a limited air defense capability. Organic weapons can provide some protection against aircraft as outlined in appendix E.

f. This unit is dependent upon the division adminstration company, TOE 12–157, for personnel administration services.

2–10. Methods of Operation

a. One or more engineer companies may be attached to or placed in direct support of an airborne infantry brigade for the airborne assault. The remaining companies are kept under battalion control. Companies attached to brigades revert to battalion control as soon as practicable after the assault in order to insure maximum flexibility and economy of engineer effort.

b. Equipment and personnel of headquarters and headquarters company and supporting nondivisional units are employed to reinforce the combat engineer companies. These elments may be attached to or placed in support of the line companies.

c. Principal missions of engineer units during the assault include providing combat engineer support to the assault units, initiating construction of air-landing facilities, rehabilitation of existing airfields, and preparation of obstacles for the security of the airhead. The engineer annex to the operations order contains detailed instructions concerning tasks to be accomplished or initiated during the assault.

d. The battalion may be reinforced by elements of the airborne light equipment company (TOE 5–54) for construction and maintenance of landing zones or other tasks requiring considerable earthmoving. Reinforcement may be by other types of nondivisional engineer units capable of being airlanded or airdropped, such as the airborne engineer combat group (TOE 5–52) and airborne engineer combat battalion (TOE 5–195).

e. In stability operations, elements of the airborne division engineer battalion may be assigned to political subdivisions such as regions, provinces, districts, or villages on an area or task basis. Engineer civic action teams, KA KB, and KC (TOE 5–560) may be attached to the battalion to aid in the supervision and to advise on engineering tasks and projects undertaken by indigenous personnel.

Section III. COMMUNICATIONS FOR THE AIRBORNE DIVISION ENGINEER BATTALION

2–11. Radio Communications

The airborne division engineer battalion operates stations in division nets and establishes internal station nets as required. Figures 2–3 and 2–4 show the radio net configurations usually found in airborne engineer battalion.

a. Division Nets. The battalion normally operates stations in the following division nets.

(1) *Division command net, AM.* The battalion communications section operates a station for the battalion commander in this SSB voice net. The net normally is restricted to high priority traffic on a commander-to-commander basis.

(2) *Division operations-intelligence net, (RATT).* The battalion communications section operates a station in this net. The net provides a secure means for passing traffic of an operations-intelligence nature.

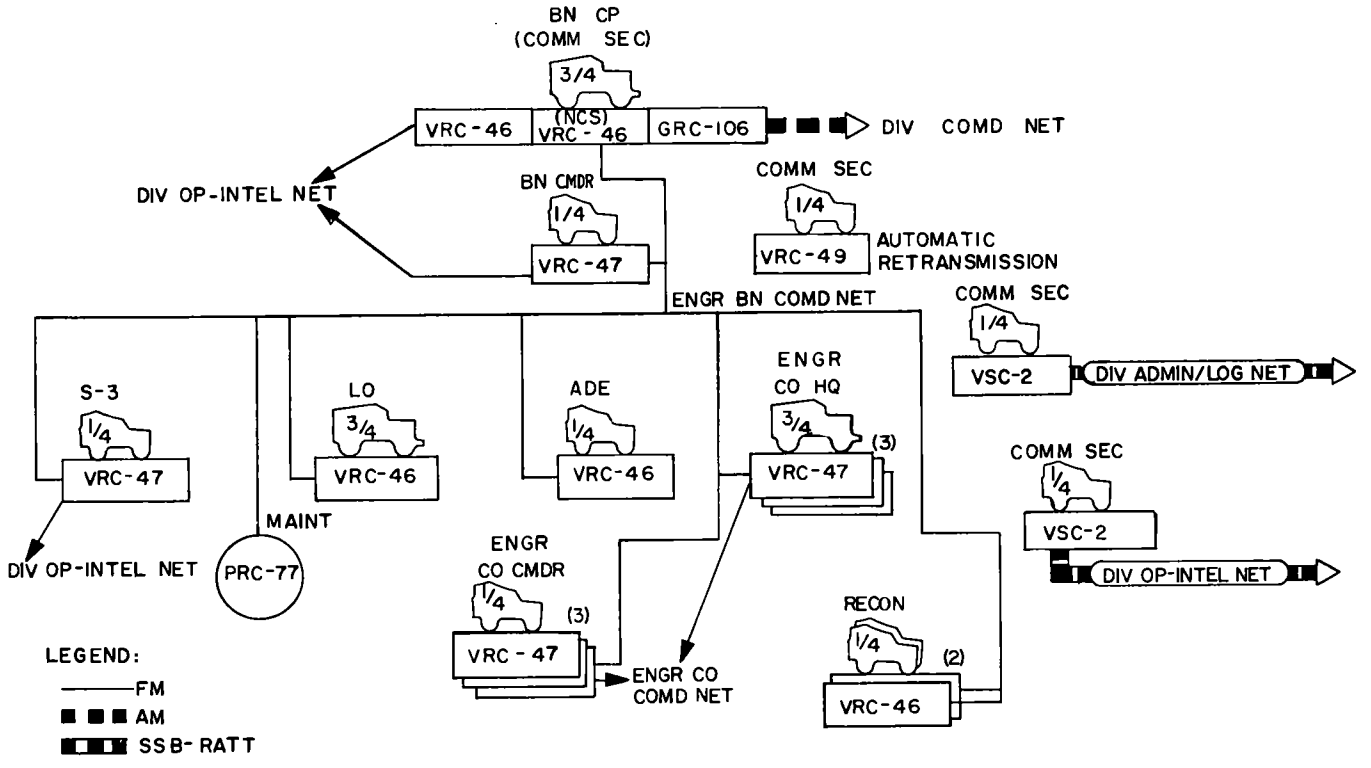


Figure 2–3. Type radio net, engineer battalion, airborne division.

(3) *Division administration-logistic net, (RATT).* The battalion communications section operates a station in this net. The net provides a secure means of passing traffic between the battalion and the division support command.

(4) *Division operations-intelligence net, FM.* The battalion commander, battalion S3, and the communications section operate stations in this net. This net normally is restricted to operational-intelligence traffic of immediate urgency.

b. Battalion Nets. The airborne engineer battalion establishes the following internal nets:

(1) *Battalion command net, FM.* This net is the battalion commander's personal means of exercising command-control over his subordinate elements (fig 2–3). Traffic is normally restricted to that of a high priority command or operational-intelligence nature. The battalion communications section has the capability of operating a retransmission station in the net to extend normal operating ranges. Subordinate combat engineer companies enter this net as required.

(2) *Company command net, FM.* Each combat engineer company establishes its own command net (fig 2–4). This net is the company commander's personal means of exercising command and control. Subordinate platoons normally enter the net, or they may enter the command net of a supported unit as necessary.

(3) *Platoon nets, FM.* Each combat engineer platoon establishes its own general purpose net (fig 2–4).

(4) *Assault net.* When possible, in air assault, the air movement should provide for the landing of vehicular mounted radio sets with their users. This will expedite the rapid establishment of normal radio nets; however, parachute delivery into the airhead may require that personnel from the combat engineer companies carry man-pack FM voice radio sets. Also in this situation, one individual from battalion headquarters (usually the communications officer) may be designated to parachute near a radio set, which is suitable to enter the division command net. Once established on the ground, this station acts as a radio retransmission point for communications between battalion units and division headquarters. The assault radio net may then appear as shown in figure 2–5.

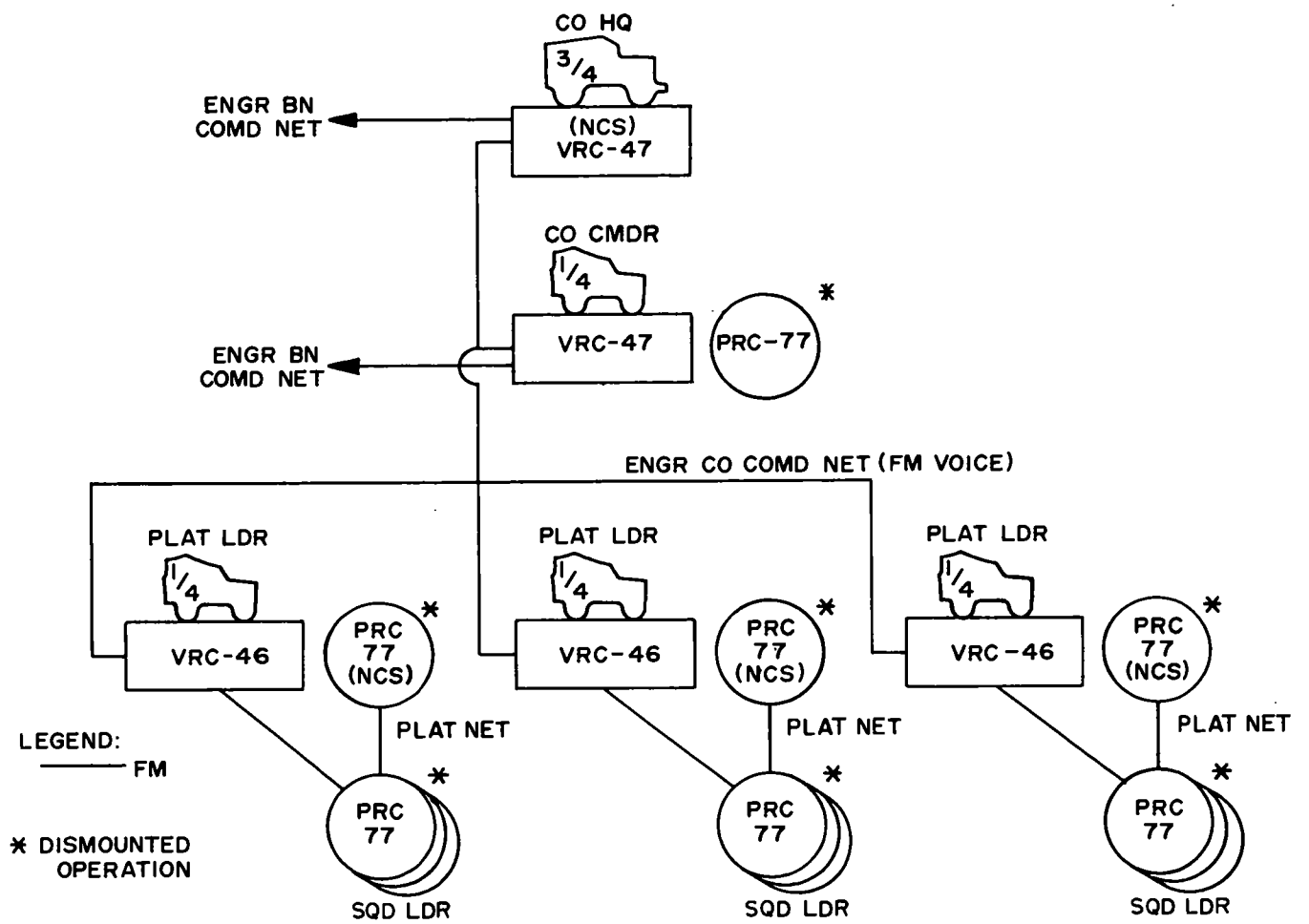


Figure 2–4. Type radio net, combat engineer company, engineer battalion, airborne division.

2–12. Wire Communications

When the situation permits, wire communications should be established among elements of the battalion. Normally distances and deployment will preclude direct, battalion-installed, wire lines from battalion headquarters to subordinate combat engineer companies. The battalion headquarters and each combat engineer company should enter the division wire system at the nearest division signal center, thus utilizing the division common-user telephone system. Figures 2–6 and 2–7 show a typical wire system for the engineer battalion headquarters and a combat engineer company.

2–13. Messenger Service

Engineer battalion headquarters normally is included in division-operated messenger runs. Internal messenger service within engineer units will be as directed by the engineer battalion commander. Elements of the engineer battalion operating in forward division areas will derive messenger support from the nearest available forward area signal center.

2–14. Communications Personnel

a. Battalion Communications Officer and Battalion Communications Section. The communications officer serves on the battalion special staff and exercises operational control over the battalion communications section of battalion headquarters and headquarters company. He is responsible to the battalion commander for the efficient operation of all communications facilities within the battalion. Each battalion communication section contains a communications chief, radio teletypewriter teams, radio mechanics, radio telephone operators, switchboard operators,

wiremen, and motor messengers. Typical duties of communications personnel are found in AR 611–201 and FM 61–24.

b. Communications Personnel at Company Level. Each engineer company is authorized a communications chief, wireman, and radio telephone operators.

2–15. Characteristics of Radio Equipment

Characteristics of radio equipment organic to the battalion are listed in appendix F.

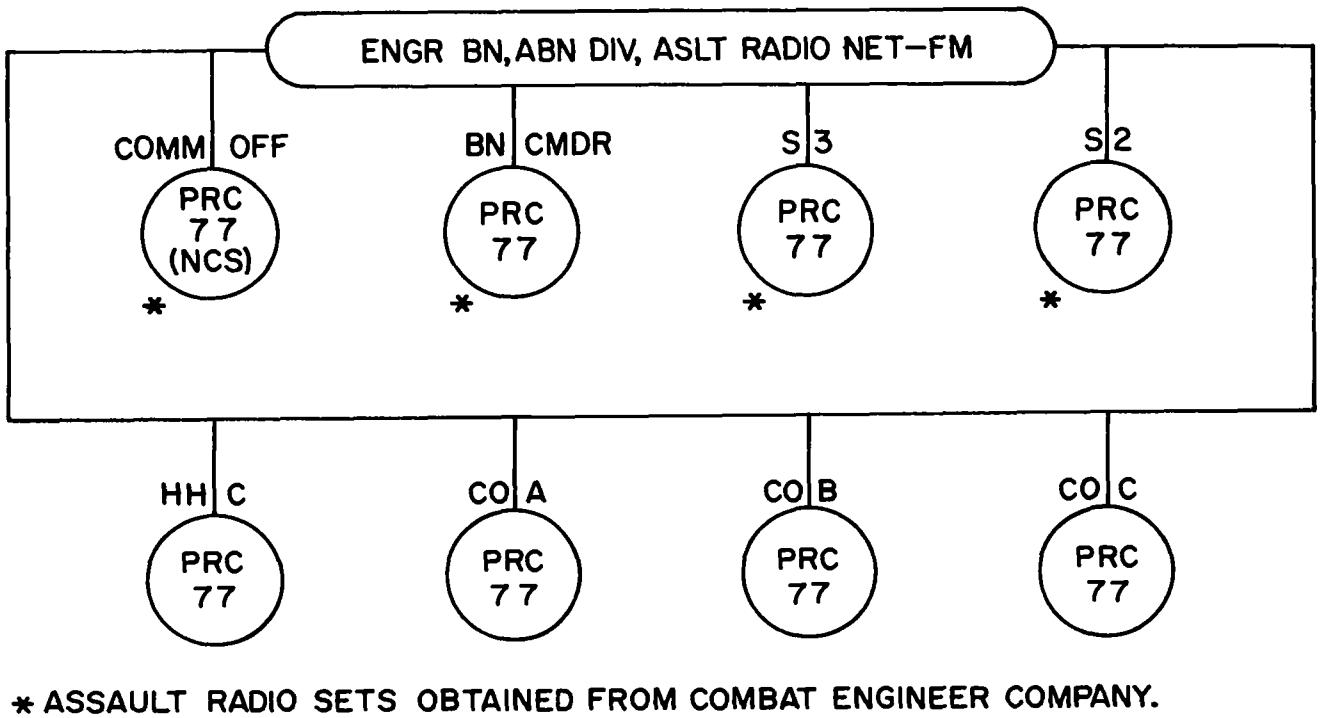


Figure 2–5. Type assault radio net, engineer battalion, airborne division.

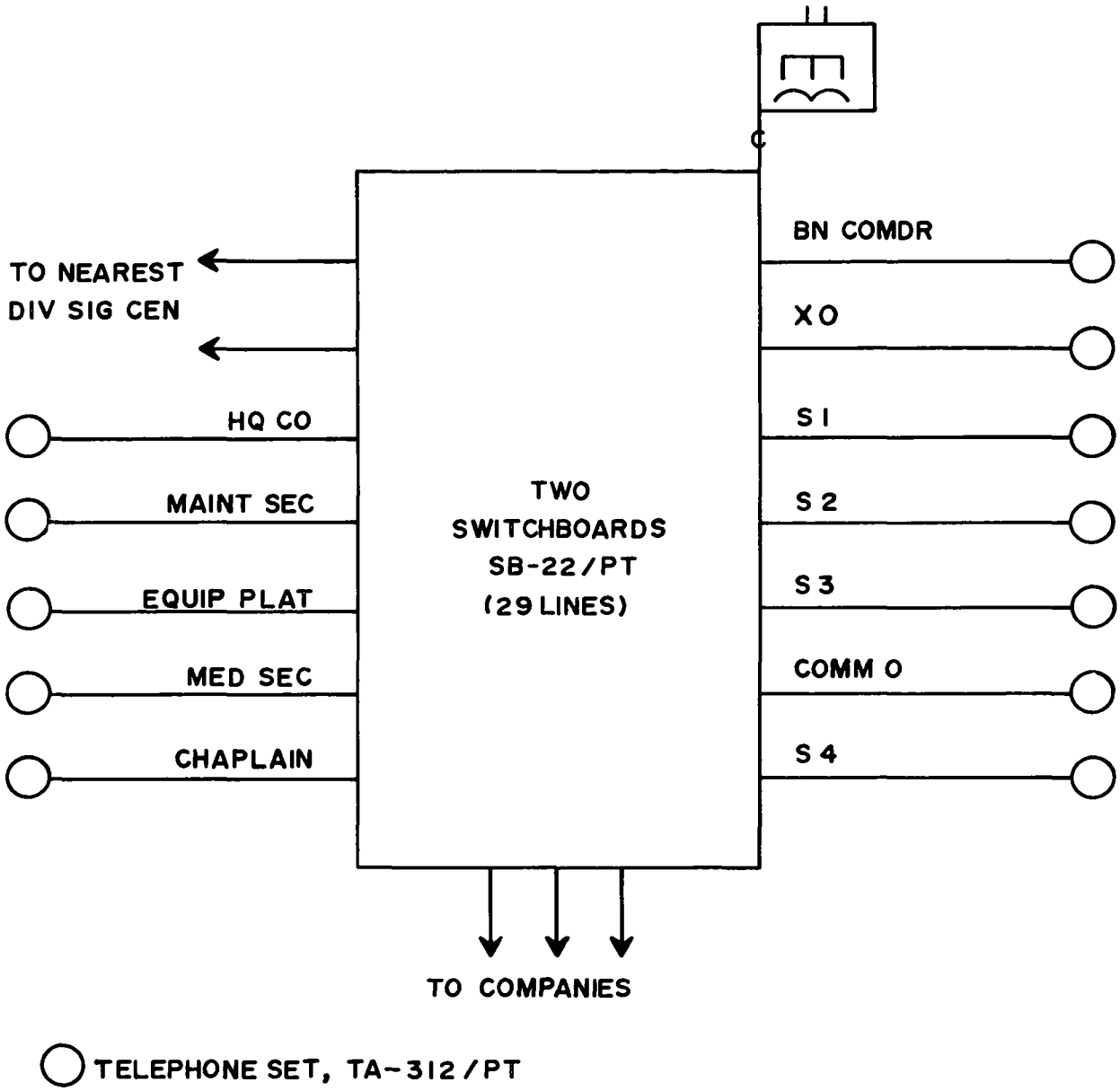


Figure 2–6. Type wire system, engineer battalion, airborne division.

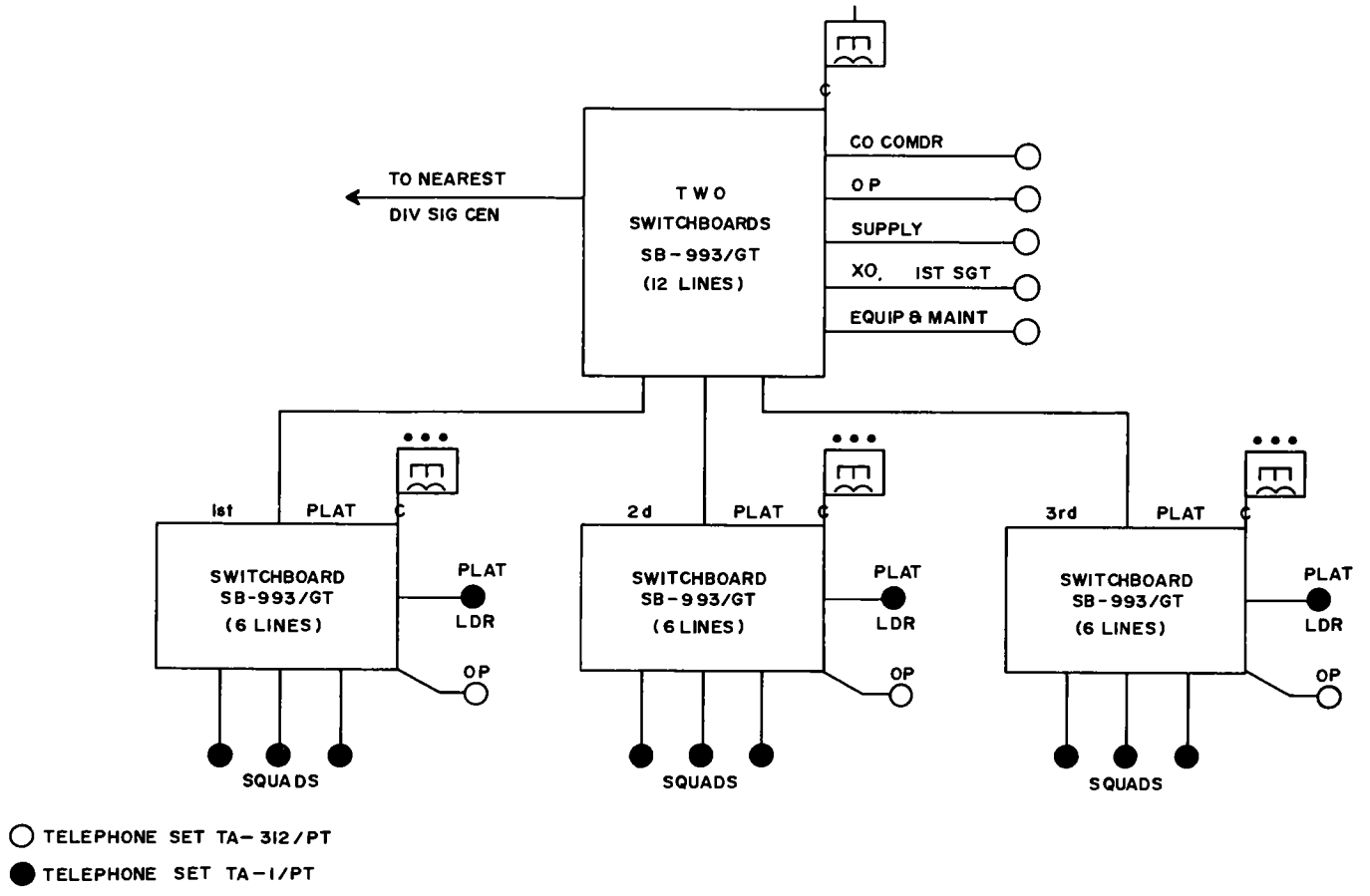


Figure 2–7. Type wire system, combat engineer company, engineer battalion, airborne division

CHAPTER 3

HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER BATTALION, AIRBORNE DIVISION

Section I. ORGANIZATION AND CAPABILITIES

3–1. Organization

Headquarters and headquarters company of the airborne division engineer battalion is organized under TOE 5–26 and consists of two elements; a battalion headquarters and a headquarters company (fig 3–1).

a. Battalion Headquarters. The battalion headquarters consists of:

(1) Battalion commander (also division engineer).
(2) Executive officer.
(3) Assistant division engineer.
(4) S1.
(5) S2.
(6) S3.
(7) S4.
(8) Engineer equipment officer.
(9) Surgeon.
(10) Chaplain.
(11) Communications officer.
(12) Sergeant major.

b. Headquarters Company. Headquarters company consists of a company headquarters, an equipment platoon, and personnel to man the following battalion headquarters sections:

(1) Administration.
(2) Operations.
(3) Intelligence.
(4) Supply.
(5) Division engineer.
(6) Communications.
(7) Maintenance
(8) Medical.

3–2. Duties and Functions

a. The duties of the battalion commander and his staff and the functions of the staff sections are as discussed in FM 5–1, FM 101–5, AR 611–101, AR 611–112, and AR 611–201.

b. The equipment platoon furnishes equipment and operators to the combat engineer companies as required.

3–3. Capabilities

a. At TOE Level 1, headquarters and headquarters company 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) ADM support to the division as required, 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 TOE 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. Members of this unit, except the chaplain and medical personnel, can engage in effective coordinated defense of the unit's area or installation.

e. When the battalion is committed to fight as airborne infantry, the headquarters and headquarters company functions as an infantry battalion headquarters and headquarters company.

f. This unit is dependent upon the division administration company, TOE 12–157, for personnel administration services.

