FM 17-45

WAR DEPARTMENT FIELD MANUAL

THE ARMORED ENGINEER BATTALION

WAR DEPARTMENT • 15 JUNE 1944

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FM 17–45, The Armored Engineer Battalion, is published for the information and guidance of all concerned.

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For explanation of symbols, see FM 21–6.

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WAR DEPARTMENT FIELD MANUAL

THE ARMORED ENGINEER BATTALION*

(This manual supersedes FM 17–45, 13 November 1942 and C1)

Section I

GENERAL

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1. PURPOSE. This manual covers the tactics and technique of the armored engineer battalion. It supplements basic and engineer field manuals and engineer technical manuals, and will be used in conjunction with them in training the armored engineer battalion and its component parts.

2. MISSION. a. The mission of the armored engineer battalion is to facilitate the operation of the armored division of which it is an organic part. To accomplish this mission, the battalion is trained and equipped to–

(1) Reconnoiter and mark roads, trails, and other routes.

(2) Reconnoiter bridges, defiles, obstacles, and areas.

(3) Construct, improve, or reinforce fords, bridges, and culverts.

(4) Construct and maintain floating bridges and ferries.

* "For definition of military terms not defined in this manual see TM 20–205".

(5) Transport infantry elements across streams with assault equipment.

(6) Construct and remove obstacles, including deliberate mine fields.

(7) Establish and operate water points.

(8) Execute demolitions.

(9) Assist in the assault of fortifications.

(10) Locate, and, if necessary, prepare advance landing fields.

(11) Fight as infantry.

b. For further details of engineer duties see FM 5–5 and FM 5–6.

3. ORGANIZATION. The armored engineer battalion consists of a headquarters and headquarters company and three engineer companies (Figures 1 and 2). Details of organization are shown in current tables of organization and equipment.

4. EMPLOYMENT. a. The armored division, with its large number of heavy vehicles operating at great speed, requires considerable engineer support for maximum battle effectiveness. The armored engineer battalion is specially equipped to furnish the prompt support demanded by tank units. It is trained to work rapidly, utilizing power tools and other time-saving expedients. Armored engineers should be used economically, and should not be dissipated on unimportant or unnecessary assignments. They should be supported closely by other engineer troops, who can take over ford and bridge maintenance, and similar tasks, and release armored engineers to accompany the division. Armored engineers are employed on infantry missions only when such employment is definitely determined to be more urgent than engineering work.

b. Engineer elements should be well forward in combat groups so that necessary engineer work can be started with a minimum of delay. The engineer reserve should be placed well forward.

5. ENGINEER ATTACHMENTS. a. Armored engineer units are attached to other units of the division as required by the situation. The division engineer is prepared at all times to recommend to the division commander the strength and composition of these attachments. He keeps himself informed constantly as to the tactical situation, the terrain, road nets and their capacities, and the availability of engineer materiel and supplies. Due to the speed and dispersion of armored units in battle and the resultant difficulty of reinforcing them, initial engineer attachments are relatively strong. Under average conditions, attachments to major combat groups vary from a platoon to a company, depending on the size and engineering requirements of the attacking forces.

b. The commander of each attached engineer unit should recommend to the commander of the unit to which he is attached a method of utilizing the engineers.

6. ENGINEER EQUIPMENT. To facilitate its prompt employment on independent tasks, each squad of the engineer battalion carries in its vehicle certain carpenter, pioneer, and demolition equipment and limited quantities of engineer supplies and antitank mines. Additional equipment and supplies are carried in platoon and company transportation. Each company has a motorized air compressor with power tools. Each lettered company has a tractor with dozer. Headquarters company equipment includes a treadway ferry set. There is no bridge company in the battalion.

7. DEFENSE. Armament of the battalion includes rocket launchers, caliber .30 and caliber .50 machine guns, and individual weapons. It has no antitank guns. Engineer units can defend themselves against patrols of infantry and lightly armored vehicles. When attack by large or heavily armored forces is probable, engineers must be supported by other troops.

8. COMMUNICATION. The battalion is equipped with a limited number of radios and messengers. For

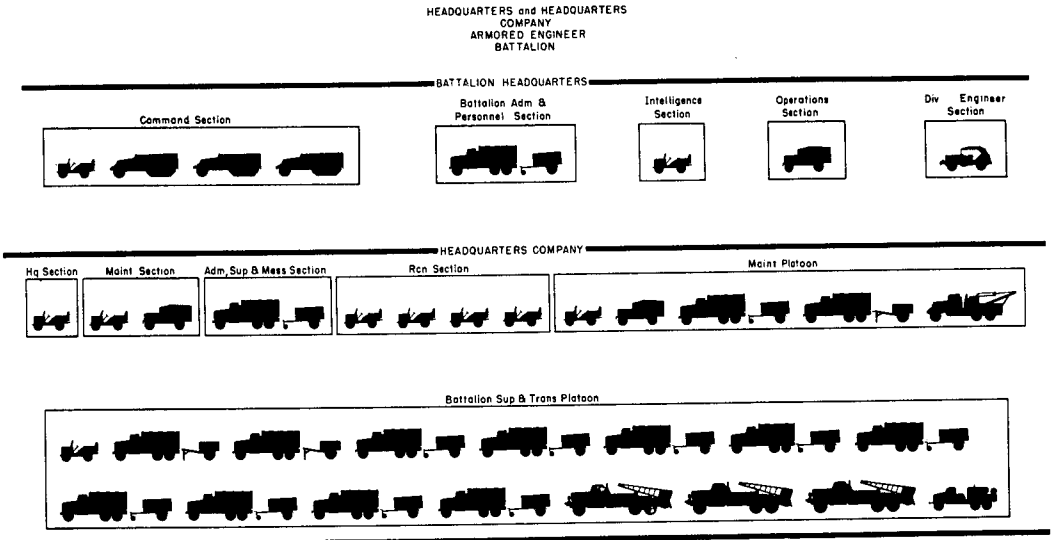

Figure 1. Headquarters and headquarters company, armored engineer battalion.

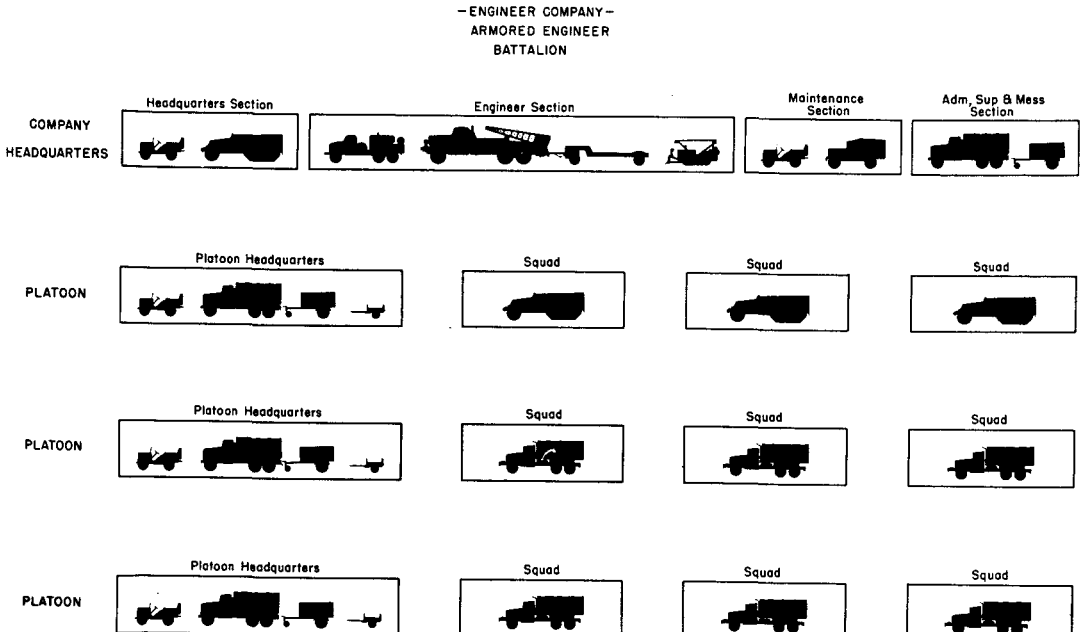

Figure 2. Company, armored engineer battalion.

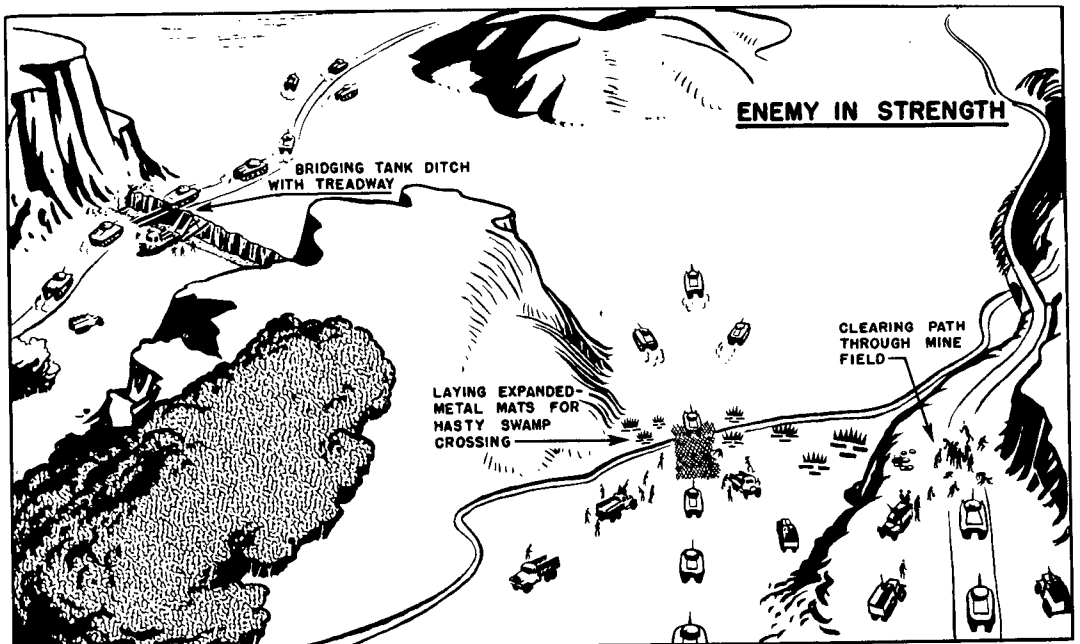

Figure 3. The primary mission of engineers is to facilitate the movement of armored units.

distribution of radios see current tables of organization and equipment. Radio nets are shown in figures 4 and 5.

