Operational logistics: Defining the art of the possible
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Logistics has been called the science of planning and carrying out the movement and maintenance of forces. But in recent years, pending manpower cuts, budget constraints, and even doctrinal developments have made it far more difficult for Marine logisticians to supply forward elements with the replenishments they require. Three of the following articles discuss important logistical considerations encountered in three recent undertakings—a major expeditionary war, a multinational humanitarian assistance effort, and a MEU(SOC) forward deployment. Two others offer 'interesting' proposals or suggestions.

Operational Logistics: Defining The Art of The Possible

by MajGen James A. Brabham

Logistics support doesn't just happen; if it is to prove successful, it has got to be planned, organized, resourced, and then informed. Marine commanders need to be aware of these constraints and act accordingly. The Corps' experience in DESERT SHIELD/DESERT STORM may prove useful in addressing these concerns.

The first essential condition for an army to be able to stand the strain of battle is an adequate stock of weapons, petrol, and ammunition. In fact, the battle is fought and decided by the quartermasters before the shooting begins.

—Erwin Rommel

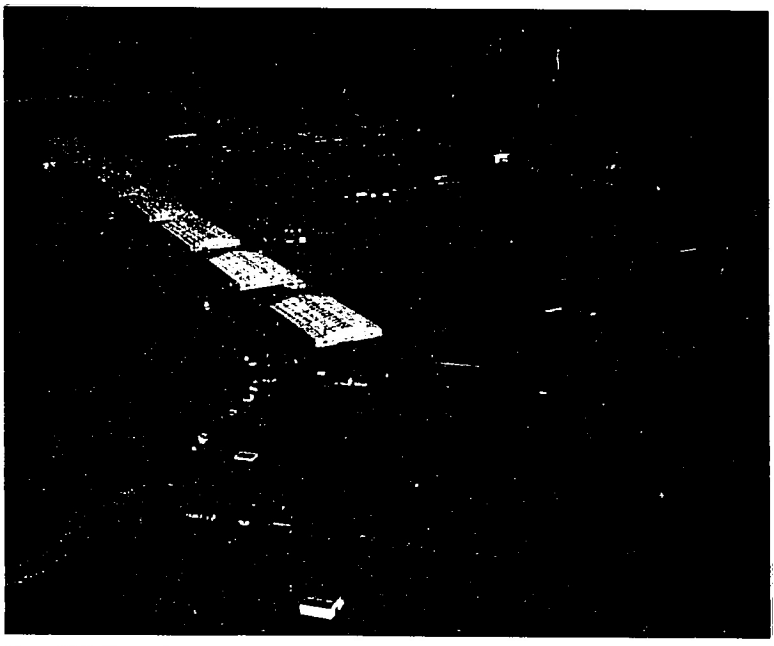
Logistics, like warfare in general, is best discussed in its three levels of application: strategic, operational, and tactical. Much has been written about the strategic level with significant works being RAdm Henry E. Eccles' *Logistics in the National Defense* and George C. Thorpe's *Pure Logistics.*

Thousands of Marines and civilians work at the strategic level of logistics every day at Headquarters Marine Corps, Marine Corps Systems Command, and Marine Corps Logistics Base Albany among others. The efficiency of both our Corps and our Nation at the strategic level of logistics is unexcelled in history and has been the backbone of victory in previous national conflicts.

The tactical level of logistics or combat service support is similarly well documented and thoroughly practiced within the Marine Corps. Our series of Fleet Marine Force Manuals (FMFMs) combined with publications of other Services provide the processes and procedures to ensure that Marines of the force service support groups (FSSGs) are well trained and well equipped for their demanding mission. Marine air-ground task forces (MAGTFs) are balanced combat/combat support/combat service support teams that bring a unique self-sustaining force to the expeditionary environment. Our Nation's legions!