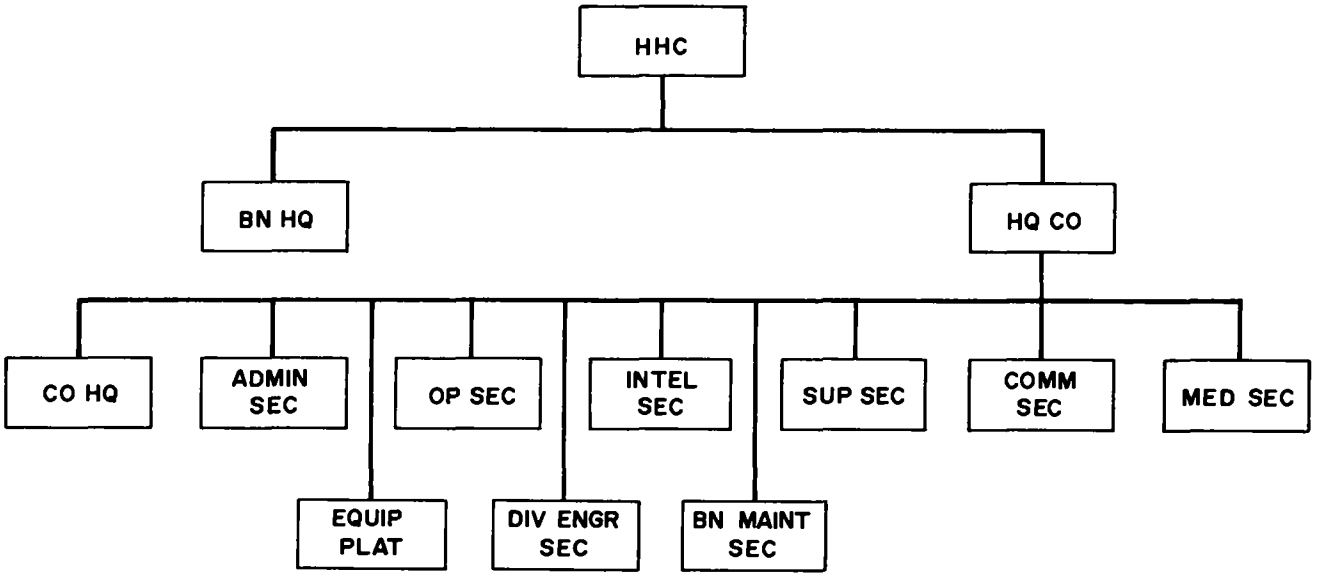


Figure 3–1. Organization chart, headquarters and headquarters company, engineer battalion, airborne division.

3–4. Major Items of Equipment

The airborne division engineer battalion is equipped on an austere basis so that it can fulfill its airborne assault mission. Major items of equipment in headquarters company are—

a. Crawler tractor dozers.
b. Scoop loaders.
c. Graders.
d. Dump and cargo trucks.
e. Air compressors and pneumatic tool sets.
f. Trailer-mounted water purification sets.
g. Pneumatic reconnaissance boats.

3–5. Mobility

Headquarters and headquarters company is 90 percent mobile in organic transportation and 100 percent air transportable in medium transport or assault aircraft.

Section II. METHODS OF OPERATION

3–6. Battalion Headquarters

The battalion commander organizes and locates his headquarters in a manner best suited for carrying out his command and staff functions.

a. Location. In addition to other considerations, the headquarters is located to facilitate communication with the division command post, subordinate units, the support command, and any supporting engineer units.

b. Layout. The battalion command post (CP) is laid out to facilitate security, dispersion, concealment, movement to and from the area, and movement within the area. An alternate CP may be established. The assistant division engineer (ADE) is usually located at the division main CP.

3–7. Headquarters Company

Normally, elements of headquarters company are attached to the combat engineer companies for specific tasks. Examples of such attachment are construction equipment with operators, medical aidmen, and reconnaissance teams. The remainder of headquarters company is located at battalion headquarters.

3–8. Supply

a. Responsibility. With the possible exception of operations conducted in a stability operations

environment, the battalion commander is responsible for the supply of the engineer battalion only and for the production of potable water for the division.

(1) *Ground operations.* Routine supply procedures are followed in the airborne division engineer battalion, except in the first stages of an airborne assault.

(2) *Airborne assault.* The quantity and types of engineer supplies and equipment to be brought into the airhead are limited by the number and types of aircraft to be used. There seldom will be sufficient airlift to bring in all the desired engineer items. Therefore, maximum use must be made of supplies and equipment locally available. The intelligence effort is specifically directed toward development of sources of supply in the objective area. Some considerations in delivery of supplies and equipment for engineer use in an airborne operation are—

(*a*) Prepackaging of barrier and construction materials.

(*b*) Delivery of materials direct to jobsites or to landing zones nearest using unit.

(*c*) Use of Army aviation when available, particularly helicopters, for delivery from drop or landing zone to jobsite.

(*d*) Use, in the airborne assault, of individual parachutists to carry explosives for demolitions, or other materials and small equipment necessary to accomplish the mission.

(3) *Stability operations.* On occasion, during stability operations, the engineer battalion, airborne division, may be called upon to provide engineer support to forces of a host country (HC), or to augment other existing U.S. forces within a foreign country. Requirements for engineer supplies and equipment, and the production of potable water, especially for civilians, may be magnified; therefore, normal supply procedures may be modified. When possible, maximum use must be made of supplies and equipment locally available. The battalion, may be augmented by teams from the TOE 5–500 series to provide additional capabilities, especially well-drilling, water purification, and water transport teams, required in supporting stability operations.

b. Water. The variable nature of an airborne operation requires that water processing and purification equipment be capable of very rapid displacement and that alternate water points be selected prior to the operation. The equipment may be delivered to the water point by parachute or any available prime mover capable of pulling the trailer. Water production procedures are as set forth in TM 5–700. Appendix C contains minimum potability standards for field water supply.

c. Class IV and V Supplies. Certain class IV and V supplies, such as tactical bridging, mines, explosives, and field fortification materials, when delivered by parachute or airlanded, should be in prepackaged composite loads. These loads should be capable of delivery to worksites, either directly, or by helicopter or vehicle from the drop zone or airlanding facility. An example of a prepackaged composite load of field fortification materials is a load consisting of all mines, pickets, and wire (on bobbins if required) for a 100-meter length of standard minefield.

3–9. Equipment Record Procedures

Equipment record procedures for the control of operation and maintenance of all equipment will be in accordance with TM 38–750.

CHAPTER 4

THE COMBAT ENGINEER COMPANY, ENGINEER BATTALION, AIRBORNE DIVISION

4–1. Organization

The engineer company, engineer battalion, airborne division, hereinafter called the combat engineer company, is the basic operating component of the airborne division engineer battalion. It is organized under TOE 5–27 and consists of a company headquarters and three identical engineer platoons. Each platoon has a platoon headquarters and three identical engineer squads (fig 4–1).

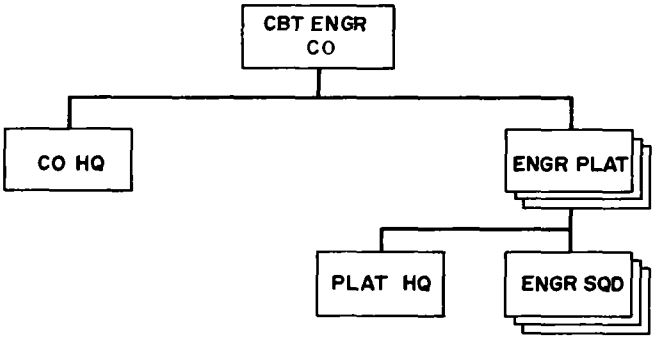


Figure 4–1. Organization chart, combat engineer company, engineer battalion, airborne division.

4–2. Mission

The mission of the combat engineer company is to provide an operating component of the engineer battalion, airborne division. It is equipped and trained to carry out its mission of increasing the combat effectiveness of major subordinate combat formations of the division by means of general and special engineer work. It performs the tactical engineer staff planning, supervision, and execution of the engineer combat support mission at brigade or equivalent size task force. It also undertakes and carries out airborne infantry combat missions when required.

4–3. Capabilities

a. At TOE Level 1, the combat engineer company:

(1) Performs pioneer tasks; when reinforce 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 TOE 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. Members of this unit can engage in effective, coordinated defense of the unit's area or installation.

e. When the battalion is committed to fight as airborne infantry, the combat engineer company functions as an infantry rifle company.

f. This unit is dependent upon the division administration company, TOE 12–157, for personnel administration services.

4–4. Mobility

The combat engineer company is 100 percent mobile in organic transportation. It is 100 percent air transportable in medium transport or assault aircraft and is air droppable.

4–5. Equipment

a. The combat engineer company is very lightly equipped. Major items in company headquarters are three 3-man, pneumatic reconnaissance boats; one trailer-mounted pioneer electric tool set; one 2½-ton dump truck; four ¾-ton cargo trucks; one 2½-ton cargo truck; two portable, gasoline-engine-driven drills.

b. Each platoon has in platoon headquarters one 2½-ton dump truck; one portable, gasoline-engine-driven drill; a platoon pioneer set; and a platoon carpenter set.

c. Each squad has a ¾-ton cargo truck, a ½-ton platform truck, a chain saw, a demolition set, a squad pioneer set, and a squad carpenter set.

4–6. Employment

a. The combat engineer company with organic

equipment is designed to provide combat engineer support to a brigade or brigade-size task force. It is reinforced with general or special engineer equipment and operators from the headquarters company, when necessary, to increase the effectiveness of its support.

b. In the airborne assault the company usually is attached to the supported unit. Where the tactical situation permits effective battalion control of the company, it is placed in direct support of the supported unit.

c. Each platoon is capable of performing pioneer and demolitions combat engineer support. The platoons are the principal working components of the company and generally operate with it. However, a platoon can also operate independently to provide the engineer support normally required by a battalion-size task force when it is furnished equipment support by the engineer battalion. In stability operations, platoons operating independently may be augmented by teams from the TOE 5–500-series to provide a greater capability to perform road maintenance, water purification, and military civic action functions. The platoon leader of the supporting engineer platoon is the engineer staff officer for the supported unit. The squad is the basic operating unit of the platoon. It consists of specialists in combat construction and demolitions, and engineer soldiers who are trained in combat engineer tasks. Because of its limited capability, the squad usually functions as a working component of the platoon. There are times, however, when it may be given an independent mission.

CHAPTER 5

BATTALION OPERATIONS

(ABCA SOLOG 125, NATO STANAG 2041)

Section I. GENERAL

5–1. Employment

a. The airborne division engineer battalion is a self-contained unit designed to provide engineer combat support in the airhead and in the forward portion of the battle area. It has the ability to overcome a variety of obstacles incident to the movement of the division, and hence contributes to the mobility of the division and its capability to maneuver in offensive action. In defense, retrograde, or denial operations, it has the capability to impede the progress of enemy ground operations by blocking critical avenues of approach.

b. The airborne division engineer battalion operates as part of division troops and deploys its companies in support of the brigades and combat maneuver elements of the division. The headquarters company contains a limited amount of engineer construction equipment with operators to supplement the engineer companies for specific tasks.

c. The combat engineer companies of the airborne division engineer battalion normally are associated with particular brigades to increase operational efficiency. The company performs the unit engineer functions of tactical engineer staff planning and execution of the engineer mission in this role. Continuous liaison is maintained by the company to the brigade for this purpose.

d. Attached or supporting engineer units should be kept under engineer battalion control when possible. Platoons may be placed in support of maneuver battalions or task forces for specific missions.

e. Attachment of engineer teams to combat elements is necessary for accomplishment of specific tasks requiring close command control. In the offensive this may consist of assault breaching or demolition tasks. In defense or retrograde, the execution of barrier demolitions and the employment of ADM may require attachment for completion of the specific mission. In the airborne assault, attachment is the normal procedure.

f. Airborne engineer troops engage in limited combat incident to accomplishment of their engineer missions. The nature of airborne operations is such that they will engage in combat more frequently than other types of divisional engineer units. Disengagement of engineer elements from the enemy is made by other combat elments to enable the engineers to continue their normal mission. When the situation requires deliberate commitment of the engineer battalion in an infantry mission, the battalion is committed by the division commander who, when possible, preserves unit integrity.

g. When task organizations are committed on separate missions, the engineer battalion provides an appropriate engineer element to accompany the force.

h. When the requirement for engineer support within the division exceeds the capability of the organic engineer battalion, additional engineer support is provided by the next higher echelon of command.

(1) Additional engineer support to the division may range from reinforcing the combat engineer strength to the provision of other engineer units (such as the airborne combat engineer group (TOE 5–52), the airborne combat engineer battalion (TOE 5–195), and the airborne engineer light equipment company (TOE 5–54)), for tasks in bridge construction, road and airfield construction, debris removal, erection of barriers, mapping, survey, camouflage, and deception.

(2) The earthmoving capability of the airborne engineer battalion is extremely limited. Projects involving more than a minimum amount of earthwork require nondivisional support. The airborne light equipment company is organized and equipped to provide this support.

(3) Nondivisional engineer units normally are placed in direct support of the division. However, these units are attached when the mission necessitates close command control in execution.

River crossings, barrier demolitions tasks, or use of ADM are examples of such situations. All engineer combat support provided to the division is coordinated by the division engineer.

i. The airborne division engineer battalion or elements thereof may participate in stability operations. By such participation, the battalion supports divisional elements engaged in stability missions, or in independent operations will support host country (HC) or U.S. forces already in-country. For details concerning employment of the battalion in stability operations see paragraphs 5–39 through 5–49.

5–2. Standing Operating Procedures

Standing Operating Procedures (SOP) reduce the number, length, and frequency of orders. They establish the regular procedure to be followed in the absence of specific instructions. An SOP is prepared for the battalion and all its operating elements. FM 5–135 contains an example SOP for a divisional engineer battalion.

5–3. Security

Each commander is responsible for the security of his unit. Security includes all measures taken by a commander to protect his unit against enemy interference, surprise, and observation. The measures adopted should be appropriate to the threat. As the threat increases, greater security measures are required to protect troops and equipment in bivouac, during movement, and at worksites. Work parties normally are responsible for furnishing their own security. Occasionally, however, they may be protected by infantry elements to free the work parties to complete the engineer mission. Organic weapons can provide some protection against aircraft as outlined in appendix E). A detailed discussion of active and passive air defense measures is contained in FM 44–1.

Section II. ADMINISTRATIVE MOVEMENTS

5–4. Engineer Assistance to Other Arms

a. Type of Work. The division usually needs engineer support when it moves administratively. A move may be made by motor, rail, water, or air. During movements, engineer work generally consists of the following:

(1) Providing facilities and assistance during loading and unloading of divisional elements at point of departure and at destination.

(2) Maintaining roads and bridges en route.

(3) Preparing the new area to receive the unit. This involves providing or improving facilities.

b. Employment. Engineers provide assistance by keeping some engineers at the point of departure until the bulk of the division has moved; furnishing an engineer advance party to prepare the new area; and sending some engineers with each major echelon moving independently. During administrative movements, engineers normally remain under control of the battalion commander. In general, engineer assistance is limited to work of benefit to the division as a whole or to work for which engineers are better trained and equipped than other troops. Supported units provide their own facilities and labor as far as practicable.

5–5. Engineer Work at Departure Point

a. Type of Work. Engineers at departure points may—

(1) Construct or strengthen ramps and loading platforms.

(2) Construct or improve routes of approach.

(3) Construct or improve preloading assembly area.

(4) Provide technical assistance to troops of other arms to load and lash equipment.

b. Loading Facilities. Every effort is made to choose departure points that require only a minimum of new construction and improvement. In most administrative air movements, terminal type facilities for loading, unloading, and intransit handling of cargo and personnel are utilized. There will be situations, however, in which loading ramps and platforms have to be built. In many cases, the engineer battalion will work in close coordination with the airborne division support command in this phase of a division administrative movement.

5–6. Engineer Work on Roads

a. Engineer Reconnaissance. Engineers make a detailed route reconnaissance before a major motor march. The engineer must be able to provide the following information:

(1) Load capacities of roads and bridges, and overhead clearance.

(2) Estimate of time and effort necessary to put required routes in condition to support division loads.

b. Engineer Work. Engineer work consists of strengthening bridges and repairing roads prior to and during movement of the division.

5–7. Engineer Work at Destination

Troops should be able to move their organic and attached transportation off the road and into their bivouac areas without halting. To make this possible, engineers may have to construct temporary crossing over roadside ditches and gullies, improve secondary roads and trails, and clear new trails. Engineer work at the destination is similar to that at the departure point. Other engineer tasks at the destination include clearing obstacles and boobytraps, area improvement, assisting in the construction of CPs and shelters, repair of existing facilities, operation of water points, construction or repair of roads and bridges within the division area, and detection and marking or clearing of minefields.

5–8. Traffic Circulation

a. When assigned an area of responsibility, the airborne division establishes a division highway traffic headquarters to plan, schedule, route, and direct all highway traffic to conform to military requirements. This headquarters, operated by the division transportation ssction, composed of engineer, military police, signal, and other specialists as required, and attempts to maintain a constant and orderly flow of traffic to realize the full potenial of the road net in the division area.

b. The airborne division engineer battalion provides representation/liaison with the traffic headquarters and assists in its mission. This assistance applies generally to all moves and not to administrative moves only. Assistance is provided by—

(1) Conducting road and bridge reconnaissance.

(2) Making recommendations concerning the routes to be utilized as tactical routes and main supply routes based on the load carrying capacity of the road net and the availability of engineer troops to maintain the road net.

(3) Preparing and posting road signs and markers.

c. The traffic headquarters is the general staff responsibility of the division G4. Control of movements is a function of the division transportation officer who coordinates with the provost marshal on traffic control, and supervises the division traffic headquarters.

5–9. Battalion Movement

During administrative movements the airborne division engineer battalion, less those units assigned support tasks, usually moves all unit forming an integral part of the division. For all movements, the battalion loads its own equipment. Properly prepared administrative movement tables provide the unit with a known system of moving by any mode of transportation. The movement tables are prepared for motor, rail, water, or air movement and are based on pertinent technical data contained in military publications pertaining to each individual piece of equipment and the data contained in FM 101–10–1, TM 55–450–15, and FM 5–35. In the airborne division engineer battalion, emphasis is placed on movement by air, and the battalion must have complete and current movement data available at all times. In addition to transportation by use of cargo aircraft, the use of Army helicopters should be anticipated for transporting elements of the engineer companies. Air-movement tables should be prepared as outlined in TM 55–450–15. For administrative moves, loads are planned to permit the most economical utilization of the maximum space in the available aircraft. When possible, key personnel should be distributed throughout the lift to minimize the effect of losses.

Section III. TACTICAL MOVEMENTS

5–10. Introduction

The airborne division makes tactical movements by foot, motor, or air. The mission of the unit, proximity to hostile forces, terrain, types of enemy resistance expected, and activity of hostile air forces are factors that will determine the organization and composition of the column in a tactical movement. All units should have tactical movement tables prepared as a part of their SOP.

5–11. Motor Movement

In tactical movements, motor transport is used for timely delivery of units and supplies to their destinations in the best formation and condition for the accomplishment of the mission. Unit integrity for tactical control, combat loading for ready availability on contact, and speed of movement are of greater importance than economical use of cargo capacities. During a tactical motor

movement the airborne division engineer battalion may move in one trip only by augmentation of its organic transportation. Detailed loading plans should be prepared in advance for each vehicle of the battalion. Vehicles organic to the squad of the combat engineer company are insufficient to transport the squad's personnel and equipment. Some of its equipment must be loaded on the platoon headquarter's vehicles. For further details on motor movements, see FM 55–30.

5–12. Battalion Movement

The airborne division engineer battalion participating in an airborne division tactical movement will normally furnish a company to support each of the leading brigades. The remainder of the battalion moves as directed by the division commander. In some tactical air movements, the battalion will be responsible for providing air-landing facilities at the destination (app B). If preparation of these facilities involves more than a minimum of construction effort, additional engineer support will be required.

Section IV. AIRBORNE OPERATIONS

5–13 Introduction

a. The airborne division engineer battalion is capable of entry into a combat area by either air-landed or parachute means. It is designed to perform combat engineer tasks in an assault role in support of an airborne division.

b. Normally, airborne operations are initiated by an assault phase followed by a defensive phase and an offensive or withdrawal phase.

(1) The *assault phase* normally is executed, employing parachute and assault aircraft, to secure an initial airhead or multiple airheads in hostile territory. Direct assault landings against occupied objectives are not attempted by aircraft unless enemy resistance has been reduced in the objective area. An airborne assault normally involves a combination of parachute and assault aircraft landings.

(2) Concurrently with the *defensive phase,* the airborne division can conduct *limited offensive* operations to expand the airhead or to secure additional objectives that will facilitate the defense or future operations.

(3) *Relief or withdrawal* is executed after the accomplishment of a specific mission, after link-up with friendly forces, or when required by the situation.

c. The division engineer recommends disposition of available engineer troops for all phases of the airborne operation based on the scheme of maneuver as announced by the division commander. The division engineer recommends appropriate changes in disposition as the situation develops and the need arises.

d. If the division engineer determines that the engineer tasks required exceed the capabilities of the battalion, he immediately provides the division commander with information as to the additional engineer forces needed to accomplish the mission. The division commander may request reinforcement. In this case, nondivisional engineer units may be placed in support of or attached to the battalion.

e. Because of the intermingling of friendly and enemy forces during the early stages of an airborne assault, the airborne division engineer battalion may be required to engage in ground combat operations for sustained periods more often than engineers in other combat situations. Limitations on the strength of maneuver units in the objective area may further require commitment of the engineer battalion as a fighting reserve. Preparation and training for an airborne assault should emphasize these requirements.

5–14. Intelligence

The battalion S2 develops the battalion intelligence plan, initiates and supervises battalion reconnaissance activities, and requests intelligence data from other agencies. The battalion S2 devotes considerable time and effort to the preparation of terrain studies and site analysis to support division operations. An engineer detachment (terrain) may be attached by the corps to the airborne division to prepare terrain intelligence for any anticipated operation. Some of the studies and analyses prepared are:

(1) *Tactical commanders terrain analysis (TACCTA).* The TACCTA is a special map and graphic intelligence aid consisting of photographs, texts, and maps overprinted with intelligence data usually covering a small geographic area. The TACCTA, when available for an area, normally is prepared at Department of Army level.

(2) *Terrain studies prepared by the force.* Terrain studies designed for the particular airborne operations, are prepared by the tactical

force. As a minimum these studies will contain data on the following:

(*a*) Landing zones, drop zones, extraction zones, and airfields.

(*b*) Roads, bridges, fords, ferries, and culverts.

(*c*) Weather and climate.

(*d*) Cross-country movement conditions, including data on trafficability and rivers and streams.

(*e*) Water sources.

(*f*) Obstacles and fortifications.

(*g*) Tactical considerations including cover, concealment, observation, fields of fire, key terrain, and avenues of approach.

(*h*) Construction material.

(3) *Special engineering site plans.* These are prepared by the division engineer and his staff for the facilities to be constructed in the airhead. For details on site selection and site plans, see appendix B and TM 5–330.

5–15. Planning

a. Method of Planning.

(1) Several methods of developing plans may be used to determine what actions, units, sequences, and procedures must be taken to accomplish the mission assigned to a unit. One method is to begin with the current position and plan through each intermediate step to the final objective. Another method is to begin with the final objective and work backward. This technique develops the required units, organization, combat service support and other essential items needed to achieve the objective. The relative time sequence and organizational placement will emerge from this technique. As the visualization continues, the need for specific tasks, conditions, or assumptions and their relative placement become apparent. The latter is the preferred method for airborne operations planning.

(2) Planning for an airborne operation begins with a visualization of operations in the objective area and proceeds in the following sequence:

(*a*) *Ground tactics in the objective area.*

1. Plans include missions and objectives; location of the airhead line, combat outpost and other reconnaissance and security forces; task organization and boundaries; and location of reserves. Planners give special consideration to the assembly and reorganization of assault forces and to the decentralized nature of initial operations in the objective area.

2. For this period, engineer plans provide for combat engineer support to the assault units, the initiation of construction of landing facilities, rehabilitation of existing airfields and preparation of obstacles. Plans should also include measures taken to control dust and the dust palliatives to be used (see app B). Detailed instructions concerning these tasks will be contained in the engineer annex to the operations order.

(*b*) *Landing in the objective area.*

1. The landing plan includes sequence and method of delivery into selected drop and landing zones in the objective area. It is not normally a formally published plan. It is primarily a work-sheet used by planners to aid them in developing the marshaling and air movement plans.

2. For this period, engineer plans include information on the method of delivering engineer equipment and personnel into the various drop and landing zones in the objective area.

(*c*) *Air movement.*

1. The air movement plan includes aircraft loads, assignment of units to serials and columns, loading and departure sites, flight routes, and other measures for air movement from the departure area. It is essential that this plan support the ground tactical plan.

2. For this period, engineer plans provide for the assignment of engineer equipment to aircraft and the assignment of engineer units to serials and columns, and loading and departure sites. Engineer planning also includes information on the facilities and assistance the engineer will provide at the point of departure.

(*d*) *Marshaling.*

1. Airborne operations may require movement to temporary camps to complete final preparations for the operation. Troops, equipment, and supplies move from the marshaling area to loading sites and prepare to load in aircraft for the air movement.