NOTE: Because of the limited range of the SCR-510 radio set, the engineer reconnaissance section has no organic means for transmitting information rapidly from its forward position with the division reconnaissance battalion to the engineer battalion headquarters. It is imperative that information concerning the condition of routes and the location of obstacles and possible engineer supplies reach the division engineer promptly and continuously from the reconnaissance section. The division commander may insure prompt delivery of this data by one of the following means:

a. Ordering assignment to the reconnaissance section of sufficient SCR-506 radio sets from the reconnaissance squadron or the division signal company.

b. Designating a definite precedence for transmission of the information over the division reconnaissance net (FM 17–70). This may be done by setting the hours when such information will be given precedence, provision being made that this does not prevent transmission of important information at other hours. A representative of the division engineer is present at division headquarters at all times to receive information directly from the G-2 and obtain any necessary clarification.

9. **SUPPLY.** The principal engineer supplies for the division are water, maps, explosives, bridge materials, camouflage materials, and in certain situations, materials for field fortifications. The division engineer is the engineer supply officer of the division (FM 101–5). Requisitions for engineer supplies (except water and maps) clear through division headquarters where the division engineer edits and alters them in accordance with priorities determined by the tactical situation and availability of supplies. Requisitions as edited are forwarded to Army, which notifies the unit through division headquarters where and when the supplies can be drawn. The using unit then obtains the supplies in its own ve-

hicles from the Army depot. In cases where the division engineer has under his control locally procured engineer supplies he deletes such items from the unit's requisition before forwarding it to the Army and then notifies the unit of the place and time it may be drawn.

a. Water. (FM 5–6) Water for the division is usually provided from local sources by using the organic water

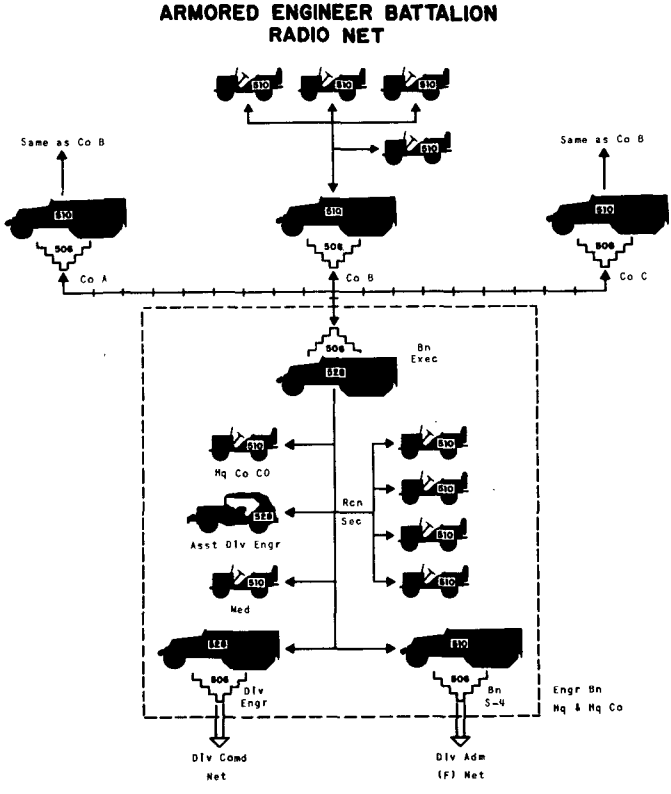

Figure 4. Armored engineer battalion radio channels.

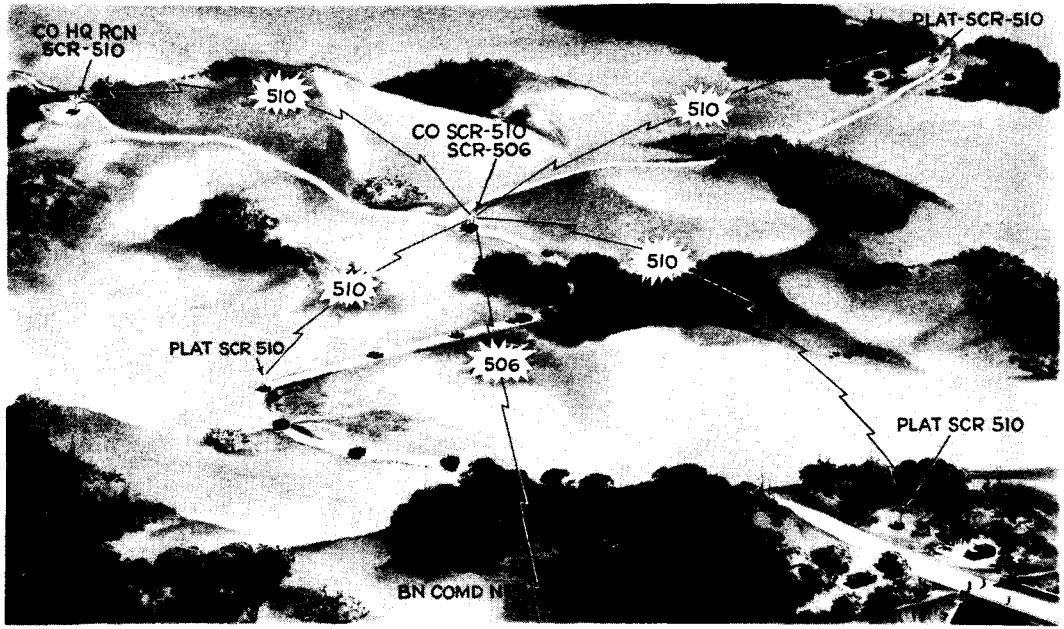

Figure 5. Operation of armored engineer company radio nets.

purification units which are part of the equipment of the engineer headquarters company. Water points are established as needed. All water is habitually filtered and chlorinated unless declared safe by medical authority. After treatment it should be similarly approved prior to distribution. Water is drawn by the using unit employing its own vehicles and water cans. When local sources are inadequate, water is brought from the rear.

b. Maps. (FM 5–6) The division engineer normally obtains maps from the engineer of the next higher unit and distributes them under supervision of the division G-2.

c. Explosives. A large quantity of explosives is carried by the armored engineer battalion. This includes several thousand pounds of both TNT and ammonium nitrate as well as blasting caps and detonating cord.

d. Bridge materials. Heavy lumber and other materials for the construction or reinforcement of bridges is procured locally, when available, or drawn from army engineer supply points. Each platoon normally carries a small quantity for emergency work, and a greater amount when need can be anticipated.

e. Camouflage and field fortification material. Such materials needed by engineer troops are drawn directly from Army or procured locally.

Section II

STAFF DUTIES, ORDERS, LIAISON

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10. DUTIES OF DIVISION ENGINEER AND ASSISTANT (FM 101–5) **a. Division engineer.** The commanding officer of the battalion is also the division engineer. The principal staff duties of the division engineer are–

(1) Advise the commander and staff on all engineer matters.

(2) To recommend to the division commander the strength and composition of engineer attachments, and as a staff officer supervise their execution of engineer tasks.

(3) To prepare current and future plans for the use of that part of the engineer battalion not attached to combat commands or other units, and supervise the execution of the plans as approved.

(4) To supervise the collection and dissemination of engineer reconnaissance data.

(5) To coordinate engineer supply for the division.

(6) To recommend traffic circulation plans, and supervise preparation and posting of signs for marking routes. (FM 100–15)

(7) To plan and construct defensive works when specially directed.

(8) To construct, maintain, repair, and operate structures and utilities when specially directed.

(9) To plan and supervise execution of instruction and measures concerning engineer work for the division.

b. Assistant division engineer. The assistant division engineer is habitually at the forward echelon of division headquarters. He is the representative of the division engineer, and is the liaison officer from the engineer battalion. In the performance of his duties, he–

(1) Keeps a situation map showing the condition of routes and bridges, the location of natural and artificial barriers and of defiles which can be blocked, the fordability of streams, the location of materiel usable for engineer supplies, and other similar information.

(2) Presents pertinent engineer information to the division commander and staff.

(3) Works in close cooperation with G-2 on reconnaissance information and map procurement, with G-3 on plans and operations, and with G-4 on traffic circulation and water and engineer supply.

(4) Collects and forwards to the engineer battalion all available information that will assist it in the performance of its tasks.

11. DUTIES OF ENGINEER BATTALION STAFF OFFICERS. Duties of staff officers are described in FM 101–5. Specific duties of engineer battalion staff officers are described in detail in FM 5–5.

12. ORDERS. a. Oral orders, frequently fragmentary, are customary. Warning orders are issued when possible. Use sketches, overlays, and marked maps to simplify orders. Be certain that orders state a definite mission. Give them in such form that they cannot be misunderstood. The form of a field order is given in FM 101–5.

b. The adoption of standing operating procedure reduces the amount of routine detail contained in orders. Standing operating procedure should not become voluminous, and must not be so rigid that it interferes with the flexibility of units or the initiative of their commanders. FM 5–6 contains a list of subjects suitable for inclusion in a standing operating procedure. That list is a guide only. It is varied as necessary to conform to the standing operating procedure of the armored division and to fit the particular needs of the battalion.

13. LIAISON. a. The assistant division engineer is the

engineer liaison officer at division headquarters (see paragraph 10).

b. An attached engineer unit provides a liaison agent at the headquarters of the unit to which it is attached.

c. General duties of liaison officers are prescribed in FM 101-5.

Section III

TRAINING

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14. GENERAL. a. The fundamentals of training are prescribed in FM 100–5, FM 21–5, and FM 5–5. Special instructions are published in periodic training directives.

b. Training of the armored engineer battalion must be well-planned, thorough, and intensive. Armored engineers must gain proficiency in the use of many kinds of special tools, equipment, and vehicles, and be prepared to perform a large number of widely varied tasks. They must be capable of executing these tasks with great speed under hostile fire, and often with improvised means or materiel.

15. INDIVIDUAL. Newly-activated units receive enlisted men directly from reception centers, and the first months after activation are devoted to basic training. Replacements usually come from engineer or armored replacement centers. Trainees learn to perform normal engineer tasks while undergoing squad, platoon, and company training. Specialized instruction is carried on in unit schools and service schools.

