Marine Engineers:

Construction and Destruction on Demand

By Captain Thomas Pratt

With fewer resources and more missions, joint operations are now a way of life. To ensure the optimum use of assets and mission success in joint operations, all service members must become familiar with the capabilities that other services bring to the fight. The Marine engineer brings a unique contribution to present-day joint operations—expeditionary engineering, which supports the Marine Air-Ground Task Force (MAGTF) in combat support and combat service support missions. This article presents the history of Marine engineering through its evolution as the Marine component of joint engineering.

History

In the late 1800's, the Marine Corps mission expanded as America's status as a world power grew. The new mission to seize and defend advanced naval bases required that Marines have their own construction, maintenance, facilities operation, and general service capabilities. As a result, the initial mission of Marine engineers was primarily combat service support. Their objective was to construct, repair, or improve facilities in amphibious operation areas.

World War I. During World War I, the Marines relied on the Army to provide what we now call combat engineer support. In 1927, the Commandant of the Marine Corps, Major General Lejeune, further enhanced the role of the Marine engineer by publishing his vision of an organization within the Marine division that would operate captured or newly constructed advanced bases until relieved by their Army or Navy counterparts. That vision remained the mission of Marine engineers until the end of the 1930s. Today, these duties are mostly associated with landing support activities.

The development and organization of the Fleet Marine Force in 1935 gave birth to the Marine Corps' first force engineer companies. Engineers within these companies relied heavily on the Army for doctrine, training, and equipment. For military engineer schooling, Marine officers went to Fort Belvoir, Virginia, where they learned to apply civilian engineer knowledge in a military environment. In 1941, the Marine Corps established the Marine Corps Engineer School at Quantico, Virginia. A year later, the school was moved to Camp Lejeune, North Carolina. At this time, there were 58 military occupational specialties (MOSs) in the engineer field.

World War II. When World War II began, the Marine Corps grew immensely. For the first time, it began to think in terms of brigades and divisions and, along with this, the need for larger service units. By 1942, the Corps decided that each division would have an organic engineer battalion and an organic pioneer battalion. Normally these battalions went ashore in the second assault wave and set up the landing beaches. After the initial assault wave, they off-loaded materials and personnel. (The pioneer battalions are now called landing support battalions.) Later in the war, engineer regiments were formed with an engineer battalion, a pioneer battalion, and a Navy Seabee battalion. Since there was no



Marines from the 9th ESB pour a footing at Camp Foster, Okinawa.



Marines from MWSS-273 construct a temporary shelter in Jubail, Saudi Arabia.

standard table of organization and equipment at this time, all units were task organized to meet the division commander's specific needs during the island-hopping campaigns. The Marine "combat engineers" originated during World War II.

Assault engineer companies, created to breach the beach obstacles commonly found in the Pacific islands, were attached to regimental landing teams. These companies provided direct support to maneuver elements during landings and normally reverted to engineer battalion control when the battalion headquarters landed. Then they filled a general-support role for the regimental combat teams.

Except for the assault companies, employment of the engineer battalion in a purely combat support role was not considered. As a result, no combat-oriented doctrine or training was specifically developed for engineers. To compensate for this lack of training, infantry units normally received their engineer assets well in advance and trained them on assault techniques. On several occasions, Marine engineers applied their unique skills and equipment in assaults. Often an engineer or pioneer battalion was thrust into the defensive perimeter to free up an infantry unit.

Post-World War II. By the end of the war, the number of Marine engineers had increased more than 6,000 percent. Inevitably, they were hit hard by the postwar drawdown. In the late 1940s, the Marine Corps began a series of restructuring and reduction analyses to adopt a peacetime posture. In 1947, pioneer battalions were renamed "shore party battalions" to more accurately reflect their mission. Many of the engineer MOSs for Marine officers and enlisted personnel were combined or deleted. Between 1945 and 1950, the number of engineer MOSs dropped from 55 to 9; however, the number of missions did not drop. This lead to a "jack of all trades" phenomena that portrays Marine engineering today.