2. For this period a theater army support command or other support unit provides marshaling support to the airborne force. However, engineer units of the force may be required to render some assistance to the support units in construction or strengthening ramps and loading platforms for the airborne force at the departure points.

b. The Engineer Plan of Operation. The success of the engineer portion of an airborne operation is dependent upon well coordinated missions and proper disposition of available engineer

troops and equipment. In all planning, the division air-movement table must be reviewed carefully by the engineer to insure coordinated movement of the engineer battalion into the airhead.

c. Water Supply. Information on water supply, provided by the division engineer, should also be included in plans. Units participating in the assault should carry with them the maximum amounts of potable water in individual canteens and unit water containers. The amount of time necessary to make water points operational can be minimized by careful study of maps and aerial photographs and by delivery of water purification equipment and operators as close as possible to the selected sites.

d. Division Operations Order. The engineer, under general staff supervision of the G3, is also responsible for preparing the following annexes to the division operations order, based on the division commander's concept of operation:

(1) *Engineer annex.* Refer to FM 5–135 and FM 101–5.

(2) *Atomic Demolition Munitions Plan.* See FM 5–26.

e. Barrier annex. In addition to the above, the division engineer prepares portions of the barrier (and denial) plan under the supervision of the G3 (FM 31–10).

5–16. Marshaling

a. Preparation. After orders have been issued to the engineer battalion, the companies which will be attached to brigades usually join those brigades in specified marshaling areas and prepare for the operation with the supported unit. The remainder of the battalion is marshaled in one or more areas with other division troops. Marshaling support is provided by an area support command of a theater army support command (TASCOM) or a support unit tasked with this specific mission. Units are briefed in sufficient time to allow rigging of equipment and movement of personnel and equipment to departure airfields. TC 10–1 describes the fabrication and use of various field expedients that may be required to assist in the rigging and out-loading of airdrop equipment. Detailed rigging procedures for various items of equipment are contained in the TM 10–500-series (TM 10–500 to TM 10–500–113). FM 101–5 and FM 61–100 outline the planning required for an airborne operation.

b. Movement to Loading Sites. Elements of the battalion are provided with schedules for the movement of personnel, supplies, and equipment to loading sites based on the time required for loading and the scheduled times of takeoff. The support unit provides ground transportation as required.

c. Loading.

(1) Units are responsible for loading and lashing their accompanying supplies and equipment. Troop carrier personnel provide technical assistance.

(2) Heavy drop loads are prepared in the vicinity of loading sites in order to reduce the requirement for transportation support.

(3) Aircraft loads are based, insofar as practicable, on the ground tactical plan.

(4) The Air Force is responsible for providing technical supervision, loading aids and tiedown devices at the aricraft loading sites to secure airdrop equipment aboard the aircraft.

5–17. Airborne Assault

a. Air-Movement. The airborne division engineer battalion accompanies the airborne division into the airhead area and is delivered in accordance with the division air-movement table by airdrop or airlanding.

b. Reorganization. Immediately upon arrival in a landing zone or drop zone, elements of the battalion assemble in predesignated areas. Those units with preassigned tasks move directly to their worksites. Engineer reconnaissance is initiated and is continued throughout the operation. Close coordination with infantry elements must be maintained to assure that the areas of engineer work have been secured. Battalion headquarters and headquarters company moves to a preselected area and establishes its command post.

c. Command Posts.

(1) *Organization.* As soon as possible after the initial airborne assault, the battalion and its companies establish operational command posts and communications nets. Organization of command posts depends upon the unit's mission, the tactical situation and unit capabilities. As a minimum, a forward command post will deploy with assault elements. This element will include those members of staff elements of immediate concern or assistance to the commander. The rear command post, usually located at the marshaling area, is functionally organized to assist the unit from that location with emphasis upon unit administration and logistics.

(2) *Alternate command posts.* Active nuclear warfare requires the establishment of alternate command posts to assure continuous opera-

tion. The division engineer may designate the liaison officer of the division engineer section as the nucleus of an engineer staff section at the alternate division command post. The limited number of personnel assigned to the airborne division engineer battalion headquarters may preclude the establishment of an alternate command post. A less efficient but feasible solution is to designate the physical location of an alternate battalion command post. This location serves as a rallying point for survivors and permits rapid reconstitution of the battalion headquarters following a nuclear attack. The unit SOP should provide as much guidance as possible on this subject.

d. Supplies and Equipment. When air movement allows accurate delivery of supplies and equipment directly on a worksite, engineer problems of transportation or movement of supplies and equipment are reduced. Where this cannot be done, the original plan must provide for delivery of engineer supplies and equipment on the landing zone or drop zone nearest the worksites. Upon delivery, the supplies and equipment are recovered by the engineer troops and moved to the worksite. Where supplies are to be used at more than one worksite they may be moved to a location which permits ready access by the using units.

e. Delivery Methods. Supplies and equipment may be introduced into the objective area by a variety of means. Types and methods of delivery by airlanded and parachute means are outlined in FM 61–100 and TM 10–500/TO 13C7–1–5.

5–18 Subsequent Operations

After complete reorganization and communications have been established, accompanying supplies delivered and recovered, and initial engineer projects started, the engineer battalion enters into a normal engineer support role for the airborne division. Additional missions are assigned to the battalion by the division commander, and are then assigned as projects to the subordinate units of the battalion. The major engineer effort usually is directed toward improvement of landing areas, roads, and bridges; and toward execution of barrier and blocking operations. Engineer companies attached to divisional units revert to battalion control as soon as possible, but may remain in direct support of the brigades to which they were attached for the airborne assault. Subsequent operations of the division may include continued defense of the airhead to include delaying actions, withdrawal, or offensive operations to include exploitation and further airborne assaults.

5–19. Exploitation

a. After the division airhead line is established, the assault may be exploited by the division by one or more of the following:

(1) Improving the area for development as an advance airbase, naval base port, storage area, or missile site, and providing for its security.

(2) Launching large-scale ground operations from the area. The division's lack of armor and limited ground mobility reduce its capability for this type of operation unless it is augmented.

(3) Seizing or denying the enemy use of critical terrain, road and rail nets, waterways, signal communications facilities, and natural resources, and protecting potential allies.

(4) Destruction or capture of enemy forces, missile sites, and airfields.

(5) Seizing terrain or other objectives inaccessible to other types of ground troops.

(6) The capture and utilization of manufacturing areas, resources, or governmental control facilities and agencies as directed.

b. The exploitation missions normally are determined during the planning stages of an airborne operation, and the engineer support required for them is planned accordingly. It will usually be necessary to have additional engineer support introduced into the airhead to augment the airborne division engineer battalion, or to permit relief of the divisional battalion from airhead tasks to work in support of exploitation operations. Typical engineer support units are the airborne engineer light equipment company or airborne engineer combat battalion, delivered by parachute or airlanded; or an engineer bridge company, or elements of a combat engineer battalion (Army or Corps) delivered by airlanding.

c. Other exploitation operations which may require engineer support are raids against targets of opportunity, blocking enemy reinforcement or withdrawal, reinforcing other units which have been operating independently, advancing successively to secure critical areas ahead of or to the flanks of friendly armored or other mobile forces, and blocking or counterattacking enemy penetrations of other ground forces. These operations can be performed by employing normal ground transportation, Air Force or Army aircraft, or by parachute operations from the established airhead. Engineer support for these operations may be in direct support or by attachment to the infantry elements conducting the operation. The

ability of the airborne division to conduct operations from the objective area will depend upon:

(1) The enemy situation.

(2) The division's own capability with particular emphasis on the buildup of supplies and personnel which can be introduced into the airhead.

(3) The number and status of airlanding facilities. The construction or improvement of airlanding facilities is a determining factor, and the engineer will require additional support from other engineer units, particularly the airborne engineer light equipment company or the engineer combat battalion, airborne. Advance elements from these units may accompany the engineer battalion in the initial airborne assault with additional personnel and equipment delivered as a planned portion of the air-movement of engineer troops and equipment for the division.

5–20. Withdrawal

Relief or withdrawal is executed after the accomplishment of a specific mission, after link-up with friendly forces, or when required by the situation. Advance planning is imperative, as the nature of the area of operations and the limitations of transport aircraft introduce complicating factors not present in other ground actions. Supplies and materials which cannot be evacuated are destroyed. The engineer battalion supports the airborne division in this type of operation by—

a. Construction of obstacles to prevent any enemy advance which would interfere with the withdrawal.

b. Preparing or maintaining airlanding facilities to accommodate the necessary aircraft for the withdrawal.

c. Providing adequate road nets and bridging for the units moving to the departure facilities.

d. Assisting in the destruction of equipment not capable of being withdrawn.

e. Engaging in limited ground combat operations.

Section V. MOVEMENT TO CONTACT AND THE ATTACK

5–21. Introduction

When the infantry units move from the drop or landing zones to their initial objectives or to the prescribed airhead line positions, the movement to contact and the attack are initiated. Engineers may be used in the advance guard and in the flank and rear security forces as well as in the main body.

5–22. Specific Engineer Duties

a. During the movement to contact, speed is essential. Maximum use of existing road nets and avenues of approach is emphasized. Early seizure of critical terrain is also important. Engineers assist the troops protecting the flanks by creating obstacles in roads and other possible avenues of approach to the flanks including contamination of obstacles with chemical landmines or agents and by the use of flame mines and flame expedients. Nuclear fires, including atomic demolition munitions (ADM) which is an engineer responsibility, may be employed to provide added security by blocking enemy avenues of approach. To provide this ADM capability, the engineer battalion must be augmented by TOE 5–570 ADM teams. Other duties in the movement to contact include conducting reconnaissance; opening and improving roads, trails, and bridges for troop movement, supply, and evacuation; reducing obstacles; assisting in the passage of defiles and minefields; and constructing bypasses.

b. Engineer reconnaissance during the movement to contact normally is performed by reconnaissance teams from headquarters company. Routes of advance are thoroughly examined for serviceability, type, condition, location of critical points, alternate routes, mines, and condition and types of bridges.

5–23. Control of Engineer Effort

a. Disposition of Engineer Troops. In addition to the normal association of an engineer company in support of a particular brigade, consideration must be given to the engineer tasks to be accomplished in each objective area to determine the final disposition. The engineer unit may be placed in direct support of, or attached to, the supported unit and may be given work to accomplish on an area or task basis, or a combination of both.

b. Responsibility for Control. The division engineer maintains contact with supporting and attached elements to assure that maximum value is obtained from the engineer effort expended. The supporting engineer unit commander retains control and command of the engineer elements, but must adjust his plans and troop employment to the plans of the supported unit or units.

c. Liaison.

(1) Liaison between supporting and supported units must be maintained during the attack to assure cooperation and coordination between all units participating in the operation.

(2) The assistant division engineer is the chief liaison agent between the airborne engineer battalion and division headquarters. Liaison functions between the supporting engineer companies and the brigades are usually performed by the company executive officer or other individual designated by the company commander.

5–24. Engineer Duties in the Attack

Typical engineer duties in the attack include—

a. Conducting reconnaissance.

b. Assisting in the preparation of traffic circulation plans.

c. Assisting forward movement of infantry and supporting arms by repairing roads, constructing expedient bridges, and removing obstacles.

d. Assisting in locating, marking, and removing mines, to include chemical mines.

e. Assisting in flank security through the use of demolitions (including ADM), minefields, to include chemical and flame, and other obstacles.

f. Constructing army airfields for divisional aircraft.

g. Constructing or rehabilitating airlanding facilities, drop zones, and extraction zones for assault type cargo aircraft.

h. Performing other duties such as the operation of water points.

5–25. Engineer Reconnaissance

a. Engineer reconnaissance during the movement to contact is performed initially by the reconnaissance teams from battalion headquarters and by reconnaissance elements from the engineer units supporting the infantry. These teams provide the division and the brigades with early reliable information concerning the terrain over which the unit is to advance.

b. Engineer reconnaissance during the movement to contact should include information on—

(1) Serviceability and types of roads.
(2) Location of critical points.
(3) Alternate routes.
(4) Mines, to include chemical and flame.
(5) Bridges and river-crossing sites.
(6) Suitable sites for landing zones, drop zones, and extraction zones.
(7) Locally available construction equipment and materials.
(8) Water sources.
(9) Estimates of engineer effort required.
(10) Recommended traffic circulation.
(11) Obstacles to include radiological contamination.

5–26. Pioneer Work Done by Other Arms

Because there are seldom enough engineer troops available to do all the pioneer work necessary to assist the advance of the infantry and supporting arms, the other troops do as much of this work as possible to help themselves. All troops are trained in the installation and removal of mines. Infantry troops do much of their own pioneer work, assisted by technicians from the supporting engineer companies.

Section VI. THE DEFENSE

5–27. Introduction

a. After assault objectives have been seized in an airborne operation, the airborne force normally suspends offensive operations temporarily to secure and organize the objectives. The period of time involved will vary depending upon the mission assigned, the size and composition of the force, enemy reaction, and the type of operation contemplated.

b. Defense of the airhead generally consists of a variation of the area defense. The defense envisions organizing and occupying strong-points on dominant terrain along the airhead line to cover main routes of approach into the airhead; covering unoccupied terrain between defended localities and natural obstacles by fire, mines (to include chemical and flame), and other artificial obstacles; employing appropriate passive air defense measures to avoid air attack with provisions to actively engage attacking aircraft in self defense; continuous and intensified reconnaissance and surveillance during the hours of darkness; formation of a reserve and establishing priorities for designation of new or additional reserves. Organized defensive forces are employed to blunt and stop enemy attacks; mobile reserves are deployed to reinforce or block in threatened areas; and counterattack forces are employed in spoiling attacks, or in attacks to destroy the enemy forces or eject them from the airhead. The shape of the airhead affords the airborne division interior lines of communication, facilitating

shifting of troops and commitment of reserves. Reserves are held in positions of readiness prepared to counterattack, to occupy defense positions, or to execute blocking missions. Positions are prepared in depth within the capabilities of the airborne unit. The airhead defensive line must provide adequate space for maneuver, for protection of critical installations, and for airlanding or air-evaluation operations.

5–28. Engineer Functions in the Defense

Defensive positions usually are laid out and constructed by the troops which are to occupy them. Engineers may be used to prepare alternate or supplementary positions and to perform such duties as—

a. Repairing, maintaining, and improving roads for mobile reserves and counterattack forces; providing access to defensive positions, supply and evacuation points; and recommending traffic circulation plans.

b. Preparation of and assisting in implementation of the barrier plans. Laying minefields and advising other units on the use of minefields. Preparing demolitions.

c. Assisting in the construction of command posts, observation posts, and obstacles of all types. Assisting in the organization of the ground and the preparation of defensive position.

d. Providing engineer intelligence.

e. Providing technical assistance in camouflage.

f. Engaging in limited ground combat.

g. Improving and maintaining airlanding and air delivery facilities.

h. Conducting reconnaissance.

i. Operating water points.

5–29. Barrier Plan and Obstacles

Because of its lack of tanks and other armor protected vehicles, the airborne division is extremely vulnerable to armor attack. Among other measures, rapid erection of obstacles reduces this vulnerability.

a. Barrier plans are developed concurrently with other tactical plans and are planned and executed by all echelons of command. However, only corps and higher commanders have the authority to employ barriers on an extensive scale. This authority may be delegated to division and comparable commanders. The division engineer prepares terrain and barrier studies for G2, and advises G3 on the means and extent of augmenting natural obstacles. He plans and supervises the technical aspects of barrier employment and prepares poritons of the barrier (and denial) plan under the supervision of the division G3. Division barrier and obstacle planning usually is supplemented by detailed planning of tactical obstacles at brigade level.

b. Construction of obstacles for close-in defense and security is the responsibility of the unit commander. These obstacles may be integrated into the barrier plan of the division or higher command. Normally each unit constructs that part of a barrier system which lies within its area of responsibility.

c. The airborne division engineer battalion furnishes assistance to other division elements in the form of technical advice, supervision, and construction effort. It is responsible for siting and constructing individual obstacles (in addition to those in its own area of responsibility) when one or more of the following conditions exists:

(1) Special skills and equipment are required.

(2) Exposed flanks or rear require protection.

(3) The command as a whole will benefit.

(4) The obstacles must be prepared before the arrival of the troops who are to occupy the area.

(5) The obstacles lie outside the area of responsibility of any particular unit.

d. To ease the logistic burden inherent in airborne operations, maximum use must be made of locally available materials for obstacle construction. Atomic demolition munitions may be used to create obstacles. Minefields, within the logistic capability, are used in likely routes of armored approach. The use of aerially delivered antitank mines reduces the quantity of barrier materials that must be delivered into the airhead. For details on barriers see FM 31–10.

5–30. Defense against Nuclear and Chemical, Biological, and Radiological (CBR) Attack

a. Normal defensive measures are employed with emphasis on individual protective measures and unit radiation exposure control. (For details see FM 21–40 and FM 3–12). Particular stress is placed on the importance of deep foxholes and the provision of overhead cover. The airborne division engineer battalion conducts the following tasks in defensive planning for nuclear or CBR attack:

(1) For the division.

(*a*) Surveys are for suitable shelters and

assists in planning and constructing protective facilities for key installations.

(*b*) Selects alternate water points.

(*c*) Selects and prepares an alternate bridge site or bypass for each bridge required.

(2) For the battalion.

(*a*) Disperses unit personnel, equipment, and supplies consistent with operational practicability.

(*b*) Organizes unit first aid, rescue, and evacuation teams.

(*c*) Prepares a CBR defense SOP based on that of the division.

b. In the event of a nuclear detonation or a CBR attack, the airborne division engineer battalion accomplishes the following:

(1) *For the division.*

(*a*) Decontamination of essential areas or of exit routes required for evacuation to safe areas.

(*b*) Construction and posting of signs for unsafe areas.

(*c*) Firefighting missions.

(*d*) Clearance of debris from essentiol routes and airlanding facilities.

(e) Production of maximum amount of potable water.

(*f*) Such other engineer tasks a sare required.

(2) *For the battalion.*

(*a*) First aid, rescue, and evacuation.

(*b*) Operation of personnel and equipment decontamination stations.

5–31. Defense against Airborne Attack, Guerrilla Action, and Infiltration

The airborne division engineer battalion establishes, within its area of operation, an observation and warning system and local security adequate for defense against enemy airborne, guerrilla, and infiltration tactics. The battalion may be called upon to construct obstacles for the division which would act as a deterrent to the use of such enemy tactics.

Section VII. DENIAL OPERATIONS

5–32. Introduction

A denial operation is designed to prevent or hinder the enemy's use of or benefit from an area, personnel, facilities, or material. It may include destruction, removal, contamination, or erection of obstructions. Denial operations are basically strategic in concept. Staff responsibilities for denial operations plans are the same as for barrier plans. In the division, denial operations are incorporated normally in the barrier plan. All troops participate in denial operations, particularly in the removal or destruction of organic equipment and supplies, procedures for which normally are included in unit SOP. Large scale demolitions, and denial targets that are technical in character, usually are assigned to the divisional engineer battalion.

5–33. Denial by Destruction

All possible methods of destruction are used. The most common are fire, flooding or drenching, mechanical (breaking with a sledge hammer), chemical and radiological contamination, and explosives including ADM and projectiles (small arms, artillery, and bombs). So that destruction may be executed at the desired time, personnel to destroy each item are designated in advance; supplies necessary for the destruction are obtained and stored at convenient locations; the circumstances under which destruction is to take place are definitely prescribed; and, if orders for destruction are to be issued, the means of transmission are provided. According to the Rules of Land Warfare of the Geneva Convention, medical supplies will not be destroyed intentionally but other supplies which cannot be evacuated are destroyed.

5–34. Denial by Removal

Evacuation of material is as much a part of denial operations as destruction. All possible military supplies and equipment are evacuated. Evacuation is started early and conducted in accordance with prepared priority lists. Every available means of transportation is used to capacity.

5–35. Atomic Demolition Munitions

When augmented with ADM teams from the TOE 5–570-series, the airborne division engineer battalion may use atomic demolition munitions in denial operations. With ADM, it is possible to destroy targets which otherwise would be difficult or impossible to destroy. Denial targets suitable for the employment of ADM are airfields, defiles, underground installations, and tunnels. For details on the employment of ADM, see FM 5–26.

Section VIII. RIVER-CROSSING OPERATIONS

5–36. Introduction

a. The airborne division, or elements of the division may, when suitably equipped, conduct river-crossing operations as follows:

(1) During the initial establishment of the airhead.

(2) While conducting link-up with friendly forces.

(3) While conducting aggressive reconnaissance from the objective area.

(4) As a portion of a raid from the objective area.

(5) While expanding the airhead as a means of providing more space for additional airlanded elements.

(6) As a part of normal ground operations subsequent to an airborne operation.

b. River lines and the possible requirement for river crossings during the early stages of an airborne assault must be carefully considered when the objective area and the airhead line are selected during the planning phase. Wide rivers provide excellent natural obstacles as a part of the airhead line, but may require river-crossing operations by the airborne elements in further situations.

5–37. Capabilities

The airborne division engineer battalion has no organic stream-crossing equipment. However, personnel of the battalion have the technical training to construct standard military floating and fixed bridges. Expedient construction may be practical under certain conditions for hasty crossings of short gaps.

5–38. Conduct of River-Crossing Operations

a. Hasty crossings of unfordable streams and small rivers may be accomplished by the airborne engineer battalion provided the bridging is delivered to the constructing unit.

b. Deliberate river-crossings of large streams must be supported by additional troops and equipment. The airborne division engineer companies cross with the airborne brigades to provide support on the far shore. Corps or Army engineer troops furnish the necessary equipment and construction crews to accomplish the bridging mission and all near shore support. The conduct of river-crossing operations is explained in detail in FM 31–60.

Section IX. STABILITY OPERATIONS

5–39. General

Stability operations are those types of internal defense and internal development operations and assistance provided by the Armed Forces to maintain, restore, or establish a climate of order with which responsible government can function effectively and without which progress cannot be achieved. Stability operations include advisory assistance operations, intelligence operations, civil affairs operations, psychological operations, tactical operations, and other operations designed to foster growth and to forestall or resolve internal conflict within a nation.

5–40. The Environment

In stability operations many factors contribute to making the environment different from that of limited or general war. Among these factors are—

a. The guerrilla attempts to select terrain which offers him an advantage by limiting the mobility of conventional forces.

b. Forces usually are dispersed over an extremely wide area and operations are oriented towards control over the population of an area rather than establishment of a front.

c. The adversary generally is elusive, hard to identify, highly trained in the techniques of guerrilla warfare, and well motivated.

d. Gaining and maintaining the active support of the population is decisive in determining the outcome of the conflict. The activities of military units are thus directed toward obtaining the support of the population, and each operation, whether tactical, logistical, or civil-military, must be evaluated for its impact on the population.

5–41. Role of the Engineers

Divisional engineer battalions or elements thereof will support the division or divisional elements engaged in stability operations. Divisional engineers may also support the host country through independent operations. Engineer combat elements maintain their organizational integrity, but may be organized provisionally into task forces, depending upon the particular engineering skills and equipment required. For a general

discussion of engineer units in stability operations, see FM 31–22, FM 31–23, and FM 5–1.

5–42. Engineer Capabilities

Engineer combat elements in a stability role may help a host country counter insurgency by—

a. Providing traditional engineer assistance to indigenous military forces or to U.S. forces committed to stability operations.

b. Providing training assistance and advice to host country engineer forces.

c. Planning, organizing, and supervising construction projects to be carried out by indigenous personnel in accordance with U.S. or host country civilian or military programs.

d. Making engineer surveys to support engineer projects and to provide a basis for increased engineer assistance should the insurgency escalate.

e. Providing assistance in military civic action projects (digging wells, building schools, water irrigation systems, land clearing and reclama-

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people and to encourage their support of the host country forces. Land clearing operations in heavily forested or jungle areas will require support of the specialized engineer land clearing company (TOE 5–87). For operational details, see TM 5–330, TM 5–227, and FM 5–1.

5–43. Special Considerations

When division engineer battalions are committed to stability operations, various problems and considerations not normally associated with conventional engineer operations will arise. Among these are the following:

a. Since units are usually dispersed over extremely wide areas, command supervision, to include training, maintenance, and other unit activities will be much more difficult.

b. Because of the nature of stability operations, the critical need for numerous construction projects, and the nationwide lack of engineering skills, there will be an especially heavy demand for engineer unit skills and knowledge.

c. With all engineer activities and projects generally susceptible to insurgent attack at any time, engineer unit commanders must insure that—

(1) Personnel are fully trained in the use of all unit weapons and are continually alert to possible surprise insurgent attack.

(2) Defense measures are taken around all engineer unit projects and activities.

d. Small unit commanders will be required frequently to make decisions based upon their own judgments, considering the situation at hand, rather than upon specific guidance and directions received from higher headquarters. The imagination and initiative of individual engineer commanders will especially contribute to the effectiveness of the engineer effort in stability operations.

5–44. Community Relations

Division engineer units will be required to undertake the following types of community relations in stability operations:

a. Liaison with local authorities and civilian groups, participation in local civilian activities, and organization of activities with indigenous military units.

b. Participation in programs to reduce friction arising from the presence of U.S. Forces.

c. Orientation of U.S. personnel as to local customs and insuring the proper conduct of troops toward the host country populace.

d. Community relations projects. Designed to improve relationships between the U.S. military and local civilian groups, such projects are very short-term and involve quick reaction to requests and observed needs.