16. SQUAD. Under its regularly assigned squad leader, the squad learns to perform engineer and combat missions as a unit. Training includes–

a. Care, operation, and employment of the squad vehicle and weapons.

b. Performance of typical armored engineer work, such as hasty construction and repair of bridges and culverts, placing and removal of antitank and antipersonnel mines, demolitions, and squad tasks in construction of ferries and floating bridges.

c. Continuous practice in providing local security for the squad's own working parties (see Section VI).

d. Combat training, similar to that of the armored infantry squad (see FM 17–42).

17. PLATOON. a. The engineer platoon is the basic engineer work unit, although each of its three squads is trained to perform normal engineer tasks. Under all but the most unusual conditions, the platoon remains under the control of its platoon leader in both training and combat; it should not be subdivided into smaller attachments or details. Training of the platoon emphasizes–

(1) Independent execution of typical engineer tasks.

(2) Coordination of the squads for efficient performance of platoon tasks.

(3) Local security (see Section VI).

(4) Combat training, usually in connection with engineer operations, but similar to training of the armored infantry platoon (see FM 17–42).

b. All engineer platoons receive the same type of training, but an important difference of equipment that exists between the platoons of a company may affect their employment. Of the three platoons, one is mounted in armored half-track vehicles, and two are transported in 2½-ton dump trucks. Performance of most engineer tasks is not affected by this variation, but under some conditions the equipment may govern. In particular, the platoon mounted in half-tracks may be called upon for operations that bring them under enemy ground fire (paragraph 22).

18. COMPANY. a. Engineer company. Training of the engineer company consists of developing the teamwork of the three platoons and the company headquarters, plus the training of the specialist personnel in company headquarters. The technical training of the company is accomplished best by employing it upon definite engineer tasks.

b. Headquarters company. All men of headquarters

company receive basic training. Specialists receive additional training. Specialist training is the responsibility of the company commander except for men under the control of battalion staff officers.

19. BATTALION. a. General. Battalion training primarily consists of the coordination of the operations of the lower units by the battalion commander and the battalion staff. Practice of these command and staff functions should be as rigorous and continuous as the more technical phases of training.

b. Schools. The battalion conducts schools to instruct officers and enlisted specialists in technical subjects. Use is made of divisional and branch schools when they are available. Training films and similar aids are used, but practical application, particularly under field conditions, is the most important part of the training.

20. COMBINED TRAINING. a. Armored engineers are nearly always utilized as parts of larger combat groups. Their activities must, therefore, be coordinated carefully with those of tank, infantry, or other elements. Every engineer officer and noncommissioned officer must understand the characteristics of the other arms with which his command must function (paragraph 5).

b. The battalion commander should take every opportunity for combined training of armored engineer troops with the other elements of the division and with attached treadway bridge companies. Typical combined problems should be planned and executed, including operations which will allow the engineer battalion to—

(1) Reconnoiter and prepare routes for tank units in attack.

(2) Transport tank and other heavy units across streams by means of ferries and floating bridges.

(3) Construct road blocks and mine fields for defense by other units.

(4) Assist in the assault of field and permanent fortifications.

Section IV

RECONNAISSANCE

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21. GENERAL. a. Reconnaissance by the armored engineer battalion consists of obtaining technical data about all terrain features which can have an important effect upon the mission of the battalion. This includes determination of–

(1) Type, load, capacity, and traffic capabilities of roads, routes, and bridges.

(2) Location of and means of avoiding swamps, mine fields, defiles, weak bridges, and other actual or potential obstacles.

(3) Sites for construction of fords, bridges, and ferries.

(4) Location, type, and quantity of materiel usable for engineer or other supplies, This includes construction material, standing timber, water, fuel, lubricants, food, abandoned ammunition and vehicles.

b. Details of the methods of engineer reconnaissance are given in FM 5–6.

22. OPERATIONS WITH RECONNAISSANCE SQUADRON. a. Reconnaissance section. (1) The reconnaissance section of the engineer battalion headquarters company is attached normally to the division reconnaissance squadron, at least until contact is made with the enemy. The mission of this attached section is to obtain information about the condition of routes for the main columns of the division. This includes investigation of important defiles and vital bridges previously known to be key points, and general route reconnaissance of the entire terrain.

(2) Prompt transmission to engineer battalion headquarters of the information gathered by the reconnaissance section is a necessity. On this information depends

the performance of the mission of the battalion and hence the mobility of the division. These data must be available to the division engineer to indicate the proper disposition of engineer troops and supplies. Satisfactory delivery of the information requires direct transmission or prompt relaying by long range radio (see paragraph 8).

b. Attached working units. (1) To assure mobility of the reconnaissance squadron it may be necessary to attach engineer troops to it. The size and disposition of the attachment is dependent on such factors as the terrain, and the extent of enemy demolitions and mine field defenses. The attached unit is never smaller than a platoon, and may be as large as a company for operations in rough country. All engineer squads receive training which fits them for work with reconnaissance elements. Normally the first unit assigned to reconnaissance duty from an engineer company is the armored platoon, because of the mobility and protection afforded by its equipment (see paragraph 17**b**).

(2) Attached engineers assist the movement of reconnaissance elements by hasty repair of bridges, construction of fords and small ferries, and removal of obstacles. The commander of the attached unit recommends to the reconnaissance squadron commander a method of employing his attached engineers, advises him of the condition of bridges and obstacles, and directs the execution of the engineer tasks.

23. ENGINEER COMPANY RECONNAISSANCE. Engineer units attached to a combat command may detail personnel trained in reconnaissance to perform specific reconnaissance missions for the command. The method of operation of these detachments is similar to that of the reconnaissance section of the headquarters company. Information secured is transmitted as quickly as possible to the parent engineer unit. Information of use to the engineer battalion or combat command is relayed promptly by the company commander.

24. ENGINEER SITUATION MAP. The assistant division engineer, at the forward echelon of division headquarters, keeps an engineer situation map on which is plotted pertinent engineer information, supplemented as necessary by tabular data (see paragraph 10b and figure 10).

Figure 6. Reconnaissance elements investigate all important bridges.

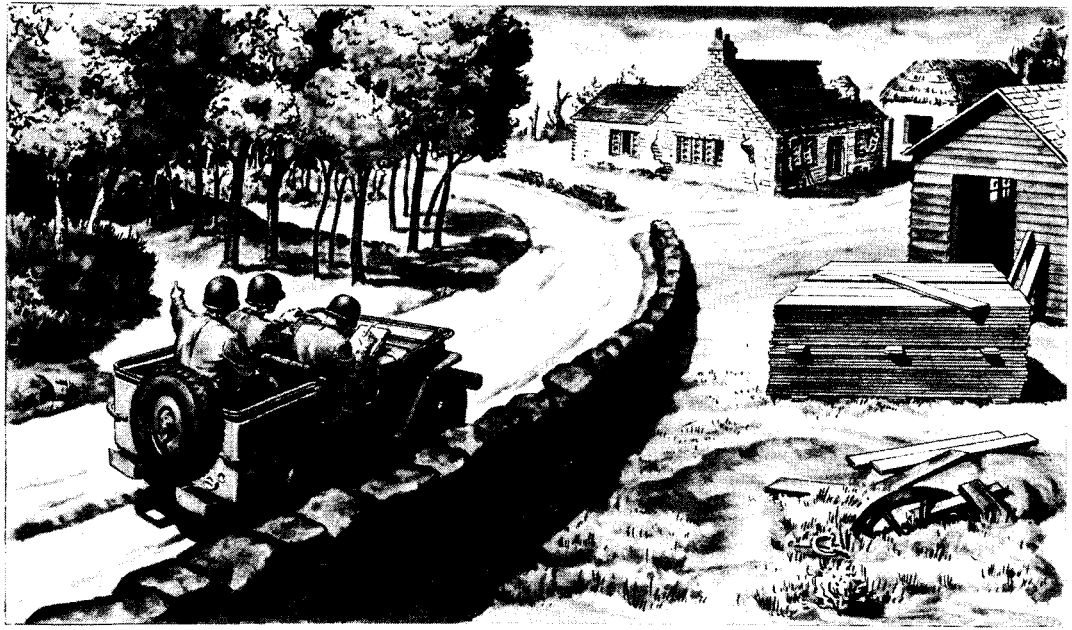

Figure 7. Reconnaissance elements report location of usable construction materiel.

Figure 8. Failure to report reconnaissance data accurately and promptly may seriously delay armored units.

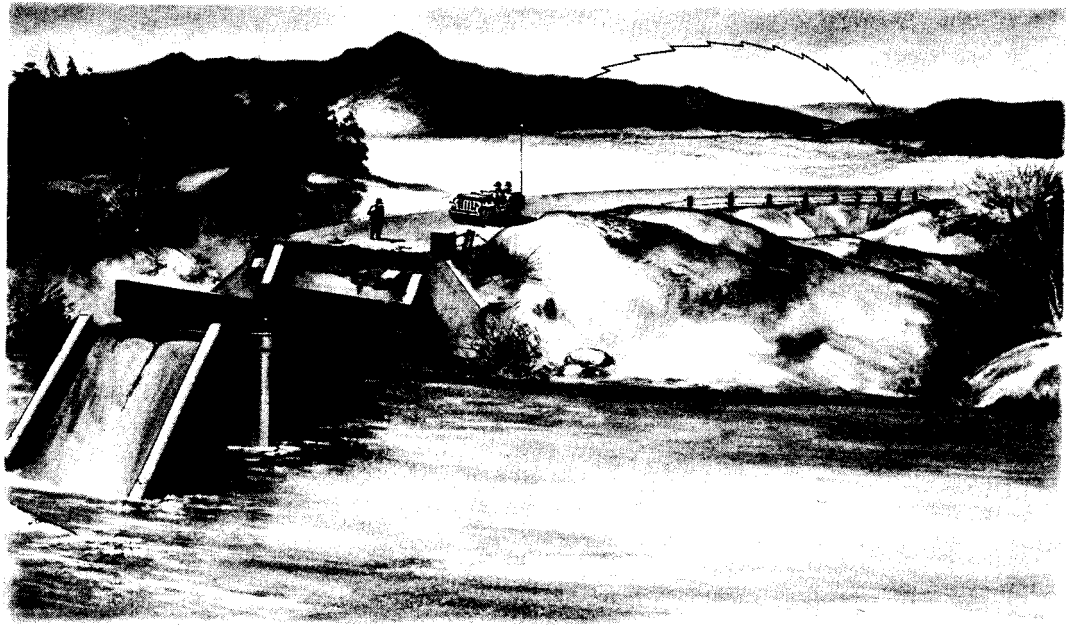

Figure 9. Report important reconnaissance information without delay.