Korean War. During the Korean War, Marine engineer efforts focused on the mobility and survivability of the force. Constructing and maintaining main supply routes and airfields, clearing roads, and constructing bridges were common operations. Engineers also performed specialized demolition missions to disrupt the North Korean lines of communications. No significant changes occurred in the engineer community during the conflict, but it became evident that new, more advanced equipment was needed to perform their missions.

Post-Korean War. After the Korean War, the entire mission and structure of the Marine Corps was evaluated against the new threat—nuclear weapons. The popular thought at the time was that technology was becoming a more valuable resource than people. The engineer community did not suffer as badly as others, but significant changes occurred in the following years. The Navy Seabees were removed from the Marine engineer organization during the 1950s, although a strong link remained between the two services. To fill this void, a memorandum of understanding was written, and force engineer battalions were created.

The force engineer units had their roots in the aviation engineer battalions of World War II. Their mission was to support the entire landing force, including the aviation element, and to reinforce, augment, and expand the missions of

the division engineers. Therefore, the force engineer units were larger and more heavily equipped than the division engineer units. Bridge companies that were independent of both division and force engineers were created.

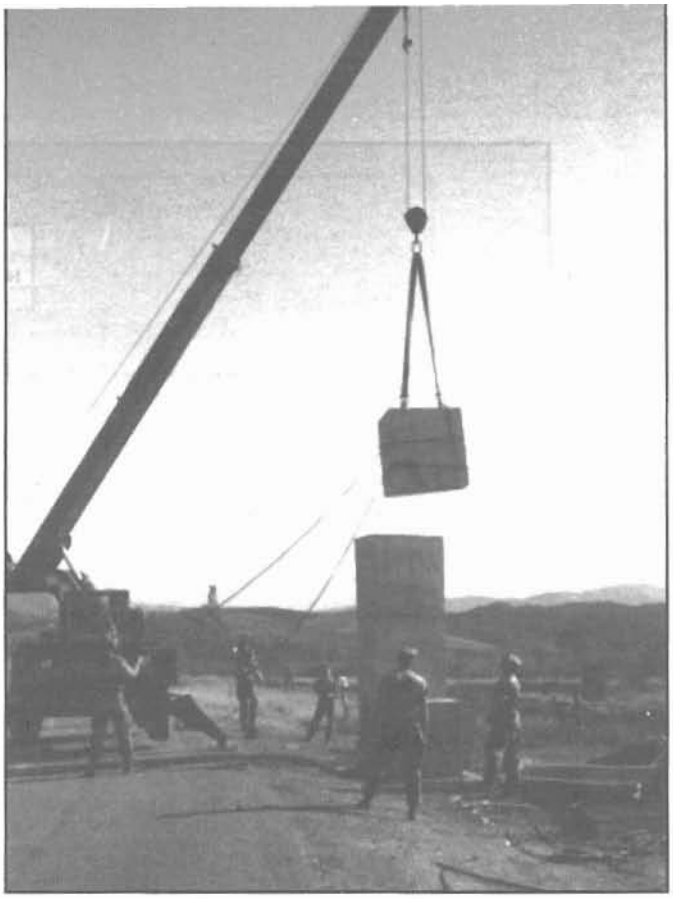
Vietnam War. In 1965, the U.S. military buildup in Vietnam began in earnest. The engineer effort there primarily involved humanitarian assistance. However, Marine engineers provided direct support in the actual fight, participating in practically every combat operation, search-and-destroy mission, roughrider convoy, and fire base preparation. Typically the engineers were a small, task-organized team—seldom more than three to four men—attached to an infantry unit.