5–45. Civic Action Considerations

Military civic action is the use of armed and paramilitary forces on projects useful to the local population at all levels in such fields as education, training, public works, agriculture, transportation, communications, health, sanitation, and others contributing to economic and social development, which would also serve to improve the standing of the armed and paramilitary forces with the population. These operations include support for the U.S. Agency for International Development (USAID) and other U.S. civilian programs in the host country.

a. Airborne engineer units can best support that portion of the military civic action program which requires assistance and planning in the construction of utilities, structures, and other similar facilities for use and benefit of the civil population. Engineer units are suited by their organization, equipment, and skills to undertake such tasks; however, the local civilian population must participate in the accomplishment of projects in order to gain knowledge and experience in performing similar tasks in the future. Engineer units are best utilized in support of military civic action by providing teams to advise and assist during the progress of work. Airborne engi-

neer units are capable of supporting the many military civic action missions; however, when technical assistance and construction beyond their capabilities are required, engineer construction units must be employed. (See FM 5–162, FM 31–16, FM 31–73, FM 41–5, FM 41–10, and FM 100–20).

b. Typical military civic action projects in which engineer units may participate are—

(1) Construction of medical, educational, governmental, religious, recreational, and community facilities.

(2) Rehabilitation and construction of public utilities such as powerplants and water production facilities.

(3) Development and rehabilitation of transportation facilities to include roads, bridges, airfields, and navigable waterways.

(4) Assistance in the development of natural resources such as timber, building material, fuels, and agriculture.

(5) See FM 31–22 and FM 31–22A for additional tasks that may be performed by engineer combat units.

5–46. Tactical Operations

The doctrine for employment of airborne engineer units in limited and general positional warfare offensive and defensive operations applies with modification to internal defense situations. If the insurgency has escalated to include guerrilla or mobile warfare, internal defense tactical operations will include counterguerrilla and mobile warfare activities. Positional warfare tactics and techniques must be modified to fit the special requirements of the operational environment and the nature of the insurgent threat. When supporting tactical operations against insurgent forces, the airborne division engineer battalion must take advantage of its superior flexibility and mobility.

a. Since airborne engineer units often will be supporting tactical forces in isolated locations, they may be required to assist in the static defense of the village, outpost, camp, or similar installation in which they are quartered. Airborne engineer units may also be designated as reserves and required to provide defense of an installation while the installation's main defense force is aiding a similar installation under attack. Type tasks which airborne engineer troops may perform in support of tactical operations in internal defense are essentially the same as for conventional warfare.

b. The scope of engineer support for tactical operations will be considerably increased, particularly in underdeveloped areas of the world. Engineer units should expect and be prepared to furnish more than the "normal" amount of tactical support and assistance in such fields as water purification, route maintenance, airstrip and helipad construction, bridging, and construction of hasty fortifications. This increased scope of engineer support may require that the units be augmented by teams from the TOE 5–500-series.

c. Since the airborne engineer battalion is well suited to support heliborne operations, it may be used extensively to support other U.S. or host country armed forces heliborne operations on a mission basis.

d. When supporting tactical internal defense operations, the airborne engineer company, platoon, and squad may often operate independently of and/or at long distances from their parent unit; therefore, there will be an increased requirement at the lower echelons for independent decisions, initiative, and technical knowledge.

e. Resupply of engineer units may be extremely difficult; therefore, units in support of tactical operations should be authorized a special stockage of repair parts, tools, and other expendables as accompanying supplies.

f. Additional liaison and supervisory personnel may be required when subordinate units (companies, platoons, and squads) are widely separated to insure competent support of tactical operations. In internal defense operations, the engineer company or platoon may be supporting small U.S. or host country forces in isolated areas, highly susceptible to insurgent attack. In this case, survival of the unit is paramount and all personnel may be organized into combat elements. No rear echelon is organized; those personnel normally included in the rear echelon may be organized into combat elements to provide CP security, defensive fire support (to include indirect fire), or they may form all or part of the installation reserves. Engineer units operating in this manner may be provided additional crew-served weapons such as the M60 LMG, 60-mm mortar, and 81-mm mortar.

5–47. Advisory Assistance

a. The airborne division engineer battalion may be required to provide advisory assistance to include furnishing specialized mobile training teams (MTT), and training counterpart armed or paramilitary forces in branch or branch immate-

rial subjects. These operations may include support for USAID, USIA, and other U.S. civilian programs in the host country.

b. The wide range of skills and experience found in engineer units also provides a source of trained personnel which may be used to advise and train civilian governmental personnel. Engineer units may be required to provide part or full-time engineer advisors to civilian agencies at the province, district, city, or village levels.

5–48. Psychological Operations

Psychological operations (PSYOP) conducted as part of the overall internal defense program encompass those political, military, economic, and ideological actions planned and conducted to create in friendly, neutral or hostile groups the emotions, attitudes, or behavior to support the achievement of national objectives.

a. PSYOP conducted or supported by airborne engineer units must mesh with, and extend host country civilian-military information and PSYOP programs.

b. PSYOP in internal defense operations are of the utmost importance. PSYOP can be particularly useful to engineer units engaged in military civic action projects. A PSYOP campaign should be conducted before, during, and after the completion of a project. Requests for PSYOP assistance should be forwarded to higher headquarters. See FM 33–1 for detailed discussion of PSYOP.

5–49. Intelligence Operations

Intelligence plays a vital role in combatting insurgency. Adequate and timely intelligence is most vital to the overall internal defense operation. U.S. military personnel, particularly engineer personnel, are in an excellent position to collect information, from close and frequent contact with the civilian populace. Conversely, U.S. personnel must be careful of loose talk and poor classified material handling procedures lest classified material become compromised. For detailed discussion, procedures, and role of intelligence in internal defense, see the FM 30-series and FM 31–22 and FM 31–22A.

Section X. OTHER OPERATIONS

5–50. Link-Up

Surface link-up with an airhead generally is made by armored forces. The airborne division engineer battalion must assure adequate routes for passage of the link-up force into or through the airhead. This may involve repair of roads, construction or repair of bridges, and clearance of obstacles. If engineer effort is required beyond the limits of the division area, elements of the battalion may be required to move out of the airhead. Such an operation may require infantry support for security of worksites. Engineers may also be required to assist in flank protection for the armored units while they operate in the division area. This flank protection may include construction of barriers or denial operations. The use of atomic demolition munitions in this type of operation is a probability which must be planned or.

5–51. Amphibious Operations

a. The airborne division is not ideally suited for participation in an amphibious assault in an amphibious role without augmentation.

b. The airborne division may participate in an amphibious operation by conducting an airborne assault on one or more inland objectives for subsequent link-up with surface elements. Engineer considerations are the same as for similar operations already described.

5–52. Desert Operations

Successful operations in the desert will require special individual and unit equipment to augment the airborne division engineer battalion TOE. Additional water purification equipment and an increase in the amount of low ground pressure construction equipment normally will be required. Extensive open areas and long range visibility may make achievement of surprise difficult, thereby reducing the time ba vlaialoefearbmsly thereby reducing the time available for assembly and initial organization. For further details see FM 31–25.

5–53. Arctic Operations

If committed in artic operations, the airborne division engineer battalion will require reinforcement from equipment units and substitution of special vehicles. The requirements for summer and winter are quite different. For example, during winter frozen lakes may provide suitable landing facilities, while in summer construction of such facilities in tundra may require so much engineer effort as to be prohibitive. For further details see FM 31–70, FM 31–71, and FM 31–72.

5–54. Mountain and Jungle Operations

In mountain and jungle operations the airborne division engineer battalion operates as in normal airborne operations. If extensive clearance work

is required for airlanding facilities, the battalion will require reinforcement from equipment units. For further details see FM 31–30 and FM 31–72.

5–55. Riverine Operations

a. Airborne forces can be employed year round in a riverine environment in conjunction with forces moving overland or on water. The terrain may restrict the size of the airborne force employed. The procedures outlined in FM 31–75, (Test) FM 7–20, FM 57–1, and FM 61–100 apply.

b. Engineer airborne units participating in riverine operations may be required to construct and maintain lines of communication, including construction of bridges and ferries; provide potable water; prepare air landing facilities; construct platforms for fire bases and helicopters (app D); and provide other combat engineer support as required.

Section XI. COMBAT OPERATIONS

5–56 Introduction

The airborne division engineer battalion or any element thereof engages in combat operations when—

a. The enemy prevents access to the unit's jobsite.

b. The enemy attempts to drive the engineer unit from a jobsite.

c. The enemy prevents delivery of supplies.

d. Enemy action forces sustained ground combat. This may develop in several ways—

(1) The unit commander is forced into a sustained ground combat role to save the unit.

(2) Enemy action forces the unit to fight so that the next higher command might accomplish its mission.

(3) The major commander must commit the engineer unit because of a desperate situation.

5–57. Sustained Combat

When it is necessary to deliberately commit the engineer battalion or any of its elements to a sustained combat role, unit integrity should be maintained. The battalion accepts such a mission with a minimum of delay.

a. Responsibility. The major force commander is responsible for the decision to commit engineer units to a sustained ground combat role. He commits the engineer unit only after careful consideration of the restrictions imposed by the loss of engineer support.

b. Situations for Committing Engineer Units in a Sustained Ground Combat Role. There are a number of situations where the major force commander may commit an engineer unit to this role. Some of the more typical situations are—

(1) An overextended defensive front.

(2) A sudden enemy penetration or turning movement.

(3) An enemy airdrop or organized guerrilla activity in a rear area.

c. Type of Mission. The type of combat mission assigned an engineer unit should be based on consideration of limitations in weapons and personnel. The battalion and its companies are armed more lightly and have fewer personnel than comparable airborne infantry units; their infantry combat training is less extensive. Engineer units should be furnished additional fire support, heavy weapons and forward observers, and smaller frontages should be assigned to them than to infantry units.

(1) *Attack type mission.* This type of mission usually is limited to situations which require engineer units to engage bypassed enemy elements in order to get to critical jobsites.

(2) *Defense type mission.* The defense type mission is the one most commonly assigned to airborne engineer units. The major combat force commander should allow enough time for the engineer unit to prepare for the defense so that the proper support can be coordinated and the nonessential personnel and items of equipment can be moved to a rear area. When ample warning time is available to the engineer commander, he prepares his unit for combat in the same way as any other combat force commander.

5–58. Reorganization for Combat

A definite plan must be established which will enable the engineer unit to move efficiently from its normal engineer support role to a combat role. This plan, generally an annex to the unit's SOP, should be established by the battalion and each company. FM 5–135 contains a guide and example annex for reorganization for combat. The plan should provide for the following:

a. Designation of the forward and rear echelons of the command.

(1) *The forward echelon.* The forward echelon will consist of enough sections and units to accomplish the mission. Elements should include—

(*a*) Firepower and maneuvering elements —to fix and destroy or eject the enemy.

(*b*) Communications element—to estab-

lish communications between all echelons of the command. Wire should be used when possible.

(*c*) Supply element—to provide the necessary supplies for the mission.

(*d*) Command and control element—to direct the elements in the accomplishment of their mission.

(2) *The rear echelon.* The rear echelon will include all equipment not essential to the sustained ground combat mission. Nonessential vehicles and heavy equipment are moved to a rear area. Responsibility for the control of the rear area is designated in this section of the SOP.

b. Medical Evacuation. Assignment of aid men, establishment and location of aid stations, and channels of evacuation are covered in this section.

c. Coordination. This section establishes a guide for liaison and coordination between other units of the command, including adjacent combat units and fire support units.

PART THREE

ENGINEER BATTALION, AIRMOBILE DIVISION

CHAPTER 6

INTRODUCTION

Section I. THE AIRMOBILE DIVISION

6-1. Mission

The mission of the airmobile division is to provide reconnaissance and security for larger units; to participate in stability low and mid-intensity operations; and to control an area including its population and resources.

6-2. Organization

The airmobile division (fig 6-1) consists of a command, staff, combat support, and combat service support structure and eight maneuver battalions (airmobile infantry). In organizing the division for combat, the division commander groups appropriate elements of the division under its three brigades and other control headquarters in types and numbers appropriate to each control unit's specific mission.

6-3. Capabilities and Limitations of the Airmobile Division

a. The airmobile division can—

(1) Conduct airmobile operations alone or as a part of a larger force.

(2) Conduct operations in the enemy's rear employing vertical envelopment techniques.

(3) Disperse over extended distances and concentrate rapidly from widely separated areas.

(4) Exploit success to include the effects of nuclear, chemical, and conventional fires.

(5) Conduct covering force operations.

(6) Conduct mobile defense operations when augmented by combat, combat support, and combat service support elements.

(7) Operate as a mobile counterattack force.

(8) Conduct surveillance, reconnaissance, and target acquisition over wide areas.

(9) Conduct screening operations over extended frontages.

(10) Operate without ground lines of communications more effectively than other divisions.

(11) Bypass difficult terrain and obstacles with greater ease than other divisions.

(12) Conduct riverine operations.

b. The airmobile division has the following limitations:

(1) Limited ground vehicular mobility.

(2) Sensitivity to adverse weather conditions and aircraft availability.

(3) Requirement for a large continuing amount of logistical support, particularly aircraft maintenance, aircraft fuel, and aircraft lubricants.

(4) Lack of organic medium and heavy artillery fire support.

(5) Limited protection defense against armor.

(6) Limited protection against nuclear, biological, chemical, and conventional fires.

(7) Less defense against air attack than other divisions.

(8) Requirement for more engineer support than other divisions to prepare landing zones and to construct and maintain base airfields.

6-4. Methods of Operation

a. The airmobile division's capability for aerial movement gives it an area of interest and influence greatly exceeding that of conventional divisions. Effective use of this capability implies wide dispersion of units and greatly increased dependence on mission type orders, standing operating procedures, and radio communications.

b. The airmobile division normally establishes a division base of operations to facilitate control and coordination of the elements necessary to support division operations. As a minimum, the

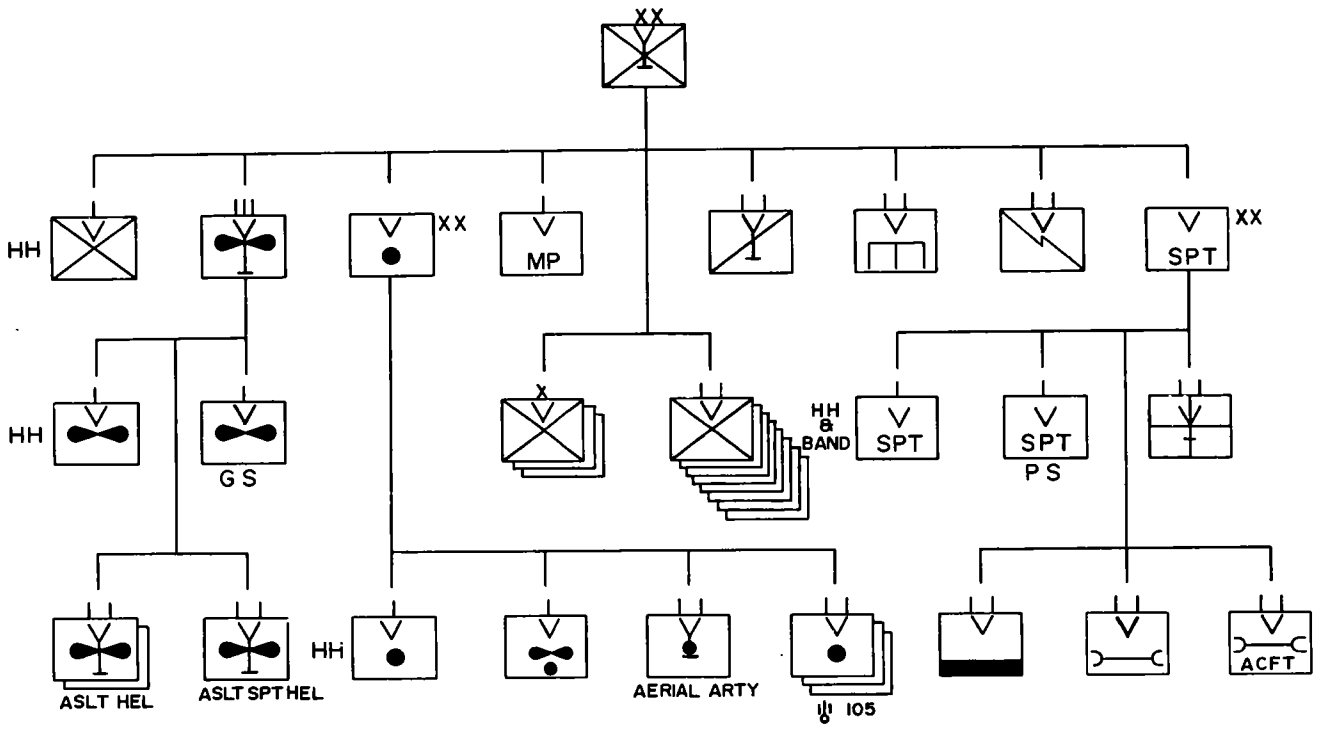


Figure 6–1. Organization chart, airmobile division.

base of operations will contain elements of division artillery, the support command, the aviation group, and an instrumented airfield. Additional facilities and elements that may be located within the area are the division main command post; the division reserve; the division rear echelon; combat support; and combat service support units. Considerations in locating the base of operations include—

(1) Adequate landing and dispersal areas for aircraft.

(2) Adequate internal surface routes.

(3) Defense of the area.

(4) Location of army and corps support elements.

(5) Ability to establish adequate communications for command and control.

c. Brigade bases of operations are established to support and control brigade operations. Facilities included and location considerations are similar to those which pertain to the division base of operations.

Section II. THE ENGINEER BATTALION, AIRMOBILE DIVISION

6–5. Mission

The mission of the engineer battalion, airmobile division, is 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.

6–6. Assignment and Organization

The engineer battalion, airmobile division, also referred to in this manual as the airmobile division engineer battalion, is organic to the airmobile division, TOE 67. The battalion is organized under TOE 5–215 and consists of a headquarters and headquarters company, and three combat engineer companies (fig 6–2).

6–7. Capabilities

a. At TOE Level 1, the engineer battalion, airmobile division 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

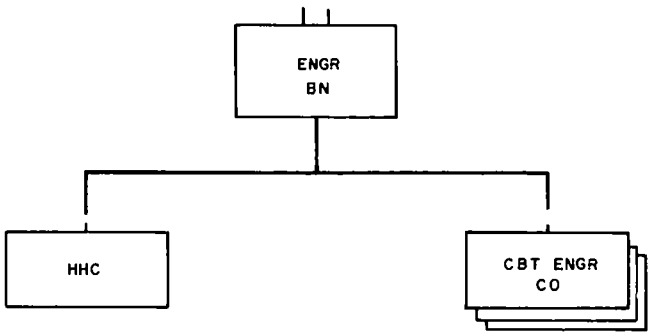


Figure 6–2. Organization chart, engineer battalion, airmobile division.

cargo and all Army aircraft, fords, culverts and cross-gap bridging.

(4) Assistance in the removal and emplacement of obstacles, including mines and booby-traps.

(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) Organizational maintenance on organic equipment.

b. This unit is not adaptable to TOE Level 2 and 3 organization.

c. This unit is not adaptable to a Type B organization.

d. Members of this unit, except the chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

e. This unit has a limited air defense capability. Organic weapons can provide some protection against aircraft as outlined in appendix E.

f. This unit is dependent upon the division administration company for personnel administration.

6–8. Limitations

a. During airmobile operations, the battalion is dependent upon support aircraft to move its equipment, supplies, and personnel. Aircraft support must be continuous until conclusion of the mission.

b. Unless furnished additional fire support by artillery, infantry heavy weapons, or armed aircraft units, its capability for sustained infantry combat is limited.

c. The total potable water production capacity of the battalion is 3000 gallons per hour. By contrast, in the infantry, mechanized infantry and armored division engineer battalions, this capacity is 7,500 gallons per hour.

6–9. Mobility

The battalion is one hundred percent air transportable. Sectionalization of heavy equipment gives the unit the capability of being transported by organic divisional aircraft.

6–10. Methods of Operation

a. One or more combat engineer companies may be placed in direct support of, or attached to, an airmobile infantry brigade for an airmobile assault. Equipment and personnel of headquarters and headquarters company and supporting nondivisional units are employed to reinforce the combat engineer companies as required. These elements may be attached to or placed in support of the combat engineer companies.

b. One of the battalion's primary mission is the construction and maintenance of forward airfields, helicopter staging areas and the construction of landing zones, some of which may take place during the assault phase of an airmobile operation. Additionally, the battalion may be required to provide direct engineer support, consisting of construction or improvement of artillery bases; construction of command, fire direction and communications bunkers; and demolitions (or advice to other personnel engaged in demolitions) of obstacles, enemy base camp areas and cache sites, including bunker and tunnel complexes. The battalion is also responsible for the maintenance of main supply routes (MSR) and lines of communication (LOC) within divisional base camps and coordination with supporting nondivisional engineers in regard to MSR's and LOC's in the divisional areas of responsibilities. Reinforcement may be by any appropriate type of nondivisional engineer unit capable of being air-landed or airdropped, such as the airborne engineer light equipment company (TOE 5–54) and the airborne engineer combat battalion (TOE 5–195).

c. In stability operations, elements of the airmobile division engineer battalion may be assigned to political subdivisions such as regions, provinces, districts, or villages on an area or task basis.

Section III. COMMUNICATIONS FOR THE AIRMOBILE DIVISION ENGINEER BATTALION

6–11. Communications

The airmobile division engineer battalion uses a combination of radio, wire, visual, sound, and messenger communications to provide as many means of transmitting and receiving messages as conditions permit. Its communications procedures are the same as those of other divisional engineer battalions which are described in FM 5–135. Wire communication is used whenever possible, but the widely dispersed operations of the battalion normally preclude extensive use of wire for communication between its elements. Engineer companies enter the signal system of the brigade or task force they support. Figures 6–3 and 6–4 show the airmobile engineer battalion's radio net and figure 6–5 its wire net.

6–12. Communications Section

a. Under the direction of the battalion communications officer, the communications section of headquarters company provides the following services:

(1) Supervises the operation of the battalion communications system.

(2) Installs wire lines to companies and staff sections when location, time and the situation permit.

(3) When required, operates the battalion message center and switchboard, and provides messenger service.

(4) Operates panel displays and message pickup facilities.

(5) Provides a stationary FM radio station at the battalion CP and at a forward CP, when required. Normally acts as NCS for the battalion command net (FM voice); operates the engineer battalion station in the division operations/intelligence net (FM voice); and monitors the division command/operations net (FM voice) operating for the battalion CO, as directed.

(6) Operates a SSB radio station for the engineer battalion in the division administration/logistics net #4 (SSB RATT) and in the division command net #1 (SSB RATT).

(7) The battalion communications officer operates a radio station in the battalion command net (FM voice) and acts as a relay or retransmission station as required to enhance overall battalion radio communication capability.

(8) Performs organizational maintenance on assigned communications equipment and furnishes maintenance support to other elements of the battalion when required.

b. The characteristics of radio equipment organic to the battalion are listed in appendix F.

6–13. Engineer Company Communications

The company commander is responsible for the efficient functioning of his unit's communications system. Company headquarters personnel perform the following communications tasks:

a. Supervise operations of the company communications system.

b. Install wire lines to platoons when time and the situation permit.

c. Operate the company message center and switchboard.

d. Operate a radio station at the company CP. Normally act as the NCS for the company net (FM voice) and operate the company station in the battalion command net (FM voice). As directed, monitor or operate in the appropriate FM net of a supported unit (fig 6–4).

6–14. Aircraft Communications Support

The communications capability of the airmobile division and its subordinate elements is increased greatly by use of organic aircraft as airborne radio relay stations. On occasion, aircraft also can be used for message courier service. Engineer battalion requirements for aircraft communications support should be coordinated through proper channels with the division aviation officer and division signal officer.

Section IV. COMBAT SERVICE SUPPORT FOR THE AIRMOBILE DIVISION ENGINEER BATTALION

6–15. Combat Service Support
Combat service support for the engineer battalion is provided by the division support command. This support is discussed in FM 5–135, FM 29–50, FM 54–2, and briefly below.

6–16. Administration
Personnel administration is provided by the administration company of the division support command.

6–17. Supplies
Supply procedures in the airmobile division engineer battalion are generally the same as those for other division engineer battalions. However, for airmobile operations the following are additional supply considerations:

a. Normally all supplies are transported into the objective area by airlift. As there is seldom enough airlift, great care must be exercised in deciding which supplies and equipment are essential for engineer operation in the objective area. Therefore, the fullest use must be made of supplies and equipment locally available in the objective area.

b. Construction supplies and equipment should be prepackaged, where possible, and delivered directly to jobsites or to landing or drop zones nearest the using engineer units.

6–18. Maintenance
Organizational maintenance on wheeled vehicles and construction equipment is performed by the airmobile division engineer battalion. Direct support maintenance, to include a limited recovery and evacuation capability, is provided by the forward support detachments of the maintenance battalion of the division support command.

6–19. Transportation
The airmobile engineer battalion's means of surface transport is limited. On occasion, it may be supplemented by usable enemy military and civilian motor vehicles found within the division area of operations.

6–20. Medical Service
Battalion medical service is supervised by the battalion surgeon. Aid men from the battalion medical section support the combat engineer companies as needed. In the event the battalion fights as infantry, the medical section of battalion headquarters company should be reinforced to provide one company aid man per platoon and one senior company aid man per company. Evacuation normally is by division air ambulance; hence, the battalion aid station should be placed as close to airlanding facilities as possible. Evacuation is to the division level medical service which is provided by the support command's medical battalion. Brigades are provided division level medical service by supporting medical companies of the division medical battalion, each of which has an evacuation platoon which may have division air ambulances attached. An engineer company supporting a brigade or task force depends upon the supported unit for division level medical service. Patients may occasionally be evacuated from forward combat areas in nonmedical aircraft returning from supply or other unit support missions.