The operational level of logistics and how Marines operate at this level, however, is less well defined and because of its nature rarely fully exercised. It is at the operational level that the industrial power of our strategic logistics infrastructure is transformed into the combat power multiplier of combat service support and herein lies our greatest challenge. The operational level of logistics is well addressed in historical perspective by Dr. Martin van Creveld in *Supplying War* and there is also a brief doctrinal section in *FMFM 1-1 Campaigning.* There remains, however, a singular lack of doctrine and experience on this most challenging level of logistical support for our forces. This challenge was aptly described in a lecture given by Dr. van Creveld to students of the Marine Corps Command and Staff College. In his lecture entitled "The Revolution in Logistics," he contrasted the efficient characteristics of standardization, uniformity, and predictability that optimize our national strategic logistics capability with the unpredictability, flexibility, and audacity that would best serve an effective tactical logistic system. Bridging the gap between those two great E's—the *efficiency* of strategic logistics and the *effectiveness* of tactical logistics—is the challenge of the operational logistics art.

The significant logistical challenges posed by Operations DESERT SHIELD and DESERT STORM provide an excellent background to analyze, and perhaps define, a simple methodology to assist Marines in planning for logistics at the operational level. This methodology is based upon the definition of a set of *elements of operational logistics* to guide logistics planners:



Port of Jubail, Saudi Arabia.

. Preparing the Logistics Battlefield
. Organizing the Logistics Force
. Sourcing the Resources
. Creating Logistics Flexibility
. Providing the Commander's Intent
. Defining the Logistics Focus of Effort

In the following paragraphs these elements will be discussed in relation to the operational logistics functions performed by I Marine Expeditionary Force (I MEF) Marines in Operations DESERT SHIELD and DESERT STORM.

Preparing the Logistics Battlefield

Logistics preparation of the battlefield is fully as important as the intelligence preparation of the battlefield and the tactical shaping of the battlefield normally conducted in a MAGTF campaign. Careful analysis and planning for utilization of logistics infrastructure and lay down of logistics assets are the cornerstones of logistics flexibility and future success. In shaping the logistics battlefield planners must look far beyond the initial stages of a campaign, for short-term logistics solutions can lead to long-term combat problems. Divining future requirements is a significant part of the operational logistics art. A key factor in all logistics planning is the historical perspective that 85-95 percent of all materiel, in terms of tonnage, will arrive in theater by sea. Therefore, the ability to move maritime cargo either across a beach or through a port network drives our infrastructure concerns.

I MEF was assigned the Saudi Arabian port of Ras Al Jubail as a primary sea terminal for the duration of DESERT SHIELD and DESERT STORM. This modern 16-berth port with its equipment and workforce was pivotal to moving materiel in support of the approximately 90,000 Marines eventually committed to the campaign. Saudi Arabia's northernmost port of Ras Al Mishab, along with limited capabilities to handle craft at Manifa Bay, also played a role in supporting follow-on operations. Both ports were essential to I MEF success, and all other logistics planning evolved around these facilities.

Although ports/littoral facilities will throughput most of the MAGTF's materiel, most of the personnel along with critical combat cargo will arrive by strategic airlift. Consequently, air facilities and their relation to ports are other key considerations. The term "air facility" rather than "airfield" is used here because much more than an airfield is required. The airfields initially available to I MEF in Saudi Arabia had tremendous modern runways but little else. A significant portion of the MEF's engineer resources were required to turn these airfields into air facilities capable of terminating strategic airlift.

Simultaneously, there was tremendous pressure to bed down tactical aircraft at facilities that would support maintenance and operational readiness. The engineering support required to receive strategic lift and adequately accommodate tactical aircraft was, and will always be, a significant logistics planning factor.

Road networks are the final piece of the critical port/air facility/line of communications triad. In DESERT SHIELD/DESERT STORM we were blessed with some well constructed modern highways, and where hard surface roads were not available the desert surface supported the rapid construction of expeditionary roadways whose maintenance was a relatively simple task.

Control of the roads and their use quickly becomes a major issue. Deconfliction between U.S. forces, coalition forces, and civilian users will normally be initially handled informally between cognizant commanders and civil authority. Major utilization conflicts will be resolved by the cognizant unified commander, i.e., the commander in chief, through an executive agent—usually the U.S. Army. Potential conflicts and restrictions must always be a part of the operational logistics planner's vision.