Post-Vietnam War. Since the end of the Vietnam War, the Marine engineer community has undergone significant changes. In 1976, the division engineer battalion was renamed "combat engineer battalion" to more accurately reflect the combat nature of its mission. Once again, the Marine Corps responded to a postwar drawdown by restructuring the remaining active duty units. As a result, the force service support group (FSSG) was formed as the combat service support element of the MAGTF. Many of the division support units were moved into the newly created FSSG. The combat engineer battalion remained within the division, the force engineers were located in the FSSG, and the wing engineers were in Marine wing support squadrons (MWSS). When a MAGTF is organized, it pulls engineer assets from one or all of these three organizations, depending on the mission. This organization remains the same today. Because Marine Corps engineers lacked their own doctrine, they adopted the Army's doctrine when the FM 5-100 series was published in the mid-1980s. While the Marine Corps still uses Army doctrine, service-specific organizations are published in Fleet Marine Force Manual 13, *MAGTF Engineer Operations*.

Training

All Marine second lieutenants attend the Basic School at Quantico, where they are assigned an MOS. Assignments are based on their class standing, their staff platoon commander's evaluation, and their individual desires. Upon completion of the Basic School, lieutenants go to their respective MOS schools. Engineer officers attend a 13-week course at the Marine Corps Engineer School, where they learn the basic fundamentals that engineer platoon commanders need to know. However, engineer officers receive most of their training on the job. During fleet tours, engineer officers may be assigned to combat engineer battalions, engineer support battalions, or Marine wing support squadrons. Other assignments include the drill field, recruiting, facilities maintenance, Marine Corps headquarters, Marine Corps Engineer School, and professional and graduate studies.

Enlisted Marine Corps engineers are trained at several locations, depending on their specialty. They receive entry-level training and then return for two career-progression courses at the noncommissioned officer and staff noncommissioned officer levels. Combat engineers receive demolition, bridging, vertical construction, and mine/countermine warfare training at the Marine Corps Engineer School. Marines in the utilities fields of electrician, electrical equipment, and hygiene equipment receive all training at the Marine Corps Engineer School. Engineer equipment operators, mechanics, and engineer assistants (drafting and surveying) receive all levels of training at Fort Leonard Wood, Missouri. Metal workers and refrigeration mechanics train at Aberdeen Proving Ground, Maryland. Bulk fuel specialists train at Fort Lee, Virginia. Enlisted engineers are assigned to Marine divisions, force service support groups, and Marine aircraft wings for duty. They may also become part of the inspector instructor staff at one of the reserve centers throughout the United States. Career enlisted Marines may receive assignments as drill instructors, recruiters, or Marine security guards.



8th Engineer Support Battalion Marines construct a "falling block obstacle" (MONOLITH) at Guantanamo Bay, Cuba.

Present Structure

The engineer mission is based on the way the Marine Corps fights—as a task-organized MAGTF consisting of four elements:

- Command element (CE)
- Ground combat element (GCE)