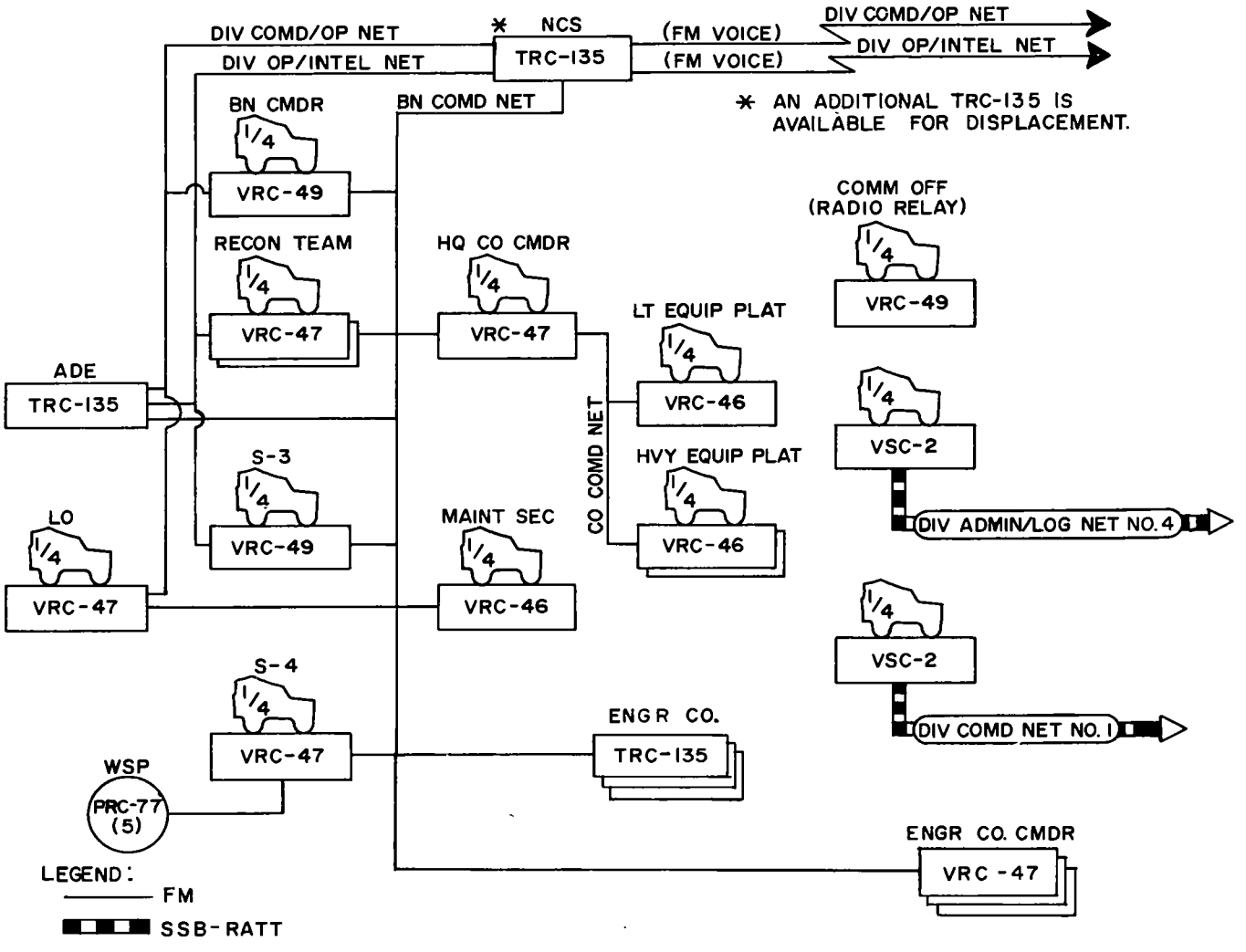


Figure 6-3. Type radio net, engineer battalion, airmobile division.

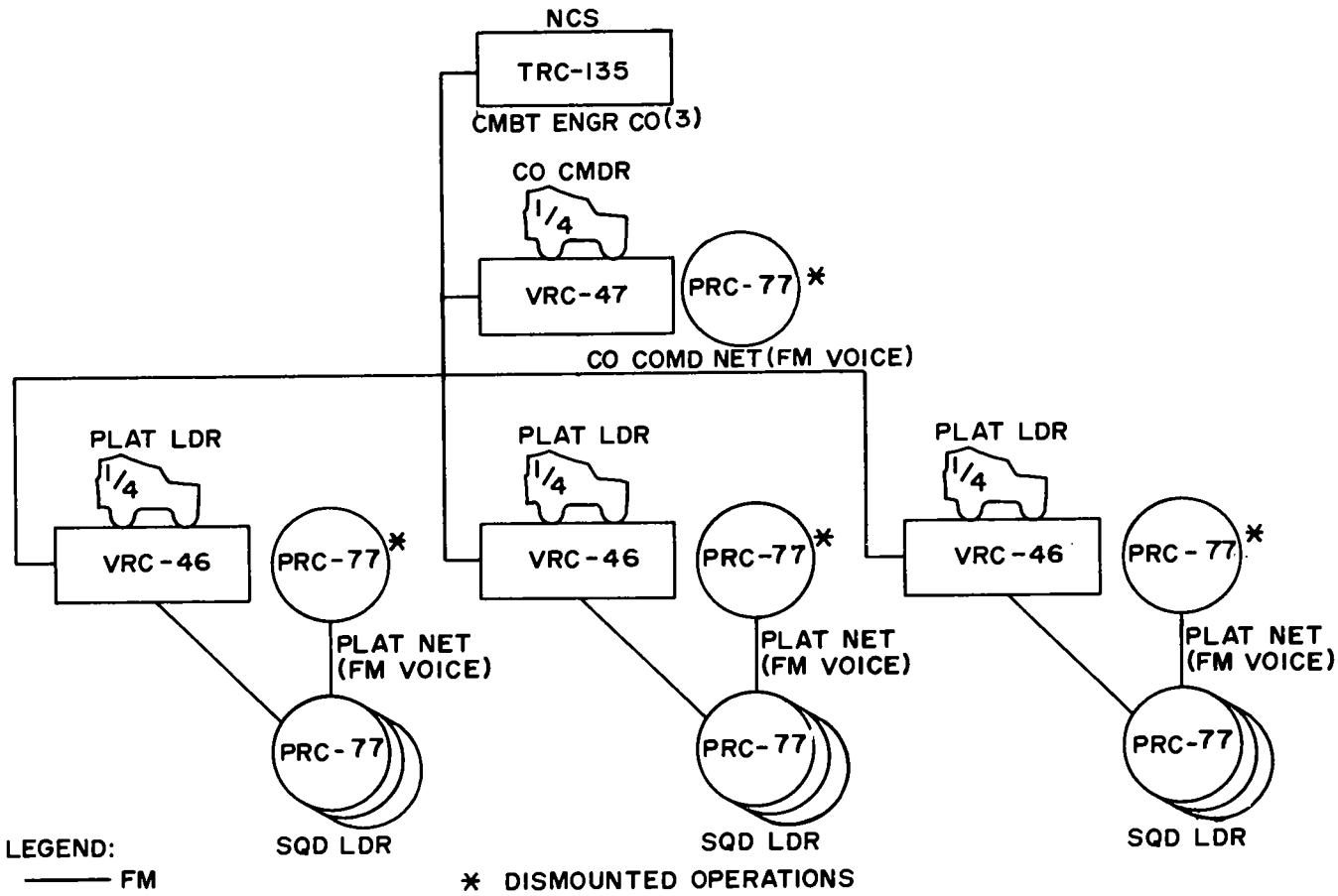
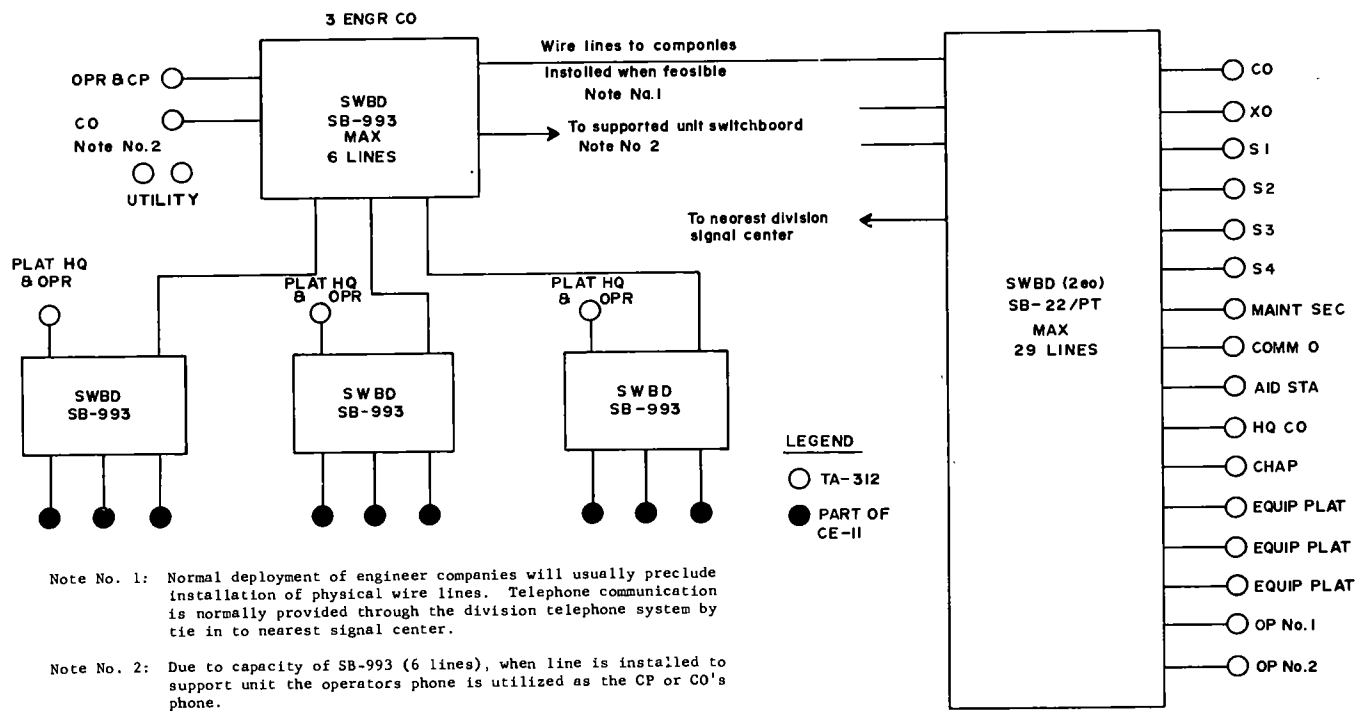


Figure 6-4. Type radio net, combat engineer company, engineer battalion, airmobile division.



Note No. 1: Normal deployment of engineer companies will usually preclude installation of physical wire lines. Telephone communication is normally provided through the division telephone system by tie in to nearest signal center.

Note No. 2: Due to capacity of SB-993 (6 lines), when line is installed to support unit the operators phone is utilized as the CP or CO's phone.

Figure 6-5. Type wire system, engineer battalion, airmobile division.

CHAPTER 7

HEADQUARTERS AND HEADQUARTERS COMPANY, ENGINEER BATTALION, AIRMOBILE DIVISION

Section I. ORGANIZATION AND CAPABILITIES

7–1. Organization

Headquarters and headquarters company of the airmobile division engineer battalion is organized under TOE 5–216 and consists of two elements; a battalion headquarters and a headquarters company (fig 7–1).

a. Battalion Headquarters. The battalion headquarters consists of:

(1) Battalion commander (also division engineer).
(2) Executive officer.
(3) Assistant division engineer.
(4) S1.
(5) S2.
(6) S3.
(7) S4.
(8) Engineer equipment officer.
(9) Surgeon.
(10) Chaplain.
(11) Communications officer.
(12) Sergeant major.

b. Headquarters Company. Headquarters company consists of a company headquarters, a headquarters and headquarters company mess team, three company mess teams, two heavy equipment platoons, one light equipment platoon, and personnel to man the following battalion headquarters sections:

(1) Administration.
(2) Operations.
(3) Intelligence.
(4) Communications.
(5) Division engineer.
(6) Supply.

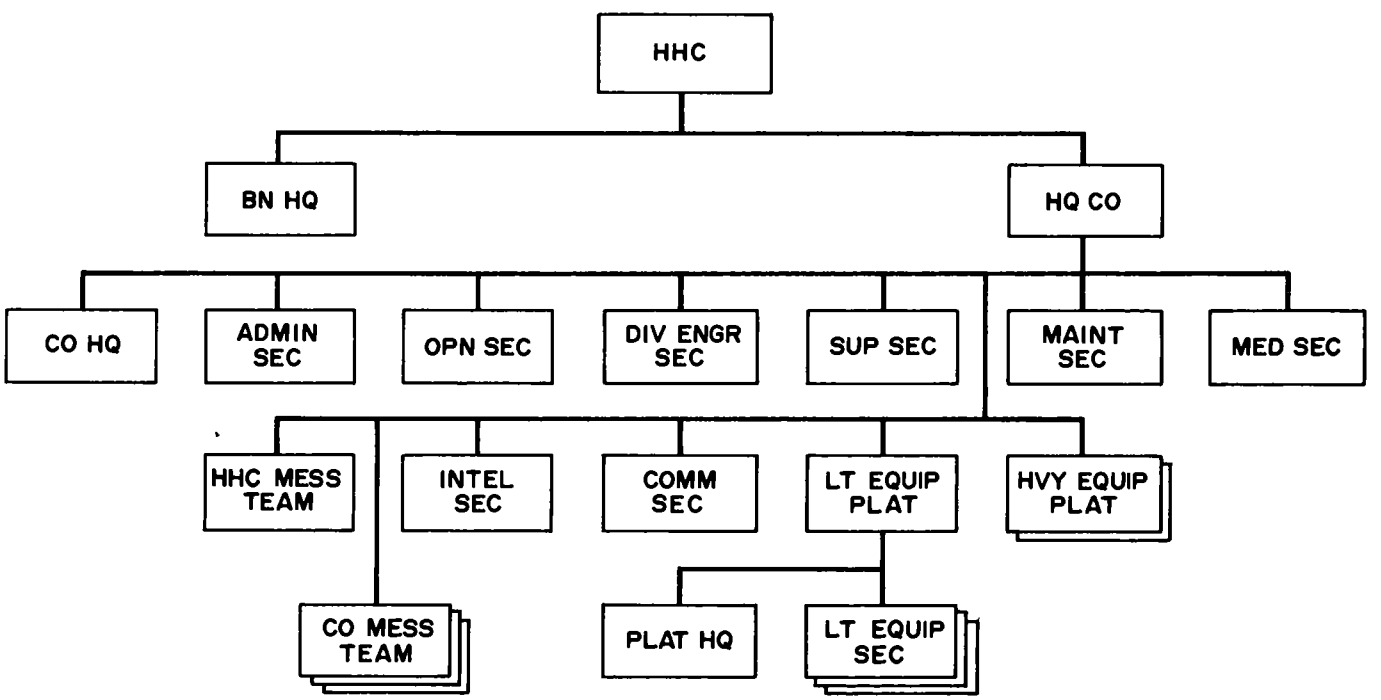


Figure 7–1. Organization chart, headquarters and headquarters company, engineer battalion, airmobile division.

(7) Maintenance.
(8) Medical.

7–2. Capabilities

a. At TOE Level 1, the headquarters and headquarters company has the capability of providing—

(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 intelligence service.

(3) Operation of the battalion communications system.

(4) Five water purification and distribution points for the supply of potable water.

(5) Atomic demolitions munitions (ADM) support, when required, by attachment of TOE 5–570 ADM teams.

(6) Unit level medical service to include medical care and evacuation for the battalion, establishing an aid station, and furnishing aidmen to battalion units.

(7) Engineer equipment support for the combat engineer companies.

(8) Organizational maintenance on organic equipment.

b. This unit is not adaptable to TOE Level 2 and 3 organization.

c. This unit is not adaptable to a Type B organization.

d. Members of this unit, except the chaplain and medical personnel, can engage in effective, coordinated defense of the unit's area or installation.

e. This unit has a limited air defense capability. Organic weapons can provide some protection against aircraft as outlined in appendix E.

f. This unit is dependent upon the division administration company for personnel administration.

7–3. Mobility

a. The company is one hundred percent air transportable and one hundred percent mobile in organic vehicles.

b. By sectionalizing heavy equipment, all items in the battalion can be transported by Army helicopters.

Section II. METHODS OF OPERATION

7–4. Battalion Headquarters

a. The battalion commander has two roles. He is both the commanding officer of the engineer battalion of the airmobile division, and also the division engineer on the division special staff.

b. The duties of the commanding officer and his staff and the functions of the staff sections of the battalion are as discussed in FM 5–1, FM 101–5, AR 611–101, AR 611–112, and AR 611–201.

c. Conforming to the policies and desires of the division commander and the division engineer, the assistant division engineer (ADE) relieves the division engineer of many routine duties at division headquarters. The ADE supervises the functions of the division engineer section which is located within the division headquarters. The division engineer section also furnishes the engineer element to the division tactical operations center (DTOC).

7–5. Headquarters Company

Headquarters company contains virtually all of the construction equipment and combat service support elements of the battalion. Therefore, it becomes involved in all missions and tasks assigned to the battalion. This requires the company commander and his key personnel to maintain close liaison with the staff sections and supported elements. Elements of the company, such as mess teams, water purification teams, medical aidmen, and various groupings of construction equipment and operators, may be attached to or placed in support of any of the battalion's combat engineer companies. Allocation of the company's resources is made by the battalion commander on the recommendation of the battalion staff.

Section III. THE EQUIPMENT PLATOONS

7–6. Organization and Equipment

Two heavy equipment platoons and one light equipment platoon are organized as part of headquarters and headquarters company. The two heavy equipment platoons have no suborganization, being composed of individual pieces of equipment and their operators. Equipment available in these two platoons includes compaction equipment, wheel-mounted cranes, graders, scrapers, scoop loaders, wheeled and full-tracked

tractors, and 2 1/2-ton dump trucks. The light equipment platoon is composed of three subordinate sections and has available electric tool sets, generators, grass cutters, light compaction equipment, helicopter-transportable full-tracked tractors, wheel-mounted backhoe-front loader combinations and one cubic yard dump trucks (see app I).

7–7. Capabilities

Capabilities of the platoons include—

a. Providing engineer construction equipment and operators to the engineer companies.

b. Providing technical assistance and advice to the supported units on the use and capabilities of the equipment.

c. Assisting headquarters and headquarters company in planning and directing employment of platoon equipment.

d. Supervising the movement of platoon equipment to and from jobsites.

e. Providing 2-shift operation with earthmoving equipment in the platoons. This normally will take the form of two 10-hour work shifts and 4 hours of maintenance in each 24-hour period. Transporting equipment by Army helicopter by sectionalizing the heavy equipment. (see app G & I).

7–8. Employment

All construction equipment within the battalion, except for chain saws, tool sets, and 1 cubic yard dump trucks, is concentrated in the equipment platoons. Based on recommendations of the S3 and the engineer equipment officer, the battalion commander allocates platoons, sections, or separate pieces of equipment and operators to subordinate units. Whenever possible such allocation will be made as a complete platoon, section, or element drawn from a single platoon, and will include supervisors drawn from the parent platoon. Elements so allocated normally will be either attached to or placed under the operational control of one of the combat engineer companies for the performance of a specific mission. Upon completion of the mission they revert to control of the headquarters company.

CHAPTER 8

THE COMBAT ENGINEER COMPANY, ENGINEER BATTALION, AIRMOBILE DIVISION

8–1. Mission

The mission of the combat engineer company, engineer battalion, airmobile division is to—

a. Provide combat support for the airmobile division by accomplishing general and special engineer tasks.

b. Undertake and carry out infantry combat missions when required.

8–2. Organization

The combat engineer company is organized under TOE 5–217 and consists of a company headquarters and three identical engineer platoons. Each platoon consists of a platoon headquarters and three identical engineer squads (fig 8–1).

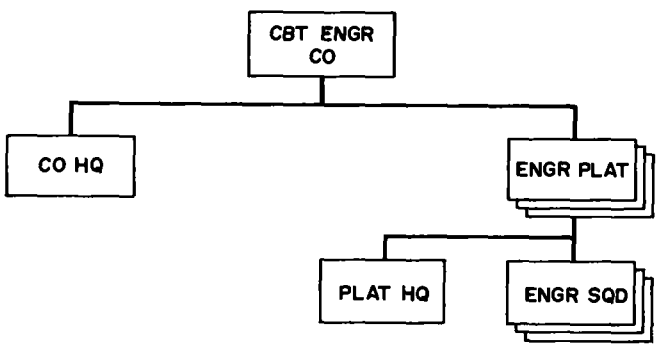


Figure 8–1. Organization chart, combat engineer company, engineer battalion, airmobile division.

8–3. Capabilities

a. At TOE Level 1, the combat engineer company has the following capabilities:

(1) Accomplishing combat engineer tasks, and limited additional engineer support to the extent possible.

(2) Establishing road blocks and barriers by emplacement of obstacles, including mines and booby traps, 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.

(7) Performing organizational maintenance on organic equipment.

b. This unit is not adaptable to TOE Level 2 and 3 organization.

c. This unit is not adaptable to a Type B organization.

d. Members of this unit can engage in effective, coordinated defense of the unit's area or installation.

e. This unit has a limited air defense capability. Organic weapons can provide some protection against aircraft as outlined in appendix E.

8–4. Limitations

The combat engineer company is dependent upon the headquarters company or other engineer units supporting the battalilon for construction equipment support and upon the supported unit for combat service support. It is also dependent upon divisional aviation units for airmobility. Mess support is provided by company mess teams attached from battalion headquarters company.

8–5. Mobility

The combat engineer company is one hundred percent air transportable.

8–6. Methods of Operation

The ccmpany carries out missions such as task force assignments as directed by the battalion commander. If often is reinforced with construction equipment and operators from the equipment platoons of headquarters and headquarters company in order to accomplish certain specific tasks. During the assault landing, the company may be required to construct hasty landing zones in the

objective area to accommodate cargo (transport), utility, and heavy lift helicopters of the airmobile force. Additionally, the company as a unit, or one of its platoons, may be required to construct artillery fire bases and infantry forward operating and resupply bases in support of a task force. When in support, specific missions or task assignments for the combat engineer company are directed by the supported unit or task force commander based upon the tactical plan and the staff planning and recommendations of the engineer company commander acting as the unit engineer. When required, engineer troops are inserted into normally inaccessible areas through the use of rappelling techniques and troop ladders.

8–7. The Engineer Platoon

The platoon usually is employed as part of a company. However, for specific short duration missions, the platoon may be placed in direct support of an airmobile infantry battalion or task force of comparable size. In the latter circumstance, the engineer platoon leader becomes the engineer staff officer for the supported task force and advises the commander on employment of the engineer platoon. To insure the most effective and economical use of the division's engineer effort, such platoons should be returned to engineer company control as soon as possible.

8–8. The Engineer Squad

Because of the limited capability of the engineer squad, it is employed, when possible, as part of its parent platoon. When the squad is supporting a small task force, or when platoon jobsites are widely dispersed, it may be given an independent mission. A typical independent mission would be squad support of an infantry company conducting a raid. In this instance the squad would normally be attached to the supported unit. The squad, however, is most effective when working with the platoon, as close control and support of its efforts are thereby assured.

CHAPTER 9

COMBAT AND COMBAT SUPPORT MISSIONS

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Section I. COMBAT MISSIONS

9–1. General

General information on engineer employment is found in the FM 100- and FM 101-series. These roles are expanded and explained in FM 5–1 and FM 5–135. This chapter discusses the roles and missions of the airmobile divisional engineer battalion as they compare with other divisional engineer battalions.

9–2. Combat Missions

Engineer units participate in all forms of land combat including advance, attack, pursuit, defense, and retrograde operations. The dispersed nature and fluidity of airmobile operations is such that elements of the airmobile engineer battalion probably will engage in small unit infantry type roles more frequently than other types of divisional engineer battalions. The engineer battalion may be required to build airlanding facilities and to fight to protect working parties at the site. It also may have to defend the site against enemy counterattacks.

9–3. Combat Capabilities

Recognizing the increased combat role of the airmobile engineer battalion, each squad is provided with a light machinegun for enhanced firepower. The engineer squad is designed to provide two fire teams, plus a driver for transportation of the squad's equipment.

9–4. Combat Limitations

An engineer unit has less combat effectiveness than an infantry unit of similar size because it has fewer supporting infantry weapons and its infantry combat training is not as extensive. To compensate for these disadvantages an engineer unit is assigned a smaller frontage than an infantry unit of corresponding size. Additional fire support, such as mortars and artillery, must be furnished by the force commander.

9–5. Reorganization for Combat

a. When assigned a combat role or when the engineer mission may require fighting, the normal battalion organization is changed to provide more effective use and control of crew-served weapons, security of equipment not needed for combat, and for the special requirements of command, communications, and supply in combat.

b. The extent of modification for combat varies with the size of the unit, the time available, and the mission. Reorganization normally consists of dividing the unit into a forward echelon, composed of the personnel and equipment to accomplish the combat mission, and a rear echelon that includes all of the equipment and personnel not directly essential to the mission.