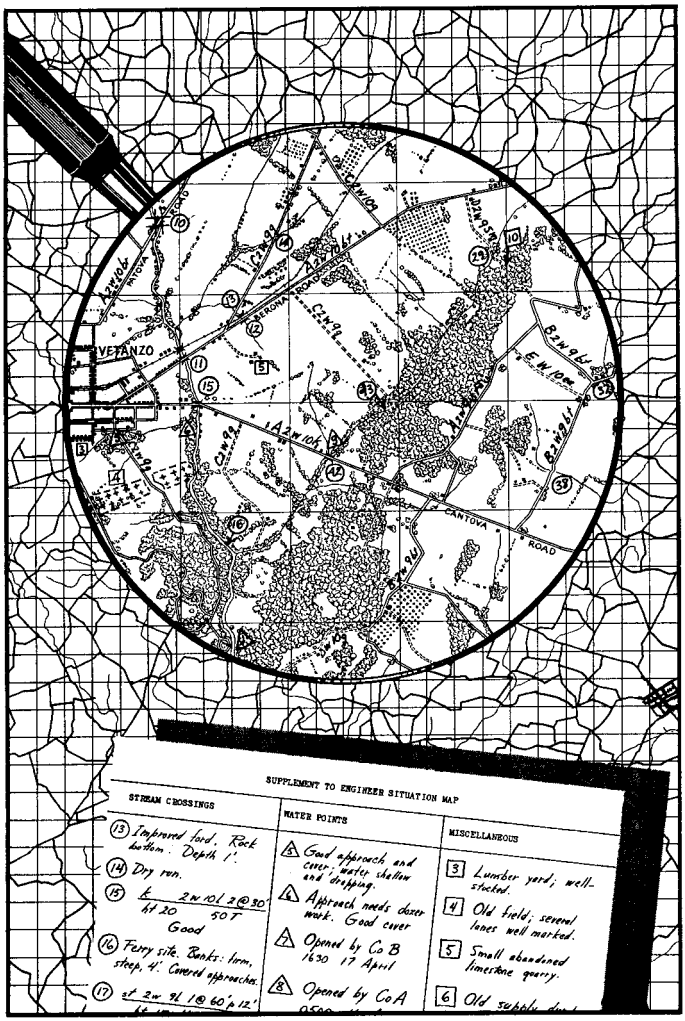

Figure 10. Engineer situation map.

Section V

MARCHES

25. CONDUCT OF MARCHES. See FM 25–10, and FM 17–50 for methods of conducting marches.

26. ENGINEER OPERATIONS. **a.** When the armored division is on the march, the primary mission of the armored engineer battalion is to assist its progress. To accomplish this, the battalion performs early, rapid, and complete reconnaissance, and effects necessary repairs to routes and bridges with a minimum of delay.

b. Engineers insure usable routes from railheads or primary road nets, and from bivouac areas to assembly areas. From assembly areas, routes may have to be prepared for the approach march.

Section VI

SECURITY

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27. GENERAL. **a.** Security embraces all measures taken for protection against surprise, observation, and interference by the enemy. It includes special measures taken for protection against hostile air, mechanized, and chemical attacks.

b. The security provisions covered in FM 100–5 and FM 5–5 apply generally to armored engineer troops.

c. The division plan for general security usually includes some engineer devices and effort. These may vary from a few hasty obstacles and the hasty mining of bridges, to the connecting of natural barriers with a system of extensive artificial barriers in depth. The system may include antitank mines, personnel mines, bridge and ford demolitions, abatis, craters, and improvised obstacles, all properly concealed. If other troops are not initially charged with the defense of such devices, engineers cover the barriers by fire until relieved. Engineers should be relieved from such duties by other troops as soon as practicable in order to proceed on important engineer tasks. Engineers cannot properly defend obstacles against heavily armored forces because their armament includes no heavy caliber weapons.

d. Each engineer unit, regardless of size, is responsible for its own local security.

28. AT WORK. **a.** The security for a working group may be provided by other troops. However, local security remains the direct responsibility of the engineer commander, who utilizes his own troops for this purpose or satisfies himself that the local security measures being taken by other troops are fully adequate.

b. Each engineer commander makes a plan of action to be followed in case of enemy attack. This plan may

provide for reinforcement of security elements from the working party, or for the withdrawal of working groups under the protection of security elements. Troops at work always keep their weapons nearby, ready for instant use.

c. (1) Security against enemy ground action is provided by an outpost. The location and nature of the outposts are determined by the anticipated enemy threat and by the location of working parties. The strength and composition of the outposts vary with the distance, mobility, and aggressiveness of the enemy, the time of day, the terrain, the size of the command to be protected, the degree of resistance the outposts are expected to offer, and any special duties assigned to them. Dispositions are no stronger than is consistent with reasonable security. Normally, small outguards of from two men to a squad, equipped with suitable weapons and posted on the principal avenues of approach, will provide adequate security against enemy ground action. For full discussion of outpost see FM 7–10 and 17–42.

(2) Defenses normally include the planned use of dismounted troops and vehicular or ground machine guns. Antitank mines may be used to block roads and other passages.

d. For security against chemicals see FM 21–40.

29. ON THE MARCH. The extent to which an engineer unit on the march provides for its security depends upon the measures taken by other troops in the same column and upon the expectation of contact with the enemy. Engineers are not used as general security forces unless operating alone. An engineer unit operating alone, however, provides for its security on the march by forming advance, flank, and rear guards. (For security formations, see FM 17–42).

30. AGAINST AIR ATTACK. a. General. Engineer units protect themselves against air attack by a warning system, dispersion, concealment, and night and cross-country marches. They take measures for imme-

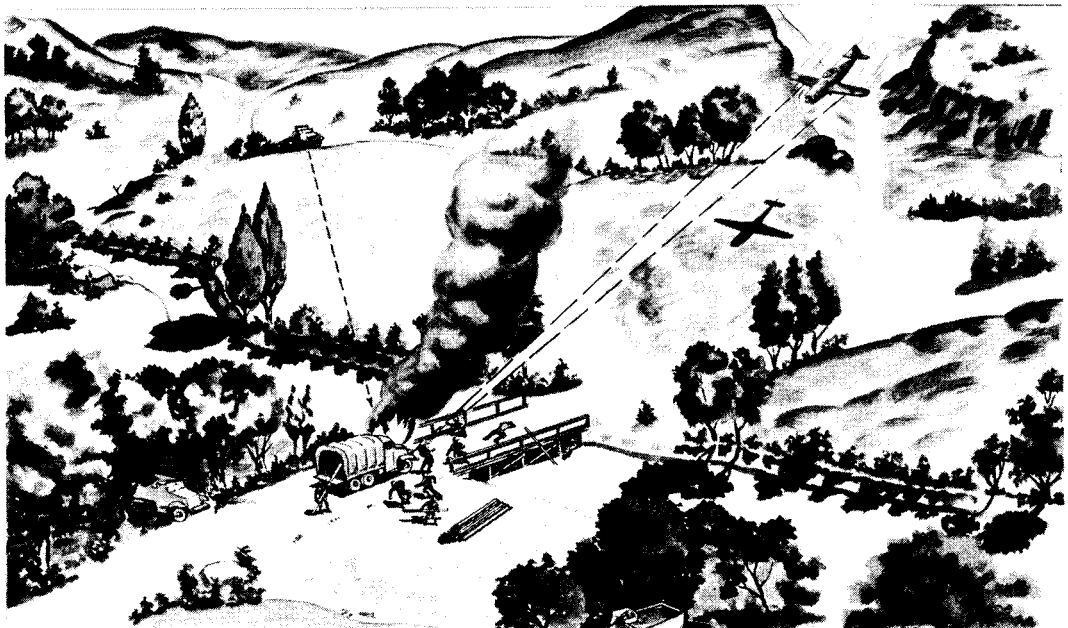

Figure 11. Do not *let a working party be surprised by sudden enemy attacks.*

Figure 12. Provide all around local defense for a working party.

Figure 13. Do not *fail to provide air security for marching columns.*

Figure 14. Be alert for air attacks, and fire with all available weapons.

diate protection against low-flying aircraft by using their own weapons which are suitable for *fire against aircraft.* All troops charged with this duty are prepared constantly for immediate action, but will fire only upon order of an officer or responsible noncommissioned officer. No aircraft will be fired upon unless it has been clearly recognized as hostile or is positively identified as hostile, or attacks with bombs or gun fire.

b. Warning system. An aircraft warning system must be organized to provide timely warning of the approach of hostile planes. Sentinels are posted at all times to warn of the approach of enemy aircraft. In bivouac and at the halt, these sentinels should be posted in positions of good observation and are provided with adequate means of communication. Units should be alert for radio warnings over command channels. Antiaircraft weapons are sited and manned habitually.

c. In bivouac. In bivouac, assembly areas, and rallying points, air security is obtained primarily by concealment and dispersion. Enforce rigid camouflage and light discipline. Curtail use of fires to avoid disclosure of positions by smoke. Brush out all vehicular tracks. Fox holes should be dug.

d. On the march. Density of vehicles usually does not exceed 20 to the mile if there is danger of air attack. Provision should be made for all around protection by fire. Be prepared to repel low-flying planes attacking from the direction of hills and woods. Use machine gun and effective small arms fire. Pistols, carbines, and submachine guns are not considered effective antiaircraft weapons.

31 DEFENSE OF KEY BRIDGES. a. Bridges erected by engineers. When an important bridge, particularly of treadway construction, is erected by engineer troops, provision is made for efficient defense of the structure, including defense against aircraft. Engineers can effect some protection of such a bridge, but are normally made available for further engineer work

as soon as possible. Other troops in greater strength and with heavier armament are usually required to defend the structure adequately.

b. Bridges prepared for demolition. In a retrograde movement, bridges which are to be demolished are guarded against surprise and seizure intact by the enemy. *Do not leave a prepared demolition unguarded.* Bridges which are to be destroyed but which are still of use to friendly troops are not blown prematurely. Such a bridge is secured from attack and seizure by small enemy forces, in order to be usable by friendly troops as long as possible. This defense may be performed by forces varying from small engineer groups which prepare the demolition to infantry, antiaircraft, and tank destroyer units. (See paragraph 40). Definite orders should be given as to when or under what circumstances the bridge will be destroyed. A definite time may be set or orders may be given that the bridge will be destroyed when certain units are across. The bridge should be destroyed if about to fall into enemy hands.