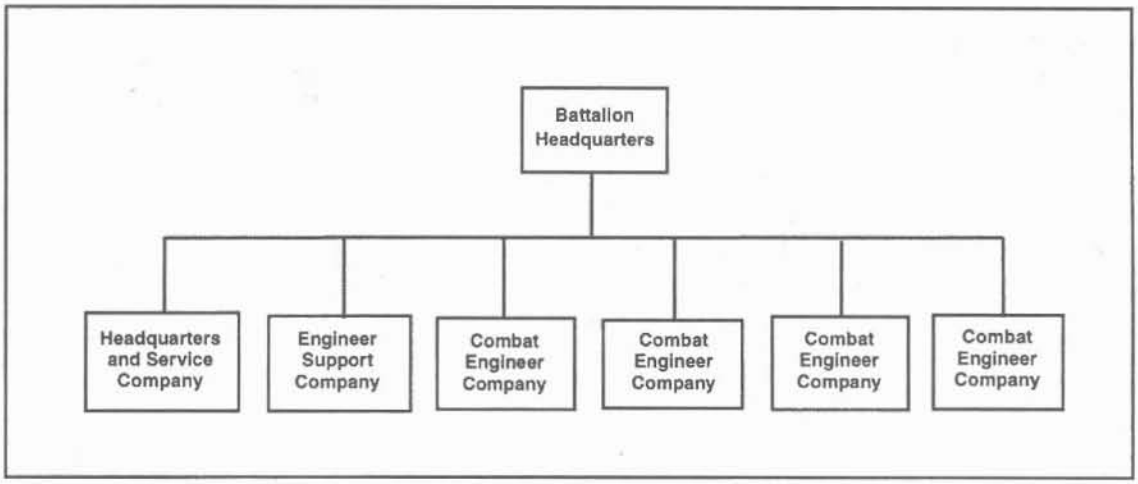


Figure 1. Marine Combat Engineer Battalion

- Aviation combat element (ACE)
- Combat service support element (CSSE)

If the mission dictates, Naval construction forces are attached to the MAGTF and become the fifth element. The Naval construction forces work directly for the MAGTF commander. Each element of the MAGTF has organic engineers. The Marine engineers' role is to support the MAGTF through operations in mobility, countermobility, survivability, and general engineering. However, Marine engineer support to the MAGTF is of an expeditionary nature and does not include the infrastructure building or theater-level construction provided by Naval construction forces and Army engineers. All engineer missions center on support to the MAGTF mission.

Command Element. The command element of a MAGTF includes the commander, the headquarters, and support required for command and control of the MAGTF. The MAGTF engineer serves as a special staff officer to the MAGTF commander. If the engineer position in the command element is not filled, the senior engineer in the MAGTF assumes the job as a secondary duty. The MAGTF engineer is responsible for coordination between the subordinate element engineer officers and, depending on the task organization and mission, Naval construction forces or other U.S., allied, or host-nation engineer assets.

Ground Combat Element. The ground combat element ranges in size from a battalion to one or more divisions. Engineers and their assets in the GCE are sourced from the combat engineer battalion (CEB) organic to the Marine division. The CEB consists of a headquarters and service company, an engineer support company, and four combat engineer companies (Figure 1). The size of the engineer complement varies with the size of the infantry unit to be supported. Normally a company supports a regiment, the platoons support the battalions in that regiment, and the company commander becomes the engineer staff officer for the regimental commander. The missions of the GCE engineers include:

- Performing engineer reconnaissance.
- Assault breaching of explosive and nonexplosive obstacles from the high-water mark inland.
- Employing assault bridge systems and, when augmented, other standard bridge systems.
- Repairing and reinforcing existing bridges.
- Constructing simple and compound explosive and nonexplosive obstacle systems.
- Performing demolition missions beyond the capability of other division units.

Additionally, Marines from the CEB provide mobile electric power to division organizations not authorized generators by their table of equipment and provide augmentation power to the division when required. Division engineers have limited resources in water purification and storage, field hygiene equipment, and vertical and horizontal construction. Division engineers primarily exist to support the maneuver of the ground combat element.

Aviation Combat Element. The structure of the aviation ground support is contingent upon the quantity and variety of aircraft to be supported. The ACE may vary in size from one aircraft squadron to one or more wings. Aircraft in the ACE are—

- Rotary-wing squadrons: UH-1N, AH-1W, CH-53D/E, and CH-46.
- Fixed-wing squadrons: F/A-18C/D Hornet, AV-8B Harrier, and C-130 Hercules.

The ACE may include one or all types of aircraft depending on the mission. Engineer assets organic to the ACE are located in four MWSS in the Marine wing support group. Two MWSS are dedicated to support fixed-wing aircraft and two are dedicated to rotary-wing aircraft (Figure 2, page 21). Normally, one MWSS is located in a Marine aircraft group. An MWSS detachment supports a composite squadron similar to those