Section II. COMBAT SUPPORT MISSIONS

9–6. General

a. The primary mission of the battalion is to provide combat support to the airmobile division. In some circumstances, such as development of a base of operations in stability operations, the battalion may be called upon to perform combat service support missions. Normally, such missions will be of the same general type as the more common combat support missions. They will not be considered separately in this manual.

b. Typical combat support missions for the airmobile division engineer battalion include the following:

(1) Construction and maintenance of forward and battle area airlanding facilities for Air Force medium cargo and all Army aircraft. Construction of landing zones for helicopters.

(2) Construction of obstacles and barrier systems.

(3) Breaching of barriers.
(4) Bridging.
(5) Construction and maintenance of roads.
(6) General construction.
(7) Employment of atomic demolition munitions (ADM) (when augmented by an attached ADM team TOE 5–570).
(8) Water supply.
(9) Technical assistance in camouflage and deception operations.
(10) CBR decontamination assistance.
(11) Technical assistance to other division units.
(12) Construction of artillery forward fire bases, and infantry forward operating and resupply bases.

9–7. Airlanding Facilities

a. The key to the success of airmobile operations may often be the ability of the engineer battalion to rapidly construct or improve airlanding sites for both rotary and fixed winged aircraft. Planning for a forward airfield will provide for early entry of a security force and a pathfinder element for air traffic control. When required, an engineer unit will be introduced along with the above elements to make improvements to the landing area.

b. In tactical operations, initial airlanding facilities will be of a minimal type which can be constructed in a short period of time. Usually, this is accomplished by engineers who land in the area in assault helicopters together with necessary equipment support. Initial construction activities usually are limited to clearing trees and other obstacles affecting landing approach, leveling, clearing of ground obstacles and debris, and improving the bearing surface. Dust control may be a major problem. Under certain climatic conditions dust palliatives, metal landing mats, or membrance surfacing materials will be required.

c. The large number of aircraft organic to or supporting the airmobile division require great quantities of aviation fuel, oil, and lubricants. Storage areas must be at or near the landing sites. Each refueling area for aircraft will also provide resupply of Class V items, as well as maintenance of aircraft, radios, and armament. Engineer effort will be required at these points for site clearing and leveling. Construction performed is the minimum necessary to accomplish the mission.

d. For further details on the construction of airlanding facilities and use of dust palliatives, see TM 5–330, DA Pam 525–5, and appendix B.

9–8. Barriers and Obstacles

a. Like the airborne force, the airmobile force is most vulnerable to attack by enemy armor. Initially, one of the primary defenses against enemy armor is tactical air support provided by U.S. Air Force, Navy, or Marine air units. Additionally, armed Army helicopters, with mounted antitank weapons, are used to maximum advantage. However, at night and during periods of limited visibility both tactical air and armed helicopter support may not be available. Strong points along the combat outpost (COP) strengthen their defense through the use of natural obstacles such as rivers, swamps, woods, built-up areas, hills, gullies, ditches, and other terrain features, augmented by minefields, wire entanglements, tank traps, demolitions, and persistent-effect chemical agents. Antitank weapons, when available, are located in depth along avenues of approach favorable to enemy armor.

b. During the assault phase of an airmobile operation engineer units seal off avenues of enemy approach on flanks with road blocks and mines. During the defensive phase, the barrier plan may be implemented. Barriers are employed primarily to delay, disrupt, or canalize the enemy's forward movement and to increase his vulnerability to defensive fires and counter-offensive action. Engineers advise troop commanders on the manufacture and erection of artificial obstacles and minefields to augment natural terrain features. Where possible, local resources and material are used in the construction of artificial obstacles. The use of aerially delivered antitank mines reduces the quantity of barrier materials that must be delivered into the objective area. For details on aerially delivered mines, see FM 20–32A. In some situations additional engineer support by nondivisional engineers may be required to aid the force in organizing the ground against hostile armor forces. For details on barriers, see FM 31–10.

9–9. Destruction, Breaching, and Passage of Obstacles

a. Airmobile operations are characterized by great speed and surprise. They are usually relatively independent of terrain influences such as obstacles that restrict surface operations. The engineer role of obstacle removal in combat should decrease in airmobile operations.

b. Before any operation begins, an engineer

study of the terrain, bridges, routes of communication, and obstacles should be made. The most profitable source of information is ground reconnaissance, but many airmobile operational areas will be beyond reach of ground patrols; therefore, considerable reliance must be placed on aerial reconnaissance and photographs.

c. The engineer unit commander should advise the force commander on how best to overcome any obstacles encountered. The engineer effort available to the force should be directed toward rapid construction and maintenance of selected routes into and through existing gaps and defiles. If bypassing is not possible, the obstacle must be breached or bridged.

9–10. Bridging

a. Although the airmobile divisional engineer battalion has no organic bridging capability, personnel of the battalion are trained in the assembly of both fixed and floating bridges. When supplemented by engineer bridge companies from either corps or army, the battalion is capable of erecting bridging required by the division's mission. The battalion is capable of designing and constructing timber trestle bridges from native materials with no additional support.

b. The airmobile division normally will fly over river lines and other obstacles requiring bridges. This will decrease the requirement for bridge construction in this type unit.

c. The airmobile division is especially suited to stability operations. Engineer bridging functions in stability operations generally are characterized by pioneer type tasks accomplished with native materials and limited equipment. To fulfill his role in this type of an operation the engineer must be thoroughly familiar with all types of stream-crossing expedients, such as bamboo rafts, suspended walkways used in mountains, hand-operated ferries, and suspension bridges.

9–11. Construction and Maintenance of Roads

Construction and maintenance of roads in airmobile operations normally will be limited to those required within the division and brigade bases of operation. New roads usually will be limited to types requiring minimum construction effort. In some areas, dust control may be a major problem; the use of dust palliatives should be considered in all road construction. The divisional engineer battalion should be relieved of its airfield and route maintenance responsibilities by corps or army troops as soon as possible so that it may concentrate on assistance to the combat elements of the division.

9–12. General Construction

The engineer battalion will be required to accomplish various general construction tasks in support of the division. Accomplishment will depend largely on the equipment, personnel, and time available. Examples are—

a. Clearing of dispersed areas for POL, ammunition, rations, and other supply points.

b. Excavating or clearing for shelter sites and emplacements.

c. Constructing command communications bunkers.

d. Prefabricating and assembling pallets for storage, transportation, and flooring.

e. Constructing airfield control towers and other needed structures.

f. Extracting, processing, and stockpiling available native resources.

9–13. Atomic Demolition Munitions (ADM)

a. The airmobile divisional engineer battalion does not have an organic ADM section for the employment of atomic demolition munitions. It relies on nondivisional sources to provide the necessary ADM teams (TOE 5–570) as the situation requires. The battalion does normal ADM planning and supervises the execution of ADM emplaced by the attached or supporting teams.

b. When their use is authorized, ADM may be employed to great advantage in cratering, tree blowdown, creating landslides and other obstacles to ground movement during offensive and defensive operations. Such use can also aid in reducing time, manpower, and logistic support necessary to accomplish barrier and denial missions. (See FM 5–26 for doctrine and employment procedures relative to ADM).

9–14. Water Supply

a. The airmobile engineer battalion is authorized five water purification sets. It is normal to have four sets in operation and one in reserve. In an airmobile operation, because of the widely scattered area in which the division will operate and the small capacity of the equipment authorized, all five sets may be committed. Support may be required from corps and army engineer

units. On departure for an operation, troops should carry with them full canteens and unit water containers. It may be many hours before water purification equipment can be airlifted to the operational area. Normally, one water point will be established in the division base of operations area under control of the engineer battalion S4 and one in each brigade base area attached to the supporting forward service supply element. Within such base areas, units draw water from the nearest water point using their own ground transportation. Water distribution to units positioned away from such base areas is the responsibility of the supply and service battalion and is accomplished in conjunction with the delivery of rations. Due to the logistics burden of transporting large quantities of water by air over long distances, troops in airmobile operations must be constantly aware of the need for conservation of water and should use potable water only for drinking and cooking. Appendix C contains mimimum potability standards for field water supply.

b. As soon as brigade and division operating bases are established, water is supplied by nondivisional engineer sources and the water points of the airmobile engineer battalion are deployed to forward battalion fire bases and landing zones.

9–15. Camouflage and Deception

In fast moving situations typical of airmobile operations, it is doubtful if time will allow extensive artificial camouflage and deception operatons, but as much effort as possible must be made to conceal the individual soldier, unit locations, and dispositions. See FM 5–20 for information on camouflage principles and techniques. At division level the G2 is responsible for the intelligence aspects, and the G3 for supervising the preparation of plans for camouflage and deception operations. The engineer plans and supervises engineer operations pertaining to significant construction tasks in support of camouflage and deception activities and furnishes technical advice on minor construction aspects pertaining to either activity.

9–16. CBR Decontamination Assistance

The engineer battalion may be directed to furnish equipment support to other division units in CBR decontamination operations. When so directed the battalion employs available personnel and equipment to decontaminate specified areas, critical materiel or installations using methods outlined in TM 3–220.

9–17. Technical Assistance to other Division Units

Military engineering, in its broadest sense, includes some pioneering tasks which can be accomplished by the troops of all arms and services. In airmobile operations, the engineer battalion will be required to operate in many widely dispersed locations, frequently taxing its capabilities to the utmost. All units of the division will be required to perform some pioneering tasks which may include site clearing, removal of obstacles, placing obstacles along avenues of approach, or constructing expedient roads and bridges. For example, the engineer battalion is authorized gasoline-driven chain saws and three electric pioneer sets. In an operation where rapid site clearance is essential, engineer soldiers may operate the chain saws while other troops carry away the timber. Training of all units of the airmobile division should stress pioneer construction tasks.

CHAPTER 10

ENGINEER BATTALION OPERATIONS

Section I. BASIC CONSIDERATIONS

10–1. Employment

a. The engineer battalion of the airmobile division is employed in furtherance of the ground combat effort. The increased mobility of airmobile units and their relative freedom from the restrictions imposed by terrain, as compared to other types of divisions, gives the division engineer more freedom in the construction of obstacles and destruction of bridges to impede the progress of enemy ground operations. The same considerations greatly reduce the necessity for removing obstacles emplaced by the enemy and repairing roads and bridges damaged by enemy action. At the same time, it greatly increases the necessity for rapid repair and construction of all types of airlanding facilities.

b. Engineer support is provided under centralized battalion control when operations permit. Its companies are placed in support of, or attached to, brigades and task forces of the division when employed in coordination with other combat and combat support elements in offensive and defensive operations.

c. The headquarters company contains engineer construction equipment and operators to supplement the combat engineer companies in specific tasks. It also contains mess teams which usually are attached to the companies when required.

d. Engineer companies should be placed in support of the same brigades whenever possible to increase operational efficiency. "Normal association" should be established for all possible situations. The company commander acts as the brigade engineer. In this capacity, he provides engineer staff planning and supervises execution of the engineer mission.

e. Attached or supporting engineers should be kept under brigade control when possible. Platoons are placed in support of infantry battalions or task forces only for specific missions. When an engineer platoon is attached to an infantry battalion, the platoon leader acts as the engineer advisor to the infantry battalion commander.

f. Attachment of engineer teams of less than platoon size is sometimes necessary for accomplishment of specific tasks requiring close combat control. In the offensive, this may consist of assault breaching or demolition tasks. In defense or retrograde operations, the execution of barrier demolitions may require mission type attachment. Units of less than platoon size should be returned to the control of the parent unit as soon as practicable after the accomplishment or cancellation of the assigned mission.

g. Airmobile engineer troops engage in limited combat incident to accomplishment of their normal missions. When the situation requires the deliberate commitment of the engineer battalion as infantry, it will be done with division command authority. When so committed, the engineer battalion should receive all available fire support from division artillery and any infantry battalions in the immediate area. Engineers should be committed to infantry-type combat only as a unit.

h. When the requirement for engineer support within the division exceeds the capability of the division engineer battalion, additional engineer support must be provided by the next higher echelon of command.

(1) The additional engineer support to the division may take the form of reinforcing the combat engineer strength, the provision of bridging, or the attachment of personnel to perform specialized missions. Usually, however, this support will consist of construction units and equipment for airstrips in the division's operational area. Such support may be critical when there are requirements for landing fields for USAF cargo aircraft.

(2) Nondivisional engineer units normally are placed in support of the division. They may be attached when their missions require close command control in execution. All engineer com-

bat support provided for the division is coordinated by the division engineer.

10–2. Standing Operating Procedures

An SOP is prepared for the battalion and all operating elements (FM 101–5). Details of air movements and loading are included in unit SOP.

10–3. Security

Like all other commanders, the engineer commander is responsible for the security of his unit. Security includes all measures taken to protect a unit against enemy interference, surprise, and observation. The security measures taken by a commander should be appropriate to the threat. Engineer work parties are sometimes protected by infantry elements in order to release more engineer troops for work requiring engineer skills. Detailed procedures for the conduct of local security are contained in FM 7–20 and FM 21–75.

Section II. EMPLOYMENT IN AIRMOBILE OPERATIONS

10–4. Introduction

a. Airmobile operations are planned to achieve tactical surprise and are completed in the shortest possible time. The airmobile division engineer battalion has been tailored for this type of operation by giving it the capability of entering a combat area by airlanded means and of performing the tasks required in the assault role.

b. Based on the scheme of maneuver as announced by the division commander, the division engineer recommends disposition of available engineer troops for all phases of the airmobile operation. He recommends appropriate changes in disposition as the situation develops and the need arises.

c. Combat elements of a force which is to participate in an airmobile operation normally are organized into echelons. The division engineer should study the tactical plan and recommend the engineer troops required to support the particular mission. Consideration will be given to those items of construction equipment needed to support each echelon. These echelons consist of—

(1) *Assault echelon.* This element consists of those forces and their equipment that are landed in the objective area to engage in ground combat. Depending on its size and the number and type of aircraft available, it may require one or more lifts.

(2) *Resupply or followup echelon.* This element consists of combat support and combat service support to sustain the assault echelon until extraction, withdrawal or linkup occurs.

(3) *Rear echelon.* This element consists of the remainder of the force not immediately needed in the objective area such as administrative personnel and equipment and items that cannot be immediately transported in available aircraft.

10–5. Intelligence

a. The current intelligence situation and intelligence estimates are essential to planning. The battalion S2 develops the battalion intelligence plan, initiates and supervises battalion reconnaissance activities, and requests intelligence data from other agencies. Certain requirements such as terrain intelligence must be given emphasis. Terrain intelligence must cover a large area. The battalion S2 plans and prepares terrain studies and site analyses to support division operations. Support may be obtained from an engineer detachment (terrain) and/or engineer intelligence staffs at army or theater level. An engineer detachment (terrain) occasionally is assigned to corps, and may be attached to an airmobile division to prepare terrain intelligence for any anticipated operation.

b. The studies and analyses prepared for airmobile operations are similar to those prepared for airborne operations in paragraph 5–14. However, in the case of terrain analysis, emphasis is placed on potential landing zones and assembly areas in the objective area; avenues of approach from landing sites to the objective; obstacles to airlanding and tactical movement; and avenues of approach available for enemy reinforcements or counterattack in the objective area. Terrain information regarding specific landing zones is required by the aviation unit commander, particularly regarding slope, vegetation, and obstacles.

c. The location and selection of adequate and useable landing zones and airlanding facilities may have a vital effect on the tactical plan. The commander of the supported unit is responsible for final selection of airlanding facilities, but he will be assisted and advised on a technical basis by the supporting aviation unit commander and the division engineer. The division engineer will

consider carefully the information furnished by engineer reconnaissance, as well as information from pathfinder teams.

10–6. Dissemination of Intelligence Information

Intelligence information should be disseminated to the lowest level and, when feasible, key personnel who take part in the airmobile operation should be given an opportunity to study photographs and maps of the objective area and surrounding terrain. When engineer units are supporting tactical elements, the engineer unit commander should advise the tactical commander and his staff of all available terrain information and point out conditions which will have an effect on the planned operation.

10–7. Reconnaissance

Reconnaissance is a mission undertaken to obtain, through observation, information about the activities and resources of an enemy or potential enemy, and data concerning the physical characteristics of a particular area. The battalion S2 has two reconnaissance teams, each consisting of an officer and an NCO, to assist him in performing battalion reconnaissance. Usually, it is not possible to conduct a detailed ground reconnaissance of the objective area. Frequently the commander must relay on aircraft for visual and photo reconnaissance of the objective area. Low oblique photos are particularly helpful. Visual reconnaissance and photo reconnaissance are conducted both before the operation and during the air movement.

10–8. Planning

Planning for an airmobile operation must be simple and flexible. All leaders must be prepared to overcome unforeseen difficulties and exploit opportunities that may airse during the conduct of the operation. To obtain flexibility the planner—

a. Develops simple landing and assembly SOP.

b. Maintains tactical integrity of the unit whenever possible.

c. Makes allowance for operational delays in takeoff and landings.

d. Insures that the success of the operation does not depend on the arrival of any one aircraft.

10–9. Planning Sequence

a. Planning for engineer support of airmobile operations is keyed to the overall tactical plan and scheme of maneuver. Engineer planning develops along the following lines:

(1) The engineer planner first determines how the engineer battalion can best support the ground tactical plan and determines what men and equipment will be required.

(2) He next develops a landing plan to include the timing and phasing of troops and equipment based on the ground tactical plan.

(3) An air movement plan is then developed based on the landing plan and, finally, a loading or marshalling plan based on the air movement plan.

These plans are all closely related and are usually developed concurrently.

b. Besides developing an engineer plan of operation, the division engineer and his staff are responsible for preparing the following annexes to the division operations order.

(1) Engineer annex. Refer to FM 5–135 and FM 101–5.

(2) Atomic Demolition Munitions Plan (as an appendix to the division fire support plan, barrier plan, or as a separate plan) (FM 5–26).

c. In addition to the above, the division engineer prepares portions of the barrier (and denial) plan under the supervision of the G3 (FM 31–10).

10–10. Air Force Support for Airmobile Operations

a. The primary source of aviation support within the airmobile division is the organic aviation group. Additionally, nondivisonal Army aviation units assigned to the field army are normally attached to corps for tactical operations. They may be further attached to, or placed in support of, subordinate corps units for specific missions. Normally, they are not attached below division level, except for airmobile operations under brigade control.

b. Plans for employing units using Army airlift can encompass operations up to and including the tactical airlift of battalions. However, the airmobile division normally receives nonorganic airlift support when deployed in its entirety. The nonorganic support available varies greatly from the organic aviation group of the airmobile division and is normally heavy in U.S. Air Force cargo aircraft such as the C–7A, C–123 and C–130. These aircraft move supplies and heavy equipment after the assault units have established a base in the objective area. Troops to

reinforce those already in the objective area are also carried in these aircraft.

c. If plans indicate that cargo and troop carrier aircraft of the U.S. Air Force are to be used for reinforcing units in the objective area, engineer plans must contain provisions for the construction of air landing facilities to accomodate the USAF aircraft. Normally, requirements such as these exceed the capability of the engineer battalion organic to the airmobile divisions. In this case, additional engineer support is provided by the next higher echelon of command. Dependent on the mission, the support provided may range from an airborne engineer group (TOE 5–52) composed of several airborne combat engineer battalions (TOE 5–195) to a simple airborne engineer light equipment company (TOE 5–54). For details on the construction of airlanding facilities, see appendix B and TM 5–330.

Section III. MOVEMENT TO CONTACT AND OFFENSIVE OPERATIONS

10–11. Movement to Contact

a. Once the initial planning phase is completed and the loading and landing plans implemented, the division is prepared to move to contact the enemy. The airmobile force is particularly suited for operation as a covering force of a larger unit during a movement to contact. It reconnoiters from the air on a wide front in advance of the main body. Pathfinder detachments, often assisted by engineer teams, assist in the location as well as the advance preparation of airlanding sites in the objective area.

b. Patrols are airlanded by helicopter to perform ground reconnaissance. When the terrain and the situation permit, visual contact between adjacent patrols is maintained.

c. Units are airlanded by helicopter to perform reconnaissance or to seize terrain. When the terrain and situation permit, visual contact is maintained between adjacent units. During foot movement, flank security forces move by bounds along open flanks and surveillance is maintained to the flanks.

d. Fire support units are displaced forward by air. Supply and evacuation are conducted by air. In this phase of the operation, engineer elements may be widely dispersed, operating with many small groups over a wide area. Communication and control will be difficult. Often a squad leader will be the senior engineer present with a small force. It is imperative that he know the mission of the unit he is supporting as well as the battalion's overall mission.

e. The employment of engineer troops in the movement to contract will differ for each operation. In those operations where it is visualized that the division advance by alternate or successive bounds across a wide front, the engineers that accompany the combat elements must be prepared to fight as infantry, prepare expedient airlanding facilities, clear sites for artillery weapons, remove obstacles, and perform other pioneer engineer tasks.

f. The engineer and his tools should never be separated. When helicopters cannot touchdown in potential landing zones, engineers are prepared to rappel from hovering helicopters into the work site. All necessary tools and demolitions are lowered on lines to the troops after they reach the ground. Since engineer troops in the movement to contact must move rapidly, tools and equipment must be ready at all times for loading into the helicopters.

10–12. Preparation

When orders have been issued to the engineer battalion, the companies that will support the committed brigades usually join those brigades in specified out-loading areas and prepare for operations with the supported unit. The remainder of the battalion remains with the other elements of the division and prepares personnel and equipment for movement to the division base.

10–13. Assault Phase

a. The assault phase of an airmobile operation begins with the landing of the lead elements and continues through the seizure of the objective.

b. The fact that the airlanded force usually lands where there are few fixed defenses and few well organized enemy combat troops facilitates rapid seizure of initial objectives. The enemy is expected to react rapidly. Initial counterattacks are likely to be hasty, uncoordinated thrusts by any of his available units.

c. An airmobile force may attack by infiltration. This method is used in isolated areas where no adequate landing sites exist at or near objectives. Rappeling from hovering helicopters may be required when helicopters cannot land in the

operational area. Forces are landed in several areas and move cross country to assembly or attack positions to launch a coordinated attack.

d. Engineer elements with the assault forces should be prepared for combat upon arrival in the landing zone. As soon as possible after arrival at the landing zone, engineer units reorganize in a specified assembly area and establish an assault command post with appropriate communications.

e. Upon assembly in the landing zone, those engineer units with preassigned tasks normally move to their worksites. Work is begun on the preparation of airlanding sites which must be built, improved, or expanded to enable other elements of the division to land. Close coordination with assault infantry elements is maintained at all times.

f. The original plan must provide for delivery of engineer supplies and equipment on the landing zone nearest the worksite. Upon delivery, the supplies and equipment are collected by the engineer troops and either moved to worksites or centrally located for ready access by the using unit.

10–14. Engineer Duties in the Attack

Typical engineer duties in the attack include—

a. Assisting the forward movement of the infantry and supporting arms by repairing roads, constructing expedient bridges, removing obstacles, assisting in locating, marking and removing of mines, constructing airlanding facilities for divisional aircraft, improving airlanding facilities for assault type cargo aircraft and constructing artillery forward fire bases (see app D).

b. Providing potable water.

c. Performing general engineer support missions such as camouflage, reconnaissance, barrier planning, and demolitions.

10–15. Pioneer Work by other Arms

There are seldom enough engineer troops to do all the pioneer work necessary for the advance of the infantry and supporting arms. Assisted by technicans from the supporting engineer companies, infantry units and supporting elements must help themselves by completing as many pioneer tasks as possible. All combat and combat support troops are trained in the installation and removal of mines.

10–16. Development of the Objective Area

After the force has landed in the objective area, offensive operations follow the principles laid down in FM 61–100, FM 57–35 and FM 100–5. Although capable of conducting operations in the same environments as other divisions, the airmobile division is best suited for those type operations that make maximum use of its ability to overfly obstacles and for those which require rapid mobility, such as—

a. Reconnaissance in force.

b. Envelopment and turning movement.

c. Infiltration.

d. Exploitation and pursuit.

e. Raids.

10–17. Reorganization

When units land directly on, or immediately adjacent to, the initial objective, they reorganize concurrently with or soon after the seizure of the initial objective. When assembly areas are required, they are located within, or adjacent to, landing zones but clear of active landing sites. Reorganization is complete when assault elements of all units are assembled and communication is established.

10–18. Link-Up

a. When withdrawal of an airmobile division from an objective area is not planned or feasible, a link-up operation by a surface force is accomplished. Link-up is planned to insure that the airmobile force is not subject to defeat in detail. In his planning, the engineer must know what type of withdrawal from the objective area is planned. When a link-up with a surface force is planned, the engineer may want heavier equipment delivered to the objective area and to concentrate his effort on roads and bridges along the main avenues of approach of the linkup force.

b. An airmobile force itself is not suited for employment as the surface link-up force. Armored, infantry, and mechanized forces are best suited in this role.

10–19. Liaison

a. Liaison between supporting and supported units is established immediately upon receipt of the operation plan or order, and must be maintained during the attack to assure cooperation and coordination between all units participating in the operation.

b. The assistant division engineer is the chief liaison officer between the airmobile engineer bat-

talion and division headquarters. Similarly, liaison functions between the supporting companies and the brigades are performed by the company commander or his designated agent.

10-20. Summary

The role of the engineer battalion in the attack will differ for each operation. Weather, terrain, area of operation, and enemy situation are among the influencing factors. In all probability, airmobile engineer troops will engage in combat more frequently than engineers of infantry or armored divisions. Lack of tanks and ground mobility means will require that greater reliance be placed on roadblocks, minefields, and similar artificial obstacles. The widely scattered areas of operation will put a serious strain on the limited engineer strength in the division. Support from corps and army engineer strength in the division. Support from corps and army engineer battalions often will be required early in an operation to help develop airlanding facilities. Getting engineer equipment and supplies to the worksite will require close coordination and control. Great reliance will be placed upon the initiative of subordinate commanders and unit leaders.