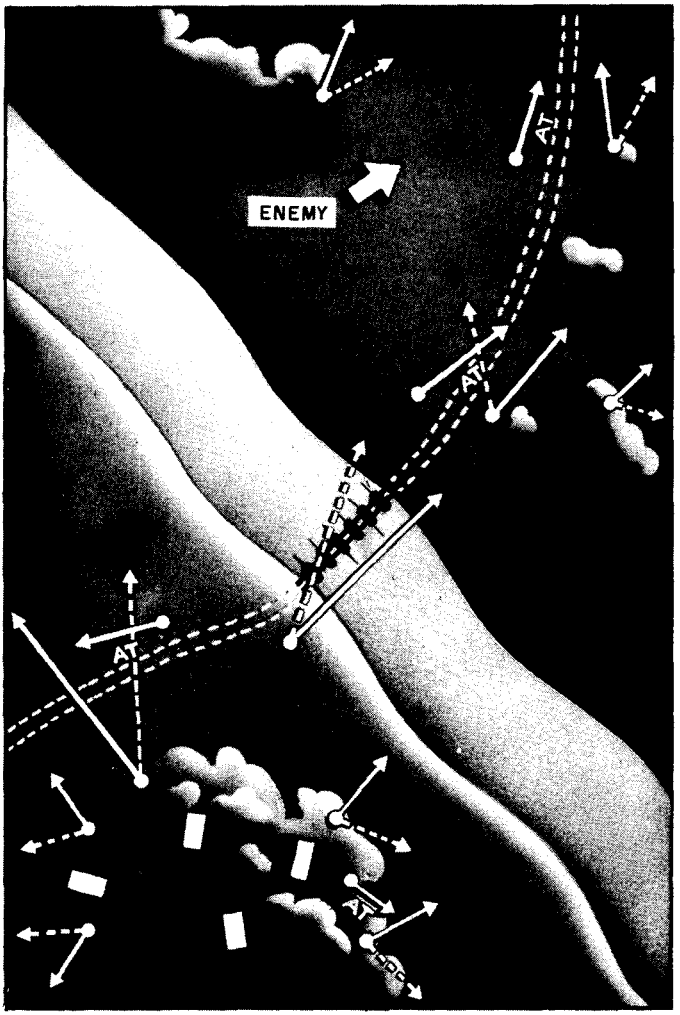

Figure 15. An important bridge is defended by heavily armed troops of adequate strength.

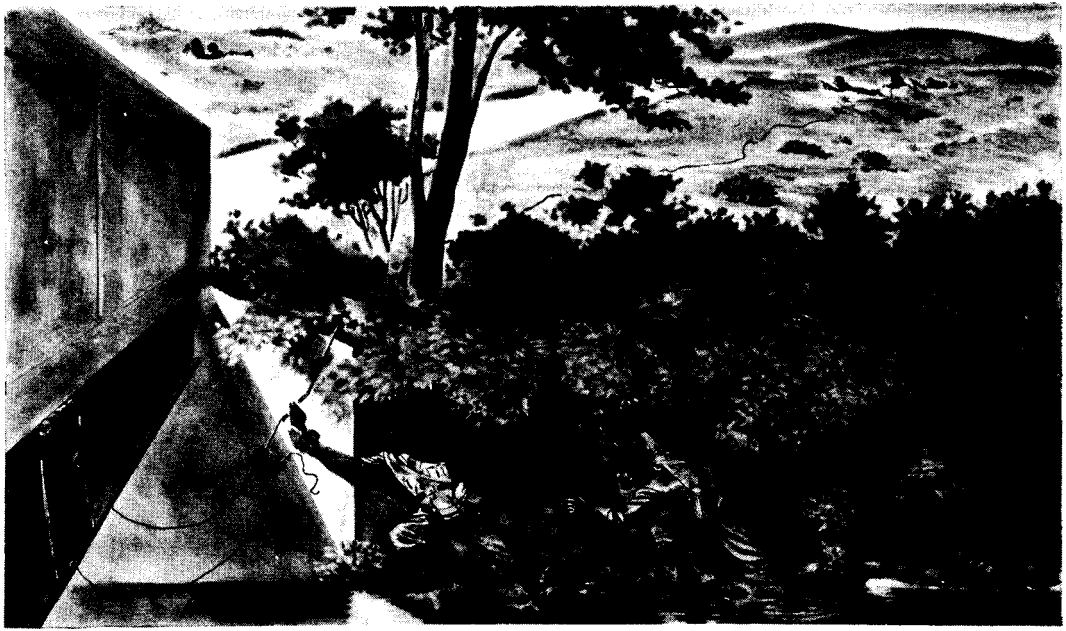

Figure 16. Do not *let the enemy approach prepared demolitions unobserved.*

Figure 17. Place guards where they can protect prepared demolitions.

Figure 18. A prepared bridge still of value to friendly forces is defended to prevent premature destruction. Proper defense may require troops other than engineers.

Section VII

OFFENSIVE ACTION

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32. GENERAL. Offensive action by armored units is covered in FM 100–5, FM 17–100, and other field manuals.

a. The primary mission of engineers in offensive action is to assist the rapid movement of combat elements. Engineers build and reinforce bridges, and remove or make passages through mine fields and other antitank obstacles.

b. Some engineer work can be foreseen, but during battle much unanticipated engineer work must be performed. Leaders of engineer units of all sizes are prepared to determine what engineer operations are necessary, and to execute them without specific instructions from higher authorities. Use expedients. Don't build a bridge when a ford will carry the traffic. When possible, have available standard equipage such as lumber, metal mats and treadways, but strive to save it for critical needs by using local material. Take advantage of the mobility of armored units by using detours to effect easy crossings and by-pass obstacles. *Time* is the most important factor in all such operations.

33. ASSEMBLY AREA OPERATIONS. a. To assist the movement of the division into the assembly area, engineers–

(1) Reconnoiter and report condition of all important routes (see Section IV).

(2) Remove obstacles on approach roads.

(3) Improve fords, install and operate ferries, and strengthen, repair, or construct bridges.

(4) Provide security by use of demolitions and obstructions on flanks and in the rear.

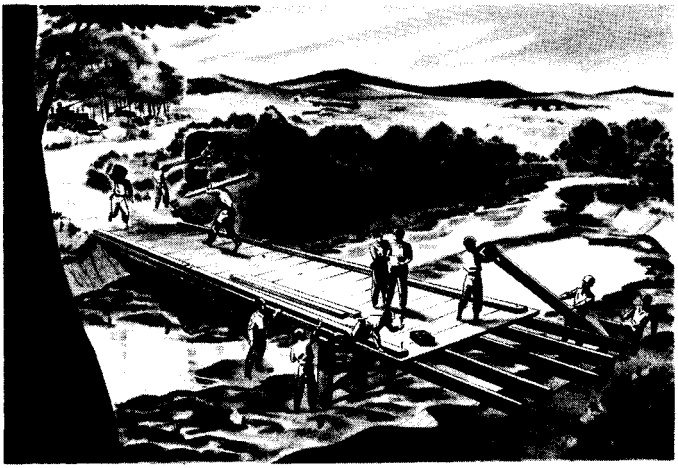

Figure 19. Do not waste time by building an unnecessary bridge.

Figure 20. Save time by building a ford when it will carry the traffic.

Figure 21. Use hand labor only when necessary.

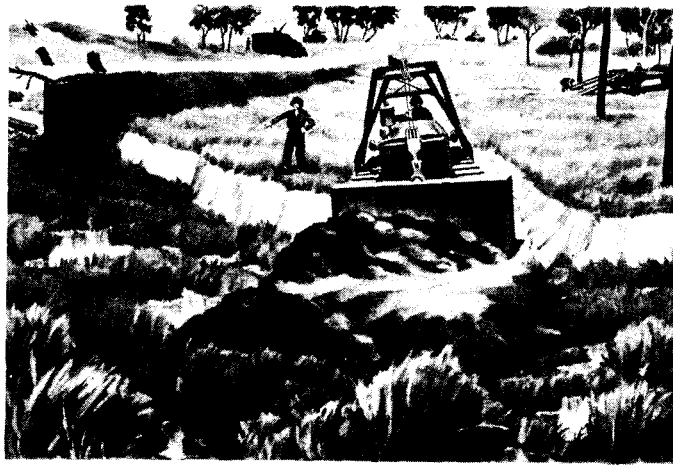

Figure 22. Save time by having power equipment available.

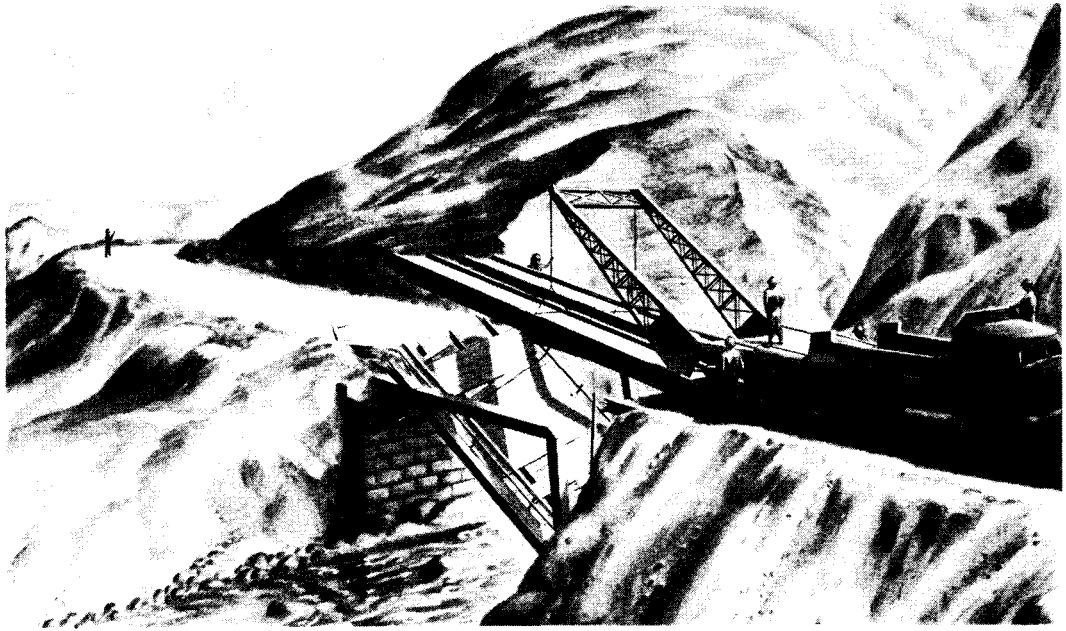

Figure 23. If practicable, use treadway equipment to speed a critical small crossing.

Figure 24. Do not immobilize a large engineer unit on a small maintenance job.