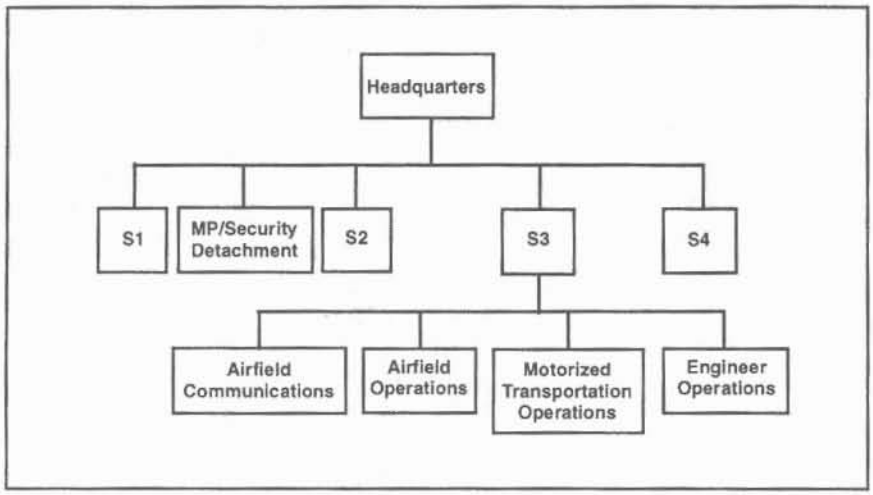


Figure 2. Marine Wing Support Squadron (V) or (R)

deployed with Marine expeditionary units (MEUs).

Wing engineers provide the ACE with limited vertical and horizontal construction capabilities. Airfield construction by elements of the MWSS normally is limited to 900 feet or less. Except for construction of forward area arming and refueling points, total engineer effort is focused on maintaining existing airfields rather than building new ones. When engineer requirements exceed the capabilities of the ACE, additional support may be obtained from the engineer support battalions and/or Naval construction forces. Wing engineer missions include:

- Performing engineer reconnaissance and survey.
- Repairing, improving, and maintaining existing road nets in the ACE tactical area of responsibility.
- Constructing and maintaining expeditionary roads.
- Constructing, maintaining, and improving vertical/short takeoff and landing sites.
- Constructing and maintaining mission-essential base camp requirements (temporary bunkers, aircraft revetments, and strongbacks).
- Providing essential utilities support (mobile electric power, water, potable water production, shower and laundry facilities, and refrigeration services).
- Developing, improving, and maintaining drainage systems.
- Assessing bomb damage and providing rapid runway repair.
- Supporting base material-handling operations.

Additionally, engineers are the bulk fuel commodity managers. They not only receive, handle, store, and operate bulk fuel assets during airfield operations but also set up expedient refueling systems at expeditionary airfields and helicopter landing zones. They are capable of all testing required for fixed-wing and rotary-wing fuels. Explosive ordnance disposal assets are located in the wing to support rapid runway repair and base recovery after attack missions.

Combat Service Support Element. The combat service support element of a MAGTF ranges in size from a small, task-organized combat service support detachment to one or more force service support groups. The CSSE draws its engineers from the engineer support battalion (ESB) organic to the force service support groups. The ESB provides expeditionary general engineering support and engineer combat service support to the MAGTF. An ESB consists of a bulk fuel company, a headquarters and service company, an engineer support company, a bridge company, and three engineer line companies (Figure 3, page 22). The bulk fuel company receives, stores, and dispenses all Class III bulk fuel products for the Marine expeditionary force. Responsibility for the fuel begins when it crosses the shoreline. The engineer support company holds the battalion motor transport, utilities, maintenance, and earth-moving and material-handling assets. Platoons and companies deploying or training receive attachments from the support company as the mission dictates. Combat engineers are located in the engineer line companies.

The missions of the engineer support battalion include:

- Performing engineer reconnaissance.
- Performing deliberate vertical and horizontal construction.
- Providing utilities support to the MAGTF to augment its organic capability.
- Performing demolition and obstacle removal.
- Receiving, storing, and dispensing Class III bulk fuel.
- Performing countermobility and survivability tasks during defensive operations.