Section IV. THE DEFENSE

10-21. General

a. The organization and defense of a sector of the FEBA is not considered a normal mission for the airmobile division. In the event an airmobile division received this mission, the division would employ a mobile defense posture. The mobile defense is that form of defense in which minimum forces are deployed forward and priority is given to use of mobile combat elements and fires concentrated in the reserve. Primary reliance is placed upon the use of offensive action by the reserve to destroy enemy forces. The airmobile division may also be used as the mobile reserve in a defense conducted by a larger force.

b. Many offensive airmobile operations will include a defensive phase in that, upon landing, the airmobile force must be prepared to counter any enemy reaction. If the airmobile operation involves the retention of the objective area, the unit will enter a defensive phase which may last from a few hours to a few days, depending on the mission assigned, the size and composition of the force, enemy reaction, and type of operation contemplated.

10-22. Engineer Support in the Defense

a. The primary combat support missions of the airmobile division engineers in the defense, whether it be a mobile defense or upon landing in the objective area, are to increase the defensive capabilities of combat troops by assisting in the organization of the area to be defended. Engineers may prepare alternate positions; maintain and improve existing roads and bypasses; prepare and maintain airlanding facilities for Air Force medium cargo and Army aircraft; prepare demolitions, lay minefields, blow bridges, and assist in the implementation of the barrier plan.

b. When authorized, ADM may be used to deny specific areas and strengthen the defensive position.

10-23. Barrier Plan

a. The division engineer assists in the formulation of the overall barrier plan and its implementation. Barrier planning, as an integral part of the defensive plan, contributes materially toward gaining time and economizing friendly forces. Barriers delay, limit, disrupt, or canalize enemy forward movement; increase his vulnerability to defensive fires and counteroffensive action; and assist in flank and rear area security.

b. The procedures set forth in paragraph 5-29, as concerns engineer planning and assistance, are also applicable to the airmobile engineer battalion. Details on conduct of barrier operations are contained in FM 31-10. See also paragraph 9-8.

10-24. Defense Against Chemical, Biological, and Nuclear Attack

a. Normal active and passive defensive measures are employed with emphasis on individual protective measures (FM 3-12 and FM 21-40). Particular stress is placed on the importance of deep foxholes and the provision of overhead cover. The engineer battalion conducts the following tasks in defensive planning for CBR attack:

(1) *For the division.*

(*a*) Surveys area for suitable shelters and assists in planning and constructing protective facilities for key installations.

(*b*) Selects alternate water point sites.

(*c*) Selects and prepares an alternate bridge site for each bridge required.

(*d*) Assists in the preparation and execution of the division area damage control plan.

(2) *For the battalion.*

(*a*) Disperses unit personnel, equipment,

and supplies consistent with operational practicability.

(*b*) Organizes unit first aid, rescue, and evacuation teams.

(*c*) Prepares a CBR defense SOP based on that of the division.

b. In the event of a chemical or nuclear attack, the airmobile division engineer battalion accomplishes the following, as may be appropriate:

(1) *For the division.*

(*a*) Clearing of exit routes required for evacuation to safe areas.

(*b*) Construction and posting of signs for unsafe areas.

(*c*) Firefighting missions.

(*d*) Clearance of debris from essential routes and airlanding facilities.

(*e*) Production of maximum amount of potable water.

(*f*) Such other engineer tasks as are required.

(2) *For the battalion.*

(*a*) First aid, rescue, and evacuation.

(*b*) Preparation of personnel and equipment decontamination stations.

10–25. Defense Against Airborne Attack, Guerrilla Action, and Infiltration

The airmobile division engineer battalion must establish, within its area of operation, an observation and warning system and local security which are adequate for defense against enemy airborne, guerrilla, and infiltration tactics. The battalion may be called upon to construct obstacles for the division which would act as a deterrent to the use of such enemy tactics.

10–26. Denial Operations

The most common type of denial operations performed by airmobile forces is the denial of further use of an objective area, to include tunnels and related facilities, on withdrawal of the occupying force. Other than the foregoing exception, participation in denial operations by the airmobile division is in consonance with doctrine established in paragraphs 5–31 through 5–34 and FM 31–10.

Section V. OTHER OPERATIONS

10–27. Night Operations

a. Airmobile forces may be employed effectively at night. They are less vulnerable to enemy ground and air fires, and the enemy has greater difficulty in determining the location of the main landing than in daylight.

b. Night operations present certain disadvantages and special problems in comparison to daylight operations and require that engineer troops have a higher state of training than for daylight operations. Engineer troops may land with pathfinder units and help establish special aids to navigation to assist in movement and landings.

c. The use of artificial illumination or image intensification and infrared devices must be considered when planning for night operations. Each combat engineer company and the headquarters company is equipped with an emergency airfield illumination set which may be used for this purpose.

d. Engineer units involved in construction tasks may experience great difficulty in operating equipment at night, especially with other troops continually entering the area. If operationally feasible, the engineer commander should seal off the engineer area of operations until all clearing and site preparation has been accomplished. This will expedite the construction mission and avoid confusion and possible injury to friendly troops in the area.

10–28. Retrograde

a. The airmobile division is suitable for use as a covering or delaying force in retrograde operations. Elements of the division with strong engineer support may be landed along main avenues of approach of the enemy and engage the enemy while the engineers prepare roadblocks, obstacles, bridge demolition and minefields to impede the enemy's advance.

b. Airmobile units conduct spoiling attacks or counterattacks when weaknesses develop in the enemy's dispositions. Engineers accompany forces engaged in spoiling attacks and assist in the destruction of enemy dumps, communications, utilities, and water points. If friendly troops plan to reoccupy the area being held by the enemy, it is extremely important to have engineers perform the demolitions during spoiling attacks, because the destruction frequently can be accomplished by destroying a small but critical part of a facility instead of the entire facility. Engineers are trained to know what and how much should be destroyed so that, if rehabilitation subsequently is to be accomplished by friendly troops, it can be accomplished in the shortest possible time. See FM 5–135.

10–29. Withdrawal by Air

Withdrawal from an objective area may be forced by the enemy or made voluntarily. Advance planning is imperative as the nature of the area of operations, and the limitations of transport aircraft introduce complicating factors not present in other ground operations. The engineer battalion has an important role in withdrawal operations and frequently will be among the last troops to leave an area. Since the engineer units will be engaged in operational missions, the commander should make sure that adequate infantry forces remain in the area to see that sufficient time is allowed for completion of the engineer mission. Some engineer missions might include—

a. Destroying supplies and materials that cannot be evacuated.

b. Executing certain obstacles, i.e., bridge demolitions or cratering charges, to prevent an enemy advance which would cause delay or interfere with the withdrawal.

c. Providing access routes into departure facilities.

d. Providing the necessary airlanding facilities to accommodate aircraft used for the withdrawal.

Section VI. SPECIAL OPERATIONS

10–30. River Crossing Operations

a. The airmobile division, with its capability to perform vertical envelopment, is especially suited for employment in support of hasty or deliberate river-crossing operations.

b. In executing a hasty river crossing, the river is approached at maximum speed on a broad front. All existing bridges in the zone of advance are objectives. Whether or not bridges are seized intact, hasty crossings are attempted on a wide front, capitalizing upon airmobile operations, nuclear fires, and improvised means.

c. In support of a deliberate river crossing, the airmobile division overflies the water barrier to seize objectives well beyond the far shore from which it can block enemy counterattacks, cut off an enemy retreat, and protect the bridgehead area.

d. In either type river-crossing operation, engineers will be employed with the force to create obstacles, remove demolitions from captured bridges, perform demolition missions including ADM, and to assist in the laying of hasty minefields. The blocking mission is to delay the enemy until friendly forces cross the river and continue the advance. Obstacles created and demolitions performed must not be of the type that will delay the advance or inhibit the maneuver of friendly forces.

10–31. Amphibious Operations

The role of the airmobile division in amphibious operations is similar to that in a deliberate river crossing. The role of the engineer battalion in an amphibious operation will depend on the size of the operation and mission of the division. The division may be a part of an army task force being landed in coordination with the operations of an engineer amphibious support command or it may be a joint operation with Air Force, Navy, and Marine units participating. If the assault is conducted from amphibious assault ships, care must be exercised to insure that embarkation planning covers the orderly assembly of engineer personnel and their equipment. They are assigned ships in a sequence designed to meet the requirements of the landing scheme of maneuvers. Doctrine for amphibious operations is discussed in FM 31–11, FM 31–12, and FM 5–144.

10–32. Desert Operations

Desert operations are discussed in FM 31–25, FM 61–100, and FM 100–5. Successful operations in the desert will require special individual and unit equipment to augment the division engineer battalion TOE. Additional water supply capabilities may be required and can be provided by the addition of appropriate water supply teams from TOE 5–520G. Major engineer roles that will increase in desert operations will include—

a. Increased requirement for water.

b. Increased camouflage requirements.

c. Increased maintenance requirements.

d. The need for heavier construction equipment.

e. The need for dust palliatives and portable surfacing material.

10–33. Arctic Operations

If committed in arctic operations, the airmobile division engineer battalion may require augmentation of engineer construction equipment and special vehicles. The requirements for summer and winter seasons are quite different. For example, during winter frozen lakes may provide suitable landing facilities; while in summer construction of such facilities in tundra may require prohibitive engineer effort. Any augmentation of equipment or personnel is based on the anticipated or actual demands of a specific situation.

10–34. Riverine Operations

a. Airmobile operations in a riverine area generally follow the established doctrine in FM 7–20, FM 31–75 (TEST), and FM 57–35. Airmobile operations are used to commit manuever elements, blocking forces, reserves and reaction forces.

b. Engineer airmobile units participating in riverine operations may be required to: construct and maintain lines of communication; provide potable water; prepare airlanding facilities; construct platforms for fire bases and helicopters (app D); and provide other combat engineer support as required.

Section VII. STABILITY OPERATIONS

10–35. General

a. The doctrine for employment of the airmobile division engineer battalion in limited and general war, offensive and defensive operations, applies, with modification, to its employment in stability operations.

b. The ultimate objective in combatting insurgency is to eliminate its causes and prevent its recurrence. Engineer combat units may support both tactical and nontactical units conducting operations over vast area, and operational plans must anticipate the difficulties of control of operations and maintenance support. Most important will be the complete integration of engineer operations into the overall stability operations campaign (FM 31–22) being conducted in a particular area such as a region, province, district, or area of responsibility of a division. This may entail support of U.S. and host country (HC tactical units in tactical operations, support of HC agencies in internal security operations, assisting HC forces in military/civic action, assisting HC through advisory assistance by providing mobile training teams (MTT) to HC armed forces, paramilitary, or civilian agencies.

10–36. Mission of Airmobile Engineers in Stability Operations

a. In addition to supporting the parent airmobile division, the engineer battalion may support U.S. Military Assistance Advisory Group (MAAG), Missions, Military Assistance Commands (MAC), U.S. and/or HC armed forces, HC paramilitary forces, and U.S. and/or HC civilian agencies. Support may entail conducting tactical operations, supporting HC agencies in internal security operations, assisting HC and U.S. forces in military civic action, assisting the HC through advisory assistance by providing MTT to HC armed and paramilitary forces or civilian agencies, or conducting these operations independently as part of the overall operation in a particular area; and, finally, participating in intelligence and psychological warfare operations. Augmentation from the TOE 5–500-, TOE 33–500- and TOE 41–500-series may be required to provide a greater capability to adequately perform all missions.

b. In general, the mission of the engineer battalion of the airmobile division in stability operations is similar to the mission of the engineer battalion of the airborne division previously discussed in paragraphs 5–39 through 5–49.

APPENDIX A

REFERENCES

A–1. Department of the Army Pamphlets (DA Pam)

310-series	Military Publications Indexes.
750–1	Preventive Maintenance Guide for Commanders.
525–5	Military Operations; Dust Control; Lessons Learned.

A–2. Army Regulations (AR)

310–25	Dictionary of United States Army Terms.
611–101	Manual of Commissioned Officer Military Occupational Specialties.
611–112	Manual of Warrant Officer, Military Occupational Specialties.
611–201	Enlisted Military Occupational Specialties.

A–3. Training Circular (TC)

10–1	Field Expedients for Rigging and Outloading Airdrop Equipment.

A–4. Field Manuals (FM)

1–15	Divisional Aviation Battalion, Group, and Brigade.
1–100	Army Aviation Utilization.
3–12	Operational Aspects of Radiological Defense.
5–1	Engineer Troop Organizations and Operations.
5–26	Employment of Atomic Demolition Munitions (ADM).
5–35	Engineer's Reference and Logistical Data.
5–135	Engineer Battalion, Armored, Infantry, and Infantry (Mechanized) Divisions.
5–142	Nondivisional Engineer Combat Units.
5–144	Engineer Amphibious Units.
5–162	Engineer Construction and Construction—Support Units.
7–20	The Infantry Battalions.
20–32	Landmine Warfare.
20–32A	Landmine Warfare (Scatterable Mines)
21–40	Chemical, Biological, and Nuclear Defense.
21–75	Combat Training of the Individual Soldier and Patrolling.
31–10	Denial Operations and Barriers.
31–11	Doctrine for Amphibious Operations.
31–12	Army Forces in Amphibious Operations.
31–16	Counterguerrilla Operations.
31–22	U.S. Army Counterinsurgency Forces.
(S) 31–22A	U.S. Army Counterinsurgency Forces (U).
31–23	Stability Operations, U.S. Army Doctrine.
31–25	Desert Operations.
31–60	River-Crossing Operations.
31–70	Basic Cold Weather Manual.
31–71	Northern Operations.
31–72	Mountain Operations.
31–73	Advisor Handbook for Stability Operations.
31–75 (test)	Riverine Operations.

33–1	Psychological Operations—U.S. Army Doctrine.
41–5	Joint Manual for Civil Affairs.
41–10	Civil Affairs Operations.
44–1	U.S. Army Air Defense Artillery Employment.
44–2	Air Defense Artillery Employment, Automatic Weapons M42/M55.
54–2	The Division Support Command and Separate Brigade Support Battalion.
55–30	Army Motor Transport Operations.
57–1	U.S. Army/U.S. Air Force Doctrine for Airborne Operations.
57–35	Airmobile Operations.
61–24	Division Communications.
61–100	The Division.
100–5	Operation of Army Forces in the Field.
100–10	Combat Service Support.
(C)100–20	Field Service Regulations Stability Operations—Internal Defense and Developments (IDAD) (U).
101–5	Staff Officers' Field Manual; Staff Organization and Procedure.
101–10-series	Staff Officers' Field Manual, Organizational, Technical and Logistical Data.

A–5. Technical Manuals (TM)

3–220	Chemical, Biological, and Radiological (CBR) Decontamination.
5–227	Design and Techniques for Military Civic Actions.
5–330	Planning and Design of Roads, Airbases and Heliports in the Theater of Operations.
5–331E	Utilization of Engineer Construction Equipment.
5–530	Materials Testing.
5–700	Field Water Supply.
10–500-series	Manuals covering the airdrop of supplies and equipment; rigging of particular items of equipment.
38–750	Army Equipment Record Procedures.
55–450–8	Air Transport of Supplies and Equipment: External Transport Procedures.
55–450–11	Helicopter External Loads rigged with Air Delivery Equipment.
55–450–15	Air Movement of Troops and Equipment (Administrative).
57–220	Technical Training of Parachutists.

A–6. Tables of Organization and Equipment (TOE)

5–25	Engineer Battalion; Airborne Division.
5–26	Headquarters and Headquarters Company, Engineer Battalion, Airborne Division.
5–27	Engineer Company, Engineer Battalion, Airborne Division.
5–35	Engineer Combat Battalion, Army or Corps.
5–52	Airborne Engineer Combat Group.
5–54	Engineer Light Equipment Company, Airborne.
5–87	Engineer Land Clearing Company.
5–195	Engineer Combat Battalion, Airborne.
5–215	Engineer Battalion, Airmobile Division.
5–216	Headquarters and Headquarters Company, Engineer Battalion, Airmobile Division.
5–217	Combat Engineer Company, Engineer Battalion, Airmobile Division.
5–500	Engineer Administrative and Headquarter Teams.
5–560	Engineer Civic Action Teams.
5–570	Engineer Combat Support Teams.
33–500	Psychological Operations Organizations.
41–500	Civil Affairs Organizations.
57	Airborne Division.
67	Airmobile Division.

A–8. Air Force Manual

Tactical Air Command Manual (TACM) 86–1.

A–9. Other

SOLOG 125	Minimum Potability Standards for Field Water Supply.
STANAG 2041	Operational Road Movement Orders, Tables and Graphs.

APPENDIX B

AIRLANDING FACILITIES

Section I. INTRODUCTION

B–1. Purpose

This appendix provides information and guidance in the planning, site selection, and engineer support required for construction of airlanding facilities in airborne and airmobile operations.

B–2. Airlanding Facility Construction Missions

a. In airborne and airmobile operations, the nature of drop and landing zones is an important consideration in formulating the landing plan and scheme of maneuver. Drop zones and landing zones must provide for an initial disposition of troops which facilitates seizure of assigned objectives. Plans for the construction and improvement of landing areas are predicated on plans for the buildup in the objective area.

b. The divisional engineer battalions in both the airborne and airmobile divisions have the mission of construction and improvement of airlanding facilities for the division. Usually, the facility will be initially a minimal type that is constructed in a short period of time. Initial construction activities usually are clearance of trees and other obstacles affecting landing approach, leveling, clearance of ground obstacles and debris, drainage, and bearing surface improvement. Engineer construction support required from nondivisional units depends upon the type of work to be done, the schedule of operations, and the criteria of the facilities. Frequently, the divisional battalion is augmented by supporting engineer elements from corps or army. When an airstrip becomes operational, the divisional engineer battalion may be relieved by supporting units so that it may be free to conduct additional operations in division forward areas.

B–3. Definition of Terms

a. Landing Area. This is the general area used for landing troops and materiel either by airdrop or airlanding. This area includes one or more drop zones or landing strips.

b. Drop Zone. A drop zone is a specified area upon which airborne troops, equipment, and supplies are dropped by parachute, or on which supplies and equipment may be delivered by free fall.

c. Landing Zone. Landing zones are specified zones within an objective area used for the landing of aircraft.

d. Extraction Zone. An extraction zone is a specified site at which supplies and equipment are delivered by extraction from minimum altitude aircraft (para 5–17*e*).

e. Airlanding Facilities. These are the minimum essential facilities which can reasonably be constructed in an airhead to permit the continuous airlanding of aircraft. The term denotes facilities less elaborate than an airfield.

f. Airfield. An airfield is an area prepared for the accommodation, landing, and takeoff of aircraft.

Section II. SITE SELECTION

B–4. Initial Planning

a. Site selection is of paramount importance in planning airlanding facilities. Sites must be capable of being rapidly improved, normally with a limited construction capability, to meet criteria imposed by aircraft characteristics. The division engineer staff provides technical assistance in selection of specific airlanding facility sites, based on the terrain in the area, and the construction capability of the units available for the mission. Assistance from an engineer terrain intelligence detachment, if available, should be obtained. Highways, sports fields, and other cleared areas which will require minimum clearance and leveling must be carefully considered. Initial planning should include selection of several possible sites for each airlanding facility required. Subsequent ground reconnaissance will determine which of

the possible sites is the most suitable for development.

b. Assault airlanding facilities in all division areas must remain in use throughout the operation so that they can:

(1) Accommodate reinforcements and resupply tonnages to insure the operation's continuation.

(2) Provide airlanding flexibility. If part of the facilities are knocked out by enemy action, other operational facilities can be used.

(3) Reduce ground supply movement. Continued use of all airlanding facilities permits aerial delivery of supplies close to using units.

B–5. Number of Airlanding Facilities

a. As many widely dispersed airfields and airlanding facilities as possible should be seized. The number actually required to support division brigade, and battalion areas varies according to the situation and the following factors:

(1) Size of the force to be supported.

(2) Planned buildup, including the number and type of aircraft to be employed.

(3) Tactical and logistical plans.

(4) Terrain in the objective area.

(5) Enemy capabilities.

(6) Weather during the operations.

(7) Engineer capabilities.

(8) Availability of local civilian resources.

b. The desirable minimum number and type of airlanding facilities for support of both the airborne and airmobile divisions is—

(1) One assault airlanding facility for each committed brigade and one for the division operations base.

(2) One medium transport airlanding facility for the division operations base capable of accommodating Air Force C–130 or similar aircraft.

c. The above minimum does not take into account provision of airlanding facilities to offset losses from enemy action.

d. The airmobile division may require additional dispersed facilities to accommodate the division's organic and attached aircraft.

e. In stability operations, airlanding facilities will frequently be constructed in many areas where operations are anticipated. This technique is required to permit rapid reaction to insurgent actions and aids in deceiving the enemy as to the location of planned combat operations. Under such conditions the minimum number of facilities given in *b* above will be greatly exceeded and the construction of such facilities will represent the major portion of the workload for many engineer units.

B–6. Landing Zones for Assault Aircraft

Existing airfields, certain sections of roads, some beaches, and open areas are suitable for assault landing zones. These sites may require improvements such as filling craters and removing trees from approach zones. Assault landing zones should include sufficient landing area, enough space for aircraft ground movement, and loading and unloading areas.

B–7. Desirable Characteristics

a. Desirable characteristics for landing zones are—

(1) Near objectives.

(2) Located in a position that is easily defensible against ground attack.

(3) Unoccupied by the enemy and free from antiairborne and antiaircraft obstacles and antiaircraft defensive fires.

(4) A straight, unobstructed, approach for aircraft.

(5) Ease of identification, especially during periods of low visibility.

(6) Availability of cover and concealment close to the landing area.

(7) Suitability for improvement and expansion.

b. Desirable characteristics for airlanding facilities are—

(1) Clear approaches to landing strips.

(2) Parking and dispersal areas to accommodate the planned aircraft capacity of the facility.

(3) A road net to and from the facility.

(4) Nearness of suitable assembly areas.

(5) Areas and other accommodations that facilitate supply and evacuation.

(6) Soil and terrain that is favorable to rapid construction and resistant to deterioration caused by usage and weather.

B–8. Tactical Considerations

Success of the mission is the overriding consideration in site selection. In some instances, a technically less desirable site is chosen over another because of tactical considerations. When an operation must have a certain airlanding capability within a specified time in order to succeed, site selection becomes a critical tactical consideration. Commanders of all participating aviation ele-

ments, therefore, must share the responsibility for site selection and consider it from the tactical standpoint.

B–9. Engineer Considerations

In site selection, the engineer is interested in the characteristics of the area of operations. Some of the factors he considers are—

a. Terrain in the objective area, with particular emphasis on the following:

(1) Airfields that can be seized intact or rehabilitated.

(2) Superhighways, beaches, or other areas of reasonably well-compacted soil.

(3) Soil characteristics, relief and vegetation.

(4) Extent and nature of obstacles in the landing area.

(5) Terrain studies of each site or area.

(6) Current aerial photographs.

(7) Drainage characteristics and effects of weather on soil conditions.

(8) Condition of the road net.

(9) Existing construction materials and natural materials in the objective area.

b. Time limitation on airlanding facility construction caused by tactical considerations.

c. Means available for delivering construction equipment and supplies to construction sites.

d. Provision of facilities for refueling, servicing and parking aircraft. Dispersion and camouflage of these facilities is also necessary. These construction tasks include leveling, clearance of obstacles, runway final grading and, possibly, surfacing.

B–10. Site Plans

Normally the engineer is furnished standard designs for the various facilities his unit will construct in the airhead. However, these designs must frequently be altered to meet time and material limitations or the limitations imposed by local geography, area or obstruction characteristics. Designs may be altered within the limitations prescribed by the headquarters directing the mission. Changes exceeding these limitations must be approved by that headquarters before work starts. When all changes have been considered, a special engineering site plan is prepared for each facility to be constructed in the airhead. As an example, a special engineering site plan for an airfield in the airhead would contain as a minmum:

a. Location of the airfield.

b. Type and capacity.

c. Anticipated life.

d. Plan views and sections for the airfield, altered to meet the local characteristics of the area.

e. Soil characteristics.

f. Detailed criteria for the runway, including its length, width, grade, and shoulders; glide angle; taxiways; aprons; surfacing; and other airfield features for the specific type of airfield.

Section III. OTHER CONSIDERATIONS

B–11. Criteria

Initial airlanding facilities are established on acceptable minimum criteria based primarily upon operational necessity and aircraft characteristics. A minimum criteria airlanding facility is one which provides the minimum dimensional and bearing capacity requirements for a specific aircraft at a specific landing weight and the anticipated sorties per day. Detailed information on requirements is contained in TM 5–330 and Tactical Air Command Manual (TACM) 86–1.

B–12. Battalion Capability

Both the airborne and airmobile divisional engineer battalions have a limited capability for construction and improvement of airlanding facilities. This capability is designed to meet the requirements for limited facilities in the initial stages of airborne or airmobile operations. Neither battalion has the capability of doing extensive construction work on airlanding facilities and simultaneously providing other types of combat engineering support to its parent unit. Thus, the requirements for construction of airlanding facilities must be considered together with the requirements for other types of combat engineering support and the divisional engineer battalion may require support by nondivisional units.