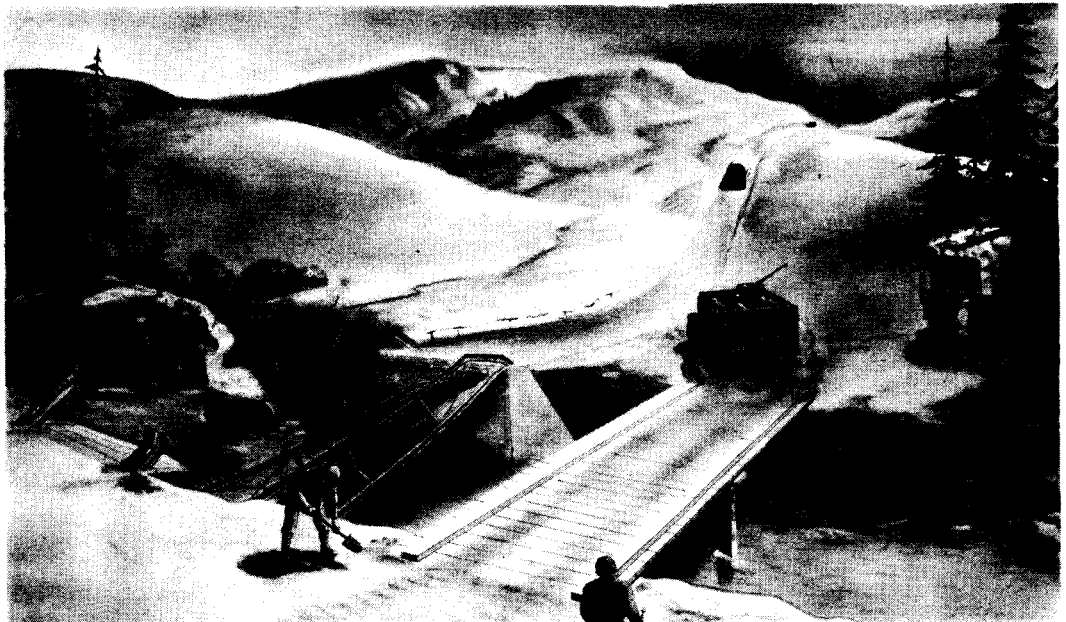

Figure 25. Leave a small detail to maintain a crossing.

Figure 26. Make and clearly mark sufficient lanes through mine fields.

b. In the assembly area, engineers—

(1) Operate water points.

(2) Assemble engineer supplies and equipment needed to support forthcoming operations.

(3) Reconnoiter routes to the attack positions and prepare plans for required work.

(4) Perform work on routes to the attack position when such action will not disclose our plans to the enemy.

c. In the approach march, engineers—

(1) Prepare routes to the attack position.

(2) Assist the advance beyond the attack position by rapidly providing means for crossing or by-passing streams, canals, marshes, gullies, antitank barriers, and similar obstacles.

(3) Remove or clear and mark lanes through mine fields.

34. ACTION IN PURSUIT. In a pursuit, the success of the whole action may depend on the maintenance of unobstructed routes for the tank elements. Engineer troops should be well forward, well supplied, and in ample strength. They rapidly construct or repair ferries and bridges, remove mine fields and other obstacles, seize bridges before they can be destroyed, and place hasty road blocks to retard and isolate enemy units.

35. ATTACK OF A FORTIFIED POSITION. a. When an attack on a fortified position by armored troops is necessary, it should be performed by specially organized assault units. These include infantry and engineers, supported by massed artillery and bombardment aviation. These special units should receive thorough advance training, including realistic rehearsals against similar structures and areas to be assaulted (see FM 100–5, FM 5–6, and FM 31–50).

b. Engineer operations in such actions consist of clearing paths through barriers, and breaching walls and destroying gun emplacements with explosives.

c. Similar tactics may be employed by engineers as a part of mopping up operations in cities and towns. Engineers assist in the clearing of such positions by using explosives to breach street barricades and demolish buildings.

36. **ATTACK OF A STREAMLINE.** The subject of river crossings is covered generally in FM 100–5, FM 17–100, and FM 17–33. Engineer operations are discussed in FM 5–5. Technical data on the treadway bridge is found in TM 5–272.

a. **General.** Engineers are called upon to assist in all types of stream crossings. They construct ferries and erect fixed and floating bridges. They may transport personnel in assault boats, pontons, or on improvised rafts. In all operations they establish adequate security, and use speed and deception to the utmost.

b. **Initial information.** Before a major stream is crossed, data is gathered concerning the general condition of the river, and the condition and location of tributaries, bridge sites, and approaches. Reconnaissance, air photographs, and all other methods available are used to collect this information.

c. **Equipment.** When a river is to be spanned with assault boats, large ferries, or a floating bridge, necessary equipment is obtained from corps or higher units. Armored engineers normally effect such a crossing by using steel treadway bridge equipment which is transported and unloaded by an engineer bridge company attached by the higher echelon. Plans are made to move the bridge unit to the site of the operation, and to protect the site during and after the crossing.

d. **Construction of treadway bridge.** Line companies of the armored engineer battalion construct the treadway bridge. The strength of the various details is dependent on the size of the bridge, urgency of its construction, condition of the stream, and engineer requirements elsewhere. Use of several working points, often considerable distances apart, aids the effort by

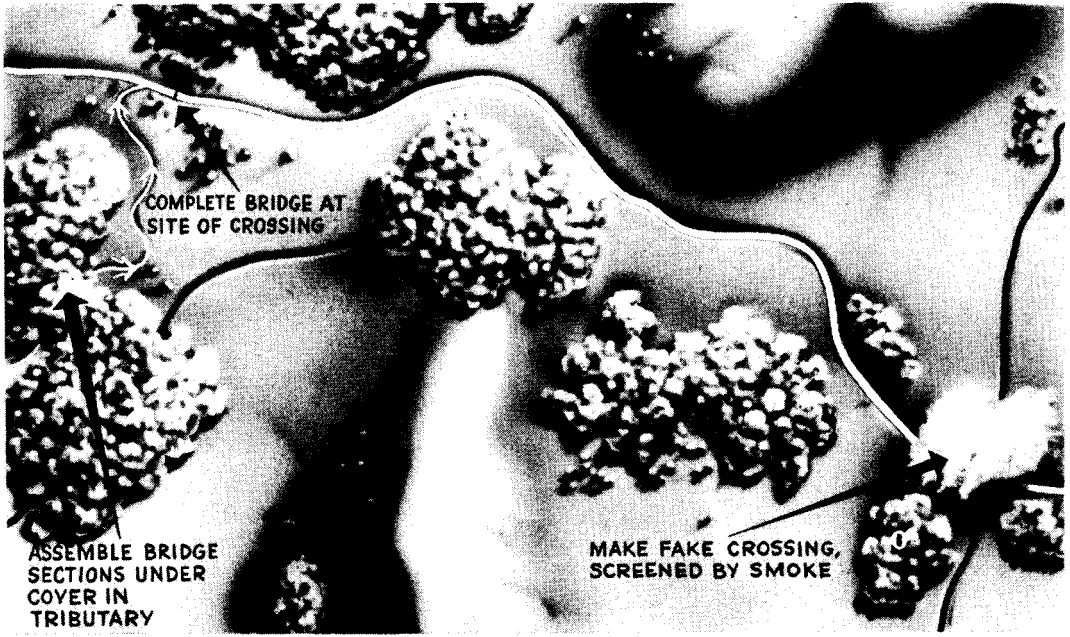

Figure 27. When feasible, use deception to aid a river crossing.

reducing size, confusion, and congestion of working groups, and improving chances for concealment. In many situations this method can be extended to effect major surprise of the enemy. Work on approaches to the bridge site should be started as early as possible. Poor approaches often are the major delay in crossing a stream. Portions of the bridge may be completed in concealment in tributaries or between islands and the shore, then moved into place rapidly with the help of power boats or outboard motors. Often useful devices are the concealment of the actual point of crossing with smoke, and the construction of dummy bridges of spare and improvised material. *Speed and deception should be used.*

37. **THE ATTACK.** Armored units seek to attack by envelopment. When this is impracticable attack by penetration is made through weak spots in the enemy position. Attack against well organized positions is made only when other operations are not practicable. The attack may be made with either infantry or tanks leading depending upon the terrain and the hostile defense (FM 17–100). Engineers and infantry breach the mine fields and reduce the obstacles so the tanks may pass through and continue the attack. When tanks lead, engineers must be well forward to assist tanks in traversing bad terrain and to move forward with the infantry should mine fields or other obstacles be encountered.

38. **ILLUSTRATIVE PROBLEM—ENGINEER OPERATIONS.** In the sample situation below, it is assumed that an armored division is in a pursuit. The enemy has organized a fairly strong position in terrain favorable to him; attack in this sector is necessary as adjacent terrain is impassable. The armored division's attack in this sector is designed to penetrate the enemy position and allow tank units to reach the favorable terrain beyond. Typical engineer functions in this type of penetration are shown.

I – RECONNAISSANCE OPERATIONS

(See figure 28)

GENERAL ACTION	ENGINEER OPERATIONS
Division reconnaissance elements (with 1 engineer reconnaissance section and 1 engineer platoon attached) advance east along main highway until stopped in Ufans by partially destroyed bridge (2 spans of large timber structure are blown).	Reconnaissance section reports condition of all roads, bridges, and fords in area to combat command and engineer battalion headquarters.
Reconnaissance extends north and south of town. Patrols attempt to cross river in reconnaissance boats, encounter fire from enemy infantry near site of blown bridge.	Reconnaissance section reports location of possible ferry site; natural construction material available. Engineer platoon repairs ford and reinforces weak truss bridge to take load up through armored car on secondary road southwest of Ufans. (No heavier load possible here without replacing bridge.)
Division reconnaissance elements cross stream southwest of Ufans, fight off enemy patrols. Reconnaissance units by-pass detachment of enemy infantry in town, but cannot penetrate enemy defenses in line of woods east of Ufans.	Engineer platoon constructs ford southeast of Ufans.