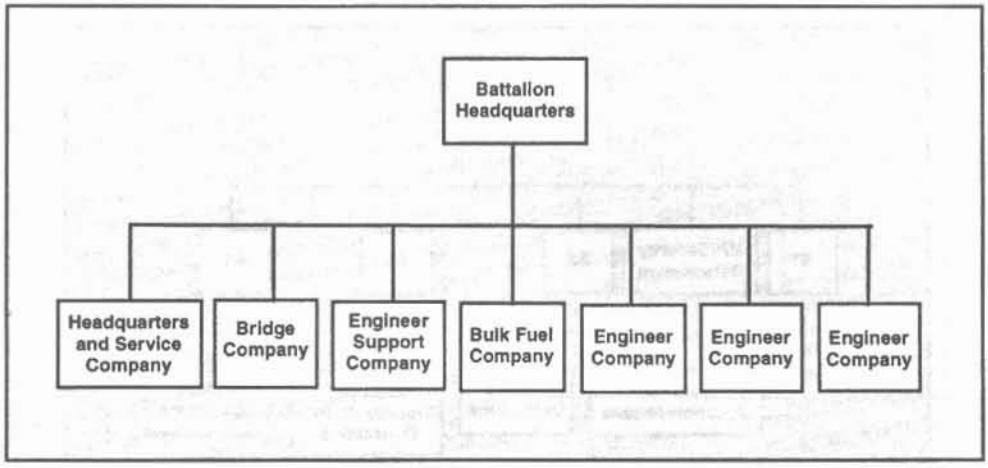


Figure 3. Marine Engineer Support Battalion

- Performing beach preparation and throughput to augment the landing force shore party.
- Reinforcing combat engineer battalions.
- Employing standard and nonstandard bridging.

Explosive ordinance disposal is also located with and managed by the engineer support battalions. However, it is a MAGTF asset and all taskings come from the command element.

Task Organizing a MAGTF. Task organizing for deployment is essentially the same for all MAGTFs smaller then a Marine expeditionary force. Typically, a Marine expeditionary unit is used. Engineers in the ground combat element are sourced from the combat engineer battalion. Engineers in the aviation combat element are from the MWSS engineer operations section, while those in the combat service support element come from the ESB. Each element's engineer section reflects the parent battalion. Often, the parent engineer battalion cannot fill their quotas for the MAGTF due to other operational commitments or shortfalls in staffing. Engineers from the landing support battalion, the maintenance battalion, and the medical battalion can be sourced to fill these quotas.

Recent and Current Operations

Marine engineers deploy year-round. They are found in every MAGTF and participate in every major Marine Corps exercise. Engineers most commonly deploy with a Marine expeditionary unit, as occurred in recent deployment operations to Lebanon, Grenada, Panama, Somalia, and Haiti. In Southwest Asia, Marine engineers played a tremendous role in the survivability, sustainability, and maneuverability of the MAGTF. Recent humanitarian assistance operations have taken engineers to places like the Philippines and Bangladesh to assist in recovery from natural disasters. In 1995, Marines from the 9th Engineer Support Battalion deployed to Sasebo, Japan, to relieve the drought-stricken Navy base. Marines from the East Coast assisted efforts during hurricane relief missions in Florida. Currently, engineers are deployed with three Marine expeditionary units. Other engineers are in Aviano, Italy, in support of the mission in Bosnia, while some are participating in training exercises.

Looking Forward

Every day there is something new that threatens to divert money, resources, and people away from our services. Many feel that each service must protect its own, or soon there will be nothing left to protect. We must overcome this fear and embrace the future of joint operations. Each service possesses skills and equipment that are decidedly unique. Awareness of the capabilities of each service and the proper use of these capabilities in a joint environment ultimately will save our nation's military engineers.

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Reference:

Grelson, Captain J.D., USMC. "Up Front: The Evolution of the Marine Engineer," an unpublished research paper, 1987-88.

Note: This is the last in a series of articles on engineers of other services. See also "Navy Seabees and the Civil Engineer Corps: Providing Skills to the Joint Environment," Engineer, *December 1994, pages 11-17; and "Air Force Civil Engineers: Building Air Power's Foundation,"* Engineer, *August 1995, pages 30-35.*