B–13. Construction Support

The engineer construction support required will depend upon the type and amount of work to be accomplished, the schedule of operations, and the criteria for the facilities. The Engineer Combat Battalion (Airborne) (TOE 5–195), and the Engineer Light Equipment Company, Airborne, (TOE 5–54), are specifically designed to support airborne and airmobile operations. The Engineer

Combat Battalion, Army, (TOE 5–35) and the nonairborne version of the Engineer Light Equipment Company (TOE 5–58) may also be used in support of either divisional battalion.

B–14. Soils Trafficability

a. Soils bearing capacity is a prime consideration in construction of airlanding facilities, roads, and other facilities. Since the environment and the situation often will limit the deliberate selection and manipulation of soil bearing capacities, the airborne and airmobile engineers must be able to determine relative soil bearing values. The principal means of accomplishing this in these units is through use of the airfield cone penetrometer which is available at platoon level in both battalions. TM 5–530 and TM 5–330 describe more rigorous testing methods which may be used if the situation permits.

B–15. Effects of Sand or Dust on Aircraft Operations

a. Operation of rotary and fixed wing aircraft in numerous areas of the world having a sand or dust environment presents serious and continuing problems for aviation and engineer uits in the field. Rotor wash on dusty or sandy surfaces can cause loss of visual contact with the ground during landing and take off. Additionally, sand and dust can pollute fuel and cause excessive wear or damage to rotor blades, turbine engines or other aircraft components. Thus a requirement exists for continued dust control by engineer units in the field, especially in areas subjected to down blast from helicopters; jet blast and prop wash from cargo, surveillance and fighter planes; and grinding action of wheeled vehicles. The engineer commander engaged in airmobile operation must be aware of the action to be taken to control dust around helipad, heliports, landing zones, airfields, and roads.

b. A variety of dust palliatives are currently available. These palliatives are listed in DA Pam 525–5 and TM 5–330. Guidance on the selection of material, equipment, and the techniques which give maximum effectiveness; expedient equipment for dust-control operations; troop training in dust-control operations; and guidance for preventive control and discipline in dust-controlled areas are also covered in the two references mentioned.

B–16. Use of Surfacing Materials

The logistical burden imposed by the use of landing mats for surfacing limits their use. However, in areas where trafficability is generally poor and weather conditions are frequently or periodically very rainy, airfield surfacing will be required, especially to support heavy transport and tactical support aircraft. The use of landing mats remains the best means to meet this requirement. Membrane surfacing has proved very helpful as a means of dust control and to assist in waterproofing but does not add strength to the underlying soil. TM 5–330 contains a discussion of both mats and membranes.

APPENDIX C

MINIMUM POTABILITY STANDARDS FOR FIELD WATER SUPPLY

SOLOG AGREEMENT 125
9 SEPTEMBER 1966

UNITED STATES-UNITED KINGDOM-CANADIAN-
AUSTRALIAN ARMIES
NON-MATERIEL STANDARDIZATION PROGRAM

TITLE OF AGREEMENT
MINIMUM POTABILITY STANDARDS
FOR FIELD WATER SUPPLY

DETAILS OF AGREEMENT

1. The Armies of the United States, United Kingdom, Canada, and Australia agree to accept the criteria and standards set forth herein as the minimum potability standard for a safe emergency water supply intended for human consumption under field conditions.

2. Criteria
   a. Short term field water consumption is consumption for 0–7 days.
   b. Long term field water consumption is consumption for periods in excess of 7 days.
   c. Total daily consumption per man is considered to be 5 liters (app 1 imperial gallon or 5 U.S. quarts). Under environmental conditions where water consumption substantially exceeds 5 liters per day, the tolerance levels should be proportionately reduced by the commander upon recommendation of his surgeon.
   d. At the individual level the only standards that can be applied are the bacteriological standard and the short term physcial standard.
   e. At the unit level short term standards only can be applied.
   f. At Brigade, Combat Group or equivalent and rearward levels the short term standards apply for 0–7 days. Beyond this time frame, the long term standards apply.
   g. Where one of the Armies is unable to meet the standards prescribed herein, the other Armies participating in the agreement will be notified.

3. Source
   The water supply shall be obtained from the best available source and shall be rendered safe by acceptable treatment methods.

4. Bacteriological Standards
   a. Coliform Count
   The most probable number of the coliform group of bacteria shall be less than 1.0 per 100 ml of water. (Short and long term.)
   b. Analysis
   The method and analysis for coliform bacteria shall be that customary for the cognizant nation.
   c. Pollution
   The presence of the coliform bacteria, including all organisms of the Coli-Aerogenes Group, shall be considered as indicating water pollution, other than BW Agents.

5. Physical Standards
   a. Turbidity
   For short term consumption water shall be reasonably clear. For long term consumption, the turbidity of water shall not exceed 5.0 mgms per liter (silica scale).
   b. Taste and Odor
   For short term consumption, water should be reasonably free from taste or odor due to hydrogen sulphide, phenols, or other chemical substances. For long term consumption, water should be free from taste or odor due to such substances both before and after disinfection.

6. Chemical Standards
   The methods of analysis for the following substances shall be as specified by cognizant nation.
   a. Substances for which water must be analyzed as a routine *requirement.*
      (1) Short Term Standards
      The maximum limits listed below are mandatory for emergency water supply for a period not exceeding 7 days. (Asterisked standards are interim pending completion of more exacting studies.)

Arsenic (As)	2.0 mgm/1
Cyanides (incl Cyanogen Chloride	20.0 mgm/1
Mustard (Sulphur & Nitrogen)	2.0 mgm/1*
Nerve Gas G (A)	0.1 mgm/1*
(B)	0.05 mgm/1*
Nerve Gas (Vx)	0.005 mgm/1*

      (2) Long Term Standards
      The limits listed below are preferable in water to be used continuously in excess of seven days. (Asterisked standards are interim completion of more exacting studies.)

Arsenic	0.2 mgm/1
Cyanides (incl Cyanogen Chloride)	2.0 mgm/1
Mustard (Sulphur & Nitrogen)	2.0 mgm/1*
Nerve Gas G (A)	0.1 mgm/1*
G (B)	0.05 mgm/1*
Nerve Gas (Vx)	0.005 mgm/1*
Chloride (Cl)	600.0 or mgm/1
Magnesium (Mg)	150.0 mgm/1
Sulphates (SO_4)	400.0 mgm/1
Color	50 units
Total Solids	1500.0 mgm/1

7. Radiological Standards (Gross Fission Products)
   a. For short term consumption, no absolute numerical standard is recommended or considered necessary. This is based on the conclusion that, if the external radiation hazard permits occupancy of the water point, the water is suitable for consumption during occupancy not exceeding the 1-week period.
   b. For long term consumption, available information does not permit the establishment of a practical standard.

APPENDIX D

CONSTRUCTION OF FIRE BASES

D–1. Description of a Fire Base

The airmobile division engineer battalion is equipped to construct artillery fire bases in areas where ground transport is prohibitive. Especially in an unsophisticated environment, such as forest and jungle, these fire bases play an integral part in airmobile operations, both as command posts and artillery fire bases. The most frequently constructed fire base houses an infantry battalion command element, two infantry companies, a 105mm howitzer battery and three to six 155mm howitzers. A fire base housing the above units consists of the following facilities: infantry TOC, artillery FDCs, ammunition storage pit, garbage sump, command and control helicopter pad, logistics storage area and slingout pad, artillery firing positions, helicopter parking area and refuel point, and hardened personnel sleeping positions. Fire bases usually are surrounded by a protective berm with perimeter fighting bunkers, two or more bands of tactical wire and a cleared buffer zone to provide adequate fields of fire for perimeter defense. If a local water source is available, an airmobile engineer water supply point may be established to provide water for the fire base and units in the local area.

D–2. Construction of a Fire Base

Construction of an airmobile fire base may be divided into three phases: combat assault and initial clearing, immediate tactical construction, and final defensive structures.

a. Phase I. Phase I, combat assault and initial clearing, consists of securing the fire base site and clearing an area large enough to accommodate CH–47 and CH–54 helicopters. The time required to complete this phase depends on the terrain at the fire base site. If the site is free of trees and undergrowth, or if these obstacles have been removed by artillery and tactical air fire preparation, combat engineers can move immediately to Phase II after the initial combat assault on the site. If the site is covered with foliage and trees, the security force and combat engineers may be required to rappel into the site from hovering helicopters. Depending on the density of the foliage on the site, completion of the initial clearing phase by combat engineers with demolitions and chain saws may take up to 3 hours to accomplish.

b. Phase II. Phase II, immediate tactical construction, commences as soon as the cleared area can accommodate either medium or heavy lift helicopters. Two light airmobile dozers are lifted to the site and are immediately employed clearing brush and stumps to expand the perimeter and to clear and level howitzer positions. Meanwhile, the combat engineers continue to expand the perimeter with chain saws, demolitions and bangalore torpedoes. If sufficient area is available, a heavy airmobile dozer usually is committed to clearing a logistics storage area and slingout pad, then to expanding the perimeter and fields of fire. The backhoes are committed to excavating positions for the infantry TOC, artillery FDCs and, as soon as the perimeter trace is established, perimeter fighting bunkers. The immediate tactical construction phase is characterized by the coordinated effort of infantry, artillery and engineer forces to produce a tenable tactical position by nightfall on the first day. It is a time of intense helicopter traffic introducing personnel, ammunition, barrier and bunker materials, rations, fuel, water, and artillery pieces into the site. Aircraft traffic and logistics input must be rigidly controlled to preclude nonessential supplies and aircraft from hampering engineer effort. Therefore, a coordinated site plan and list of priorities for transportation and construction must be prepared and constantly updated. Priorities and the site plan are established by the tactical commander in coordination with the project engineer. As soon as a perimeter trace is established and the site is capable of accepting the logistics and artillery lifts, maximum effort is directed toward the defenses of the fire base. Combat engineers and the heavy dozer continue to push back the undergrowth to permit adequate fields of fire. The two light airmobile dozers may be committed to construction of a 4-foot berm around the perimeter to protect against direct fire. Infantry troops are committed to constructing perimeter fighting

bunkers at sites previously excavated by the backhoes and, assisted by combat engineers, begin erection of the first band of tactical wire, usually triple standard concertina. Artillery troops not committed immediately to fire missions prepare ammunition storage bunkers and parapets around each howitzer.

c. Phase III. Phase III, final defensive structures, is initiated as construction forces complete the immediate defensive structures. Combat engineers who are not placing the tactical wire or clearing fields of fire commence construction of the infantry TOC and artillery FDCs. Infantry and artillery troops are committed to the second band of tactical wire and to erecting personnel sleeping positions with overhead cover. Culvert half sections lend themselves to rapid construction of these positions. Phase III is usually a continuous process, involving constant improvement and maintenance; however, the majority of protective structures, including sandbag protection of the TOC and personnel bunkers, usually are completed by the end of the fourth day. The controlling parameter in construction of a firebase is *time;* since the fire base is the first phase of the occupation of a hostile area, the battalion command center and the artillery pieces must be operational as soon as possible and protection against direct and indirect fire requires immediate attention. Several techniques have been developed to increase the efficiency and speed with which construction can progress. Among these are precut TOC structures and the use of culvert as molds for protective bunkers. However, the most effective technique yet adopted is a closely coordinated and controlled plan, outlining the location, priority and construction force for each phase of the mission.

APPENDIX E

EMPLOYMENT OF NONAIR DEFENSE WEAPONS AGAINST AIRCRAFT

E–1. Purpose

The purpose of this appendix is to—

a. Recognize the threat of enemy airmobile operations, close air support, interdiction aircraft, and air reconnaissance against any unit in a combat theater.

b. Recognize the potential effect of the large volume of small arms fire that can be furnished by organic weapons against low flying hostile aircraft.

c. Reflect the necessity of commanders to establish detailed SOP for the identification and engagement of hostile aircraft to include how identification is accomplished, which personnel will fire, techniques of fire to be used, rules of engagement, and controls to be exercised.

d. Reflect the necessity for training individual soldiers in aircraft identification, techniques of firing at aerial targets, and response to control methods.

e. Emphasize the aggressive engagement of hostile aircraft with organic weapons as specified in carefully prepared SOP and rules of engagement.

f. Recognize the threat to friendly aircraft in failure to discriminate between hostile and friendly aircraft.

g. Place in proper perspective the tactic of withholding fire to preclude disclosure of positions.

E–2. Concept

a. The substantial low altitude air threat faced by units in the combat theater may be partially countered by aggressive use of the large volume of fire which nonair defense weapons can place against this threat.

b. Exercise of the individual and collective right of self-defense against hostile aircraft must be emphasized. Hostile aircraft include all attacking aircraft and those positively identified enemy aircraft which pose a threat to the unit. The requirement for exercise of this right has not been adequately emphasized in the past. Large volumes of fire from nonair defense weapons have proven capable of destroying both high and low-speed aircraft or disrupting their attack. Exercise of this right does not demand specialized use of communications and air defense control procedures.

c. Indiscriminate use of nonair defense weapons must be prevented due to the resulting danger to friendly aircraft and troops and the requirement to place in proper perspective the technique of withholding fire to preclude disclosure of positions. Effective and safe employment of these weapons necessitates Army-wide training expenditures. Engagement of hostile aircraft in immediate self-defense will be most frequent, and training emphasis should reflect this doctrine.

d. Situations may arise wherein the exercise of the right of self-defense should be temporarily suppressed, or, contrarily, when freer use of nonair defense weapons against aircraft should be encouraged. The former case involves a local decision that prevention of position disclosure is paramount. Notice of such restriction is disseminated through command channels. The latter case should be based on a theater-level decision.

e. Use of a single rule of engagement: "Engage hostile aircraft", is based on the knowledge that common sense interpretations of the rule will be correct. For example, all aircraft attacking the unit and enemy aircraft performing operations such as forward air control, reconnaissance, surveillance, or dropping or landing troops are clearly "hostile aircraft".

E–3. Rules of Engagement

In the absence of orders to the contrary, individual weapon operators will engage attacking aircraft; engagement of all other hostile aircraft will be on orders issued through the unit chain of command and will be supervised by unit leaders. Nothing in this rule is to be taken as requiring actions prejudicial to accomplishment of the primary mission of the unit.

E–4. Techniques

The following techniques should maximize the destructive and/or deterrent effect against aircraft:

a. Engagement of Low-Speed Aircraft. In accordance with the rules of engagement, engage low-speed enemy aircraft with aimed fire, employing the maximum weapon rate of fire.

b. Engagement of High-Speed Aircraft. In accordance with the rule of engagement, engage high-speed enemy aircraft with maximum fire aimed well in front of the aircraft, and above its flight path, in order to force it to fly through a pattern of fire. This technique is not unaimed "barrage" fire, but requires a degree of aimed fire. It does not, however, call for careful estimation of aircraft speed and required lead.

c. Use of Tracer Ammunition. Automatic weapons should utilize the highest practical proportion of tracer ammunition to enhance the deterrent or disruptive effect.

d. Massed Fire. Units should employ a massed-fire technique when using small arms and automatic weapons in an air defense role.

E–5. SOP Items

Company-level SOP should cover, but not be limited to, the following items relevant to engagement of aircraft with nonair defense weapons:

a. Applicability. Designate weapons operators concerned.

b. Relation to Primary Mission. The primary mission is never prejudiced.

c. Relation to Passive Air Defense. The necessity for aggressively engaging hostile aircraft is balanced with the requirement to place in proper perspective the tactic of withholding fire to prevent disclosure of position.

d. Authority to Engage. Authority to engage attacking aircraft is delegated to individual weapons operators; authority to engage all other hostile aircraft is granted on orders through unit chain of command, subject to the rule for engagement and the rules for withholding fire.

e. Rules of Engagement. Normally, the rule is for self-defense only against all attacking aircraft and those positively identified enemy aircraft which pose a threat to the unit.

f. Rules for Withholding Fire. These apply when ordered, when not positive that aircraft are actually attacking or are otherwise hostile, and when friendly aircraft or troops are endangered.

g. Position Selection. This is applicable only to weapons specifically assigned an air defense role; e.g., designated single-barrel, caliber .50, machineguns (see FM 44–2).

h. Firing Techniques. These include lead and superelevation, massed fire, and maximum use of tracer ammunition.

i. Unit Training Requirements. These include motivation, discipline, gunnery, and aircraft recognition.

APPENDIX F

CHARACTERISTICS OF RADIO EQUIPMENT

Type	Planning distance	Frequency range	Type of service	Remarks
AN/VRC–46	20 mi (32 km) Stationary 15 mi (24 km) Moving	30–75.95 MHz	FM	Single receiver/transmitter, RT–524/VRC. Used at company and platoon level when working in one net only. Also used by battalion and higher staff.
AN/VRC–47	20 mi (32 km) Stationary 15 mi (24 km) Moving	30–75.95 MHz	FM	Single receiver/transmitter, RT–524/VRC auxiliary receiver, R–442/VRC. Used at company and higher level to monitor one net while working in another.
AN/VRC–49	20 mi (32 km) Stationary 15 mi (24 km) Moving	30–75.95 MHz	FM	Has two receiver/transmitters, (2 ea RT–524/VRC) and is thus capable of operating in two nets. Used by engineer units in the combat zone as a radio relay.
AN/PRC–77	5–8 km	30–75.95 MHz	FM	Man pack radio set. Used at squad level or for utility set for dismounted operations. Employed in company and battalion to provide two-way voice communications. This radio is transistorized and replaces the AN/PRC–25. It has the additional capability of operation with voice security devices.
AN/TRC–135	25–32 km	30–76 MHz	FM	Can transmit on two channels and monitor three. Has two receiver transmitters, RT–524/VRC, and one receiver, radio R–442/VRC.
AN/GRC–106	80 km	2–30 MHz	SSB AM CW	Command net. Used in the division command net, AM.

APPENDIX G

AIRCRAFT CHARACTERISTICS

U.S. ARMY AIRCRAFT

Aircraft	Maximum [1] External Cargo Cap. (lbs)	Useful load [2]	Payload, Normal Mission [3]	Cargo Compartment (in.) Lgth	Wdth	Ht	Door Sizes (in.) wdth	Space Cu Ft	Normal Cruising Speed (Knots)	Endurance at Cruise + 30 min reserved (Hrs + mins)
CH-21C	5,000	5,401	3,000	240	50	62	45x59	422	70	2 + 09
CH-34 (CHOCTAW)	5,000	5,532	3,600	164	59	70	52x48	372	85-107	1 + 46
CH-37B (MOJAVE)	7,500	9,500	6,197	364	87	87	87x72	1,252	85	1 + 15
CH-47A (CHINOOK)	16,000	14,888	10,300	360	90	78	90x78	1,474	130	1 + 22
CH-47B	20,000	20,445	15,900	360	90	78	90x78	1,474	150	0 + 57
CH-47C	20,000	23,380	19,100	360	90	78	90x78	1,474	155	1 + 57
UH-1B (IROQUOIS)	3,000	3,865	2,372	60	80.5	54	48x48	140	75-95	1 + 46
UH-1C	3,787	4,700	2,027	60	80.5	54	48x48	140	92-110	1 + 58
UH1D/H	4,000	4,580	3,056	92	96	54	74x49	220	92-110	2 + 08
CH-54A (TARHE)	20,000	20,170	18,565	329	104.5	78	104.5 inches (Pod)	1,552	100-90	1 + 30

[1] Consult aviation commanders and TM 57-210 for the correct data for each flight. Increase in payload requires decrease in range.

[2] *Useful load:* The load carrying capability of an aircraft. It includes the payload, crew and useable fuel and oil, required for the mission. Here it is the difference between "MAXIMUM ALLOWABLE GROSS WEIGHT" and the "BASIC WEIGHT". Thus, it is evident that a reduction of the fuel load will reduce the ENDURANCE and increase the PAYLOAD.

[3] *Normal mission:* Payload available computed under following conditions:

1. Fuel for 200 NM Range plus 30 minute reserve.
2. Flight altitude 2000' MSL, standard temperature.
3. Take-off maximum gross weight (weight of crew included).

APPENDIX H

USAF AIRCRAFT

Aircraft	Normal [1] Maximum Cargo (ST)	Cargo Compartment (in.) Lgth	Wdth	Ht	Door Size (in.) Ht(lgth)	Wdth	Normal Troop Capacity 240 lb man	Nautical mile range w/normal max payload fuel & crew	Ground Run [1] T.O. Distance (Min)-(Norm)
C-7A	3.1	344.4	86.4	74.4			31	554	-725
C-5A	132.5	1,453.2	228.0	162.0	162.0	228.0	345	1700	-6,020
C-47D	7.0	361.2	88.8	76.8	55.2sft(h) 70.8fwd(h)	84.0	27	1200	1550-2900
C-46F	5.0	576.0	117.6	84.0	81.6(h)	97.2	50	1150	1750-2700
C-54G	9.0	596.4	103.2	93.6	67.2(h)	94.8	49	1000	1400-2780
C-97C	15.0	763.2	93.6	96.0	171.6(l)	11.6(fowe)	130	2500	2700-6500
					76.0	76.8(aft)			
						80.4(rt dr)			
C-118A	20.0	816.0	106.8	95.8	123.6(l)	78(main)	76	3300	2670-5050
					91.2(l)	67.2(fwd)			
					45.6(l)	37.2(lwr)			
C-119G	15.0	442.8	110.4	96	96.0(h)	117.2 to	42	1000	1820-3180
			117.6	92.4		117.6			
C-123B	7.5	440.6	110.4	98.6	98.4(h)	110.4	61	1250	1700-3300
C-121C	9.5	999.6	139.2	80.4	73.2(h)	111.6(main)	72	2800	2500-3390
YC-121F	10.0	999.6	139.2	80.4	73.2(h)	111.6(main)	72	2800	2500-3390
C-124C	38.0	924.0	135.6	139.2(h)	139.2(h)	135.6(main)	200	1000	3000-5520
C-130A	15.0	496.8	123.6	109.2	108(h)	120.0(main)	92	2300	1410-2540
C-133A	40.0	1168.0	142.0	144.0	153.6(h)	145.0(rear)	128	2000	3620-5650
					100(h)	110.0(side)			
C-130B	18.1	496.8	123.6	109.2	109.2	120.0(main)	92	1847	2030-3000
					72.0	80.4(side)	64(Para)		
					72.0	36.0(para)			
C-130E	16.2	480.0	123.6	108.0	109.2	120.0	92	3042	3000-4200

Aircraft	Normal [1] Maximum Cargo (ST)	Cargo Compartment (in.) Lgth	Wdth	Ht	Door Size (in.) Ht(lgth)	Wdth	Normal Troop Capacity 240 lb man	Nautical mile range w/normal max payload fuel & crew	Ground Run [1] T.O. Distance (Min)-(Norm)
					72.0	36.0(para)	64(Para)		
C-141	33.04	840.0	123.6	109.2	109.2	123.6	154	2,069	-2,490

[1] This is a "BASIC MISSION" category data only; one takeoff and one landing. Overload payloads and variations in payloads, ranges, landing weights are not included. Additional data is found in TM 57-210. In the operational situation, the Air Force Liaison Officer or representative must be consulted.

APPENDIX I

AIRMOBILE ENGINEER EQUIPMENT

LIN & FSN	Items Description	Weight (lb.)	Overall Dimensions Length (in)	Width (in.)	Height (in.)	Sectionalized No. of Comp	Weight (lb.)
J74886 3805-902 -3083	Grader Road MTZD Sectionalized Cat 112	21,200	300	96	90	2	6,200 15,000
W76268 2410-900 -8539	Tractor Airmobile Sectionalized D6B	24,000	151¾	79½	75	2	12,000 2,000
W76200 2410-902 -3084	Tractor Airmobile 4 x 4 (MRS 100)	24,340	224	108	88½	5	4,400 4,660 4,580 4,900 5,800
L76693 3805-900 -8546	Loader Scoop Type: 2½ cu. yd.	22,200	255	96	97	2	10,350 11,850
S56119 3805-051 -3139	Scraper Airmobile: Sectionalized	16,250	372	104	93	2	10,500 5,750
F39172 3810-921 -5055	Crane Wheel Mounted: 3 Ton, GED, Air Transportable, M65	21,000	212½	107½	104¾	2	10,000 11,000
X52818 3930-950 -9985	Truck Lift Fork: Rough Terrain 3000 Lb Cap	3,000	137		65	1	
J76989 3720-902 -3077	Grass Cutter, Airmobile	1,000	86	87	28	1	
W76336 2410-900 -8540	Tractor Airmobile: w/Blade	10,000	140	78	88	1	
W76302 2410-900 -8538	Tractor Airmobile: w/ Backhoe and front loader ½ cu. yd.	8,850	259	81	137	1	
J75239 3805-900 -8546	Grader Scraper Attachment: for Grader Road	4,250	132	104	55	1	
X43228 2320-911 -5071	Truck Dump: ¾ ton 4 x 4 W/E	7,187	190	75.3	64.5	1	
S10682 3895-902 -3112	Roller Air Mobility Vibrating	4,750	96	66	69	1	
S11684 3895-902 -3111	Roller Motorized Pneu Tired: Airmobile 9 Wheel	8,000	151	69	96	1	
S10657 3895 -3110	Roller Airmobile: Single Drum Sheepsfoot	3,000	159	65	54	1	

LIN & FSN	Items Description	Weight (lb.)	Overall Dimensions Length (in)	Width (in.)	Height (in.)	Sectionalized No. of Comp	Weight (lb.)
Y36239 4610–902 –3106	Water Purif Set: PTBL 500 GPH	1,000	72	48	48	1	
K20417 3720–902 –3078	Hayrake, towed Model 894–A	950	120	117		1	

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