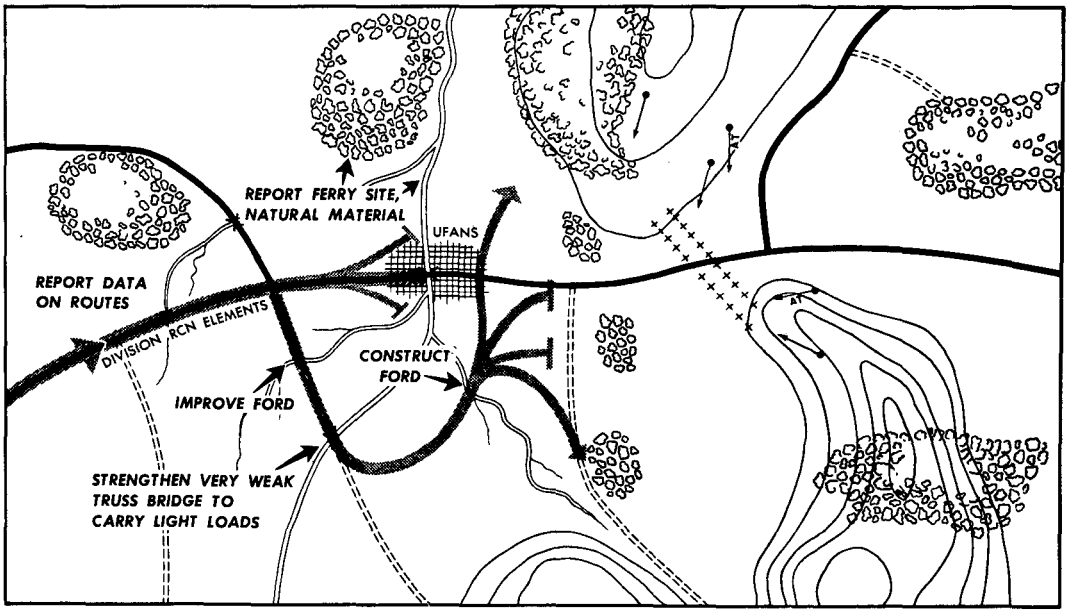

Figure 28. Typical engineer functions in attack.

II – ADVANCE GUARD ACTION

(See figure 29)

GENERAL ACTION

Reinforced armored infantry battalion (with 1 platoon of engineers attached) acting as combat command advance guard marches east on route of division reconnaissance. Infantry takes up attack of enemy defenses east of Ufans. Clears enemy out of Ufans. Supporting weapons which cannot cross weak bridge fire from west bank of stream, south of Ufans.

ENGINEER OPERATION

Reconnaissance section reports estimates of materiel, equipment, and personnel needed to repair bridge at Ufans. Decision is made by combat command commander to repair bridge. Additional construction material is assigned to combat command engineers by division engineer.

Advance guard engineer platoon improves and maintains route southeast of Ufans, begins repair of bridge at Ufans under protection of infantry. Remainder of combat command engineer company moves forward from main body to bridge site.

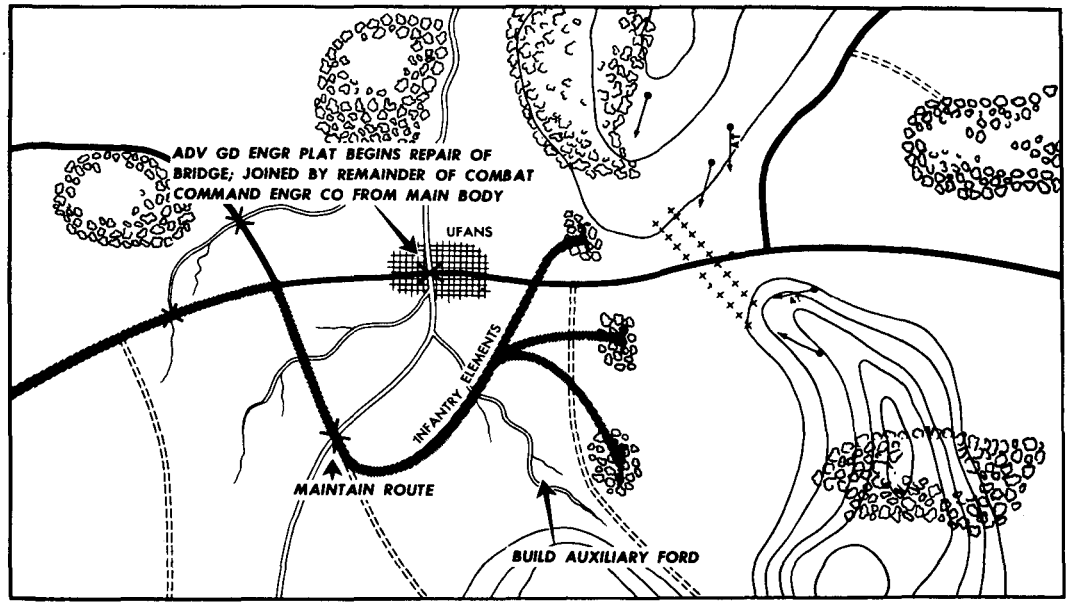

Figure 29. Typical engineer functions in attack.

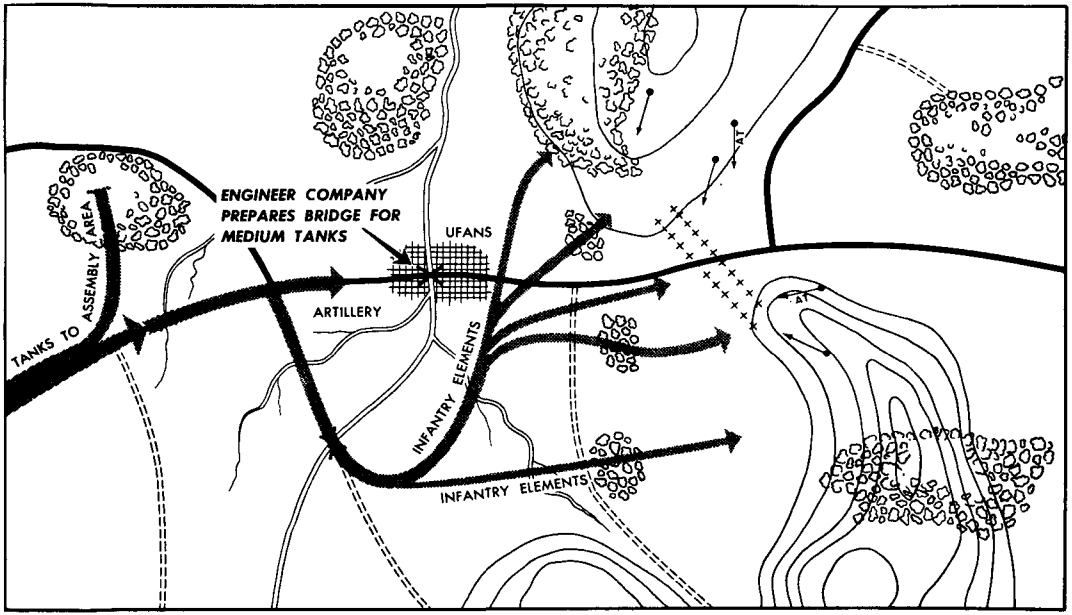

Figure 30. Typical engineer functions in attack.

III – MAIN ATTACK

(See figure 30)

GENERAL ACTION	ENGINEER OPERATION
Main body of combat command, with 1 infantry battalion leading and including 1 artillery and 1 tank battalion less advance guard detachments, advances east. Infantry follows route of advance guard, drives back defense line east of Ufans to hills flanking mine field. Tanks remain in assembly area west of Ufans.	During night, engineer company constructs new section of timber bridge at Ufans, reinforces structure to take medium tanks (8 hours).

IV – COMPLETION OF PENETRATION

(See figure 31)

GENERAL ACTION	ENGINEER OPERATION
Artillery crosses river, places concentrations on weapons in hills north and south of mine field to assist infantry assault of mine field defenses.	Engineer company leaves details to maintain route, displaces forward, reconnoiters and prepares to breach mine field.
Infantry clears defenses of mine field with help of artillery and fire of tanks. Some tanks assist infantry by fire. All are ready to pursue enemy when pass is clear.	Engineer company clears and marks lanes through mine field.

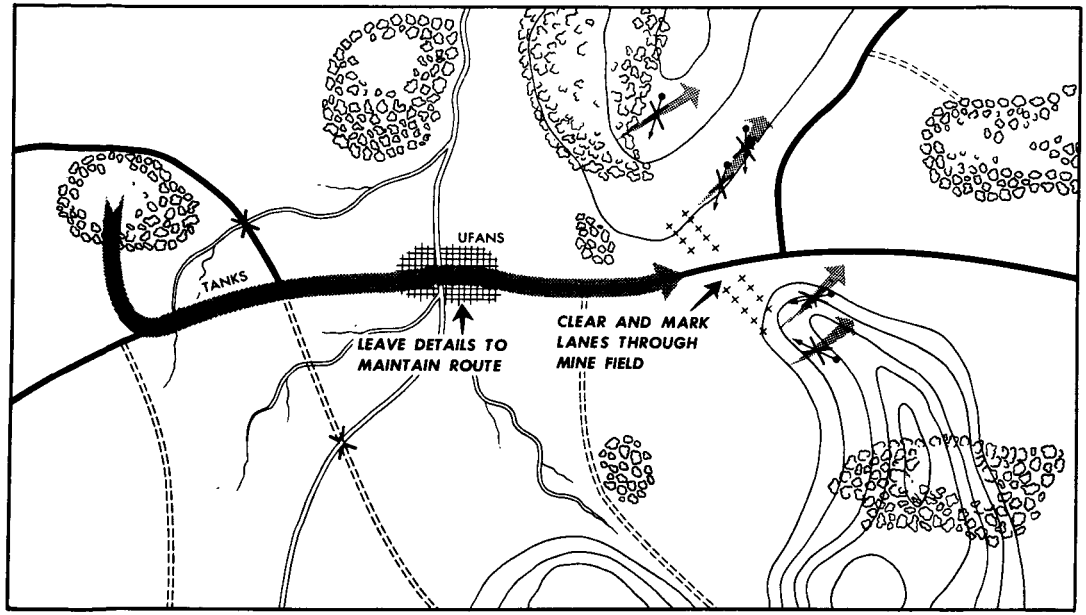

Figure 31. Typical engineer functions in attack.

Section VIII

DEFENSIVE ACTION AND RETROGRADE MOVEMENTS

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39. GENERAL. Defensive action and retrograde movements by armored units is covered in FM 100–5, FM 17–100 and other field manuals. Details of engineer functions in such operations are covered in FM 5–6.

40. OBSTACLES AND DEMOLITIONS. a. Barriers. Obstacle technique is covered in FM 5–30 and FM 5–31. When engineers construct or supervise construction of mine fields or other barriers on routes of withdrawal, they provide well marked lanes through the obstacle for the passage of friendly forces. When a barrier has been crossed by all friendly troops, or is in imminent danger of assault by the enemy, existing gaps are closed. Usually all markings are removed, although in some cases they may be left to mislead the enemy. Booby traps may greatly retard the enemy, and should be used extensively on barriers when the amount of time, personnel, and materiel permit. Provisions are made for security of working troops and for defense of completed obstacles (paragraph 27).

b. Demolitions. In a delaying action, all important fords and bridges are prepared for demolition. Those not to be used by withdrawing or delaying troops are destroyed; others are prepared and defended. A plan of demolitions is prepared by the division engineer for approval by the commanding general. Control of actual execution of demolitions is decentralized. Responsibility for a demolition rests with the unit preparing it.

41. DEFENSIVE. In the defensive the armored division usually is held in reserve. It may be forced to

take the defensive temporarily when acting alone. Rarely will it be given a defensive sector to hold.

a. When the armored division is in reserve the armored engineers prepare and keep open routes to probable areas of employment. In the counterattack by the division, engineers operate as in the offensive.

b. When the armored division occupies a defensive position engineers prepare obstacles, lay mine fields, prepare and perform demolitions, and prepare routes for counterattacking forces. Usually, some engineers are attached to the reconnaissance squadron or counter-reconnaissance force to destroy bridges and other features thus delaying the enemy. Infantry usually plans and fortifies the positions it occupies. However, in exceptional circumstances, such as when infantry is engaged elsewhere, engineers may be used to lay out the position, marking limiting points, and furnish guides for moving troops into position.

42. RETROGRADE MOVEMENTS. In retrograde movements engineers perform demolitions, erect obstacles, plant mine fields, and keep open routes to the rear.

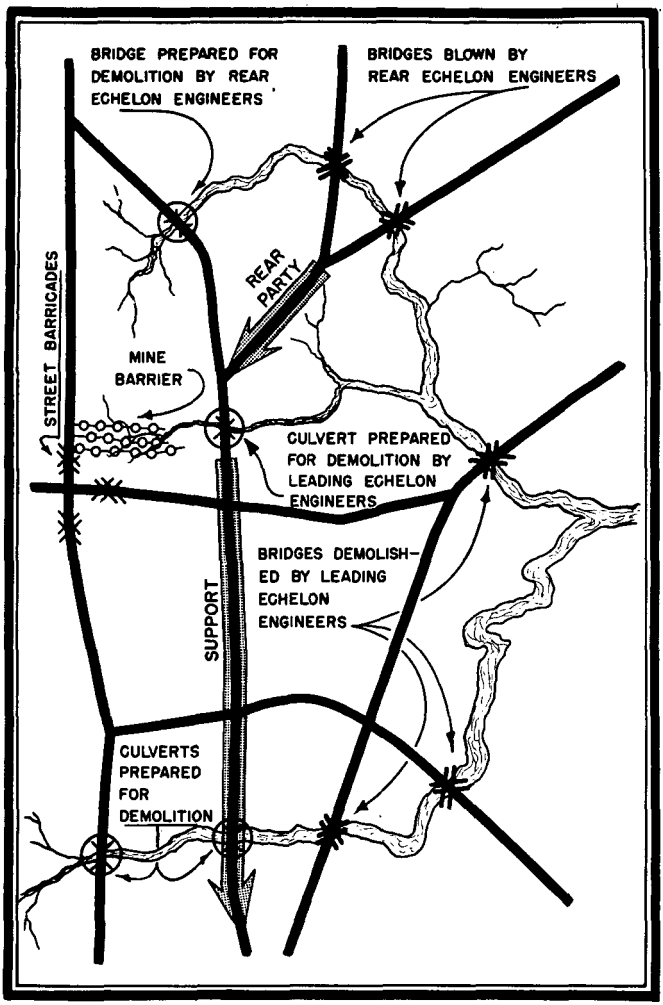


Figure 32. Engineer operations in a rear guard.

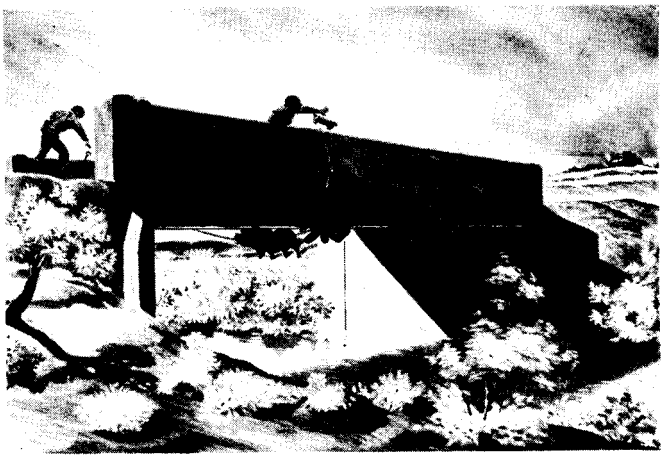


Figure 33. If pressed for time, do not use slow methods of demolition.

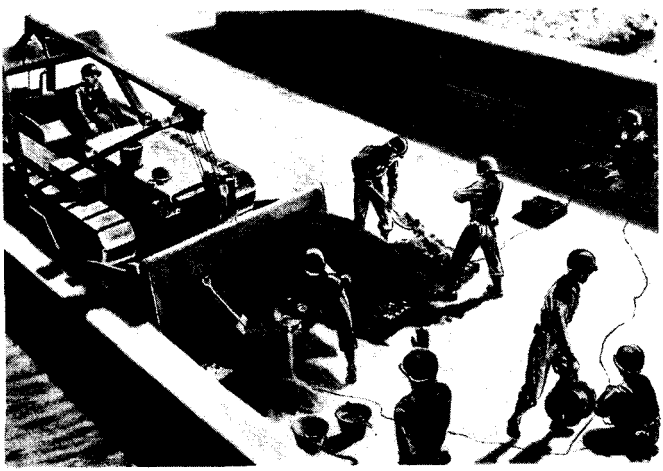


Figure 34. If time is short, speed demolitions by all available means.

Figure 35. Demolish a bridge thoroughly to prevent hasty repair. Force the enemy to bring forward heavy equipment or material.

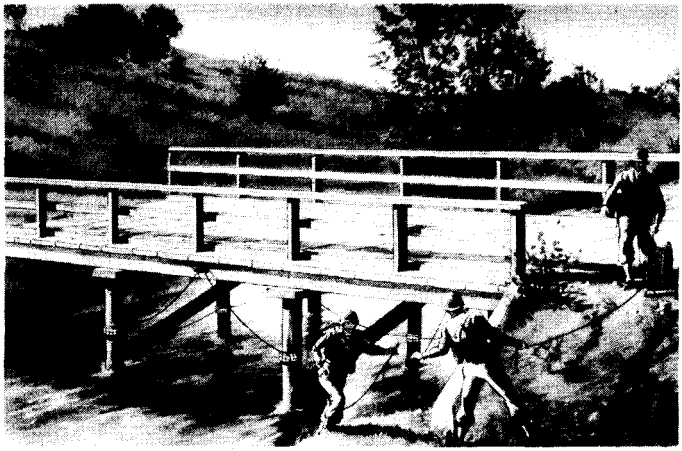
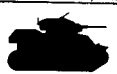
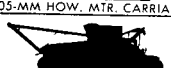


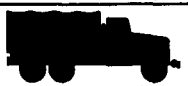
Figure 36. Do not waste explosives when other means of demolition are practicable.

Figure 37. Economize on explosives by using expedients. This method is time consuming and often ineffective. Destruction must be carefully checked.

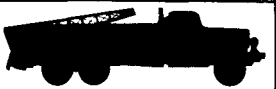
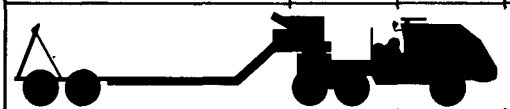
CHARACTERISTICS OF ARMORED DIVISION VEHICLES

VEHICLE	WEIGHT (TONS)	LENGTH (FEET)	WIDTH (FEET)	HEIGHT (FEET)	FORD (FEET)	SPAN (FEET)	GRADIENT (DEGREES)	STEP (FEET)	SPEED (MPH)
 HALF-TRACK CAR, M3A2	9.4	19.8	7.2	7.6	2.7	—	31	—	45
 LIGHT TANK, M5A1	16.2	14.5	7.4	7.9	3.0	6	31	2.0	40
 75-MM HOW. MTR. CARRIAGE, M8	17.3	14.5	7.4	7.6	3.0	5.4	31	2.0	35
 MEDIUM TANK, M4A3	34.2	19.4	8.6	9.3	3.0	6	31	2.0	28
 105-MM HOW. MTR. CARRIAGE, M7	26.0	18.6	9.5	8.3	3.5	6	31	2.0	25
 TANK RECOVERY VEHICLE, T5E1	33.8	23.2	9.1	9.7	3.5	6	31	2.0	24

CHARACTERISTICS OF ARMORED DIVISION VEHICLES

VEHICLE	WEIGHT (TONS)	LENGTH (FEET)	WIDTH (FEET)	HEIGHT (FEET)	FORD (FEET)	GRADIENT (DEGREES)	SPEED (MPH)
 TRUCK, ¼-TON	1.6	11.0	5.2	4.3	1.5	31	65
 COMMAND TRUCK, ¾-TON	3.4	14.6	6.3	6.8	2.8	31	54
 AMBULANCE, ¾-TON	3.9	16.2	6.5	7.5	2.8	28	54
 LIGHT ARMORED CAR, M8	8.3	15.4	8.3	6.3	2.7	31	56
 CARGO TRUCK, 2½-TON	8.0	22	7.2	9.2	1.5	33	45
 AIR COMPRESSOR TRUCK	7.2	21.1	7.5	7.8	1.5	33	45

CHARACTERISTICS OF ARMORED DIVISION VEHICLES

VEHICLE	WEIGHT (TONS)	LENGTH (FEET)	WIDTH (FEET)	HEIGHT (FEET)	FORD (FEET)	GRADIENT (DEGREES)	SPEED (MPH)
 CARGO TRUCK, 4-TON	13.3	24.7	7.8	9.7	2.0	33	40
 BRIDGE TRUCK, 6-TON	19.3	31.2	8.3	9.2	4.6	20	37
 HEAVY WRECKER TRUCK	17.7	29.0	8.9	10.1	3.3	31	45
 TANK TRANSPORTER, 40-TON	42.2	57.4	12.5	11.7	3.5	17	27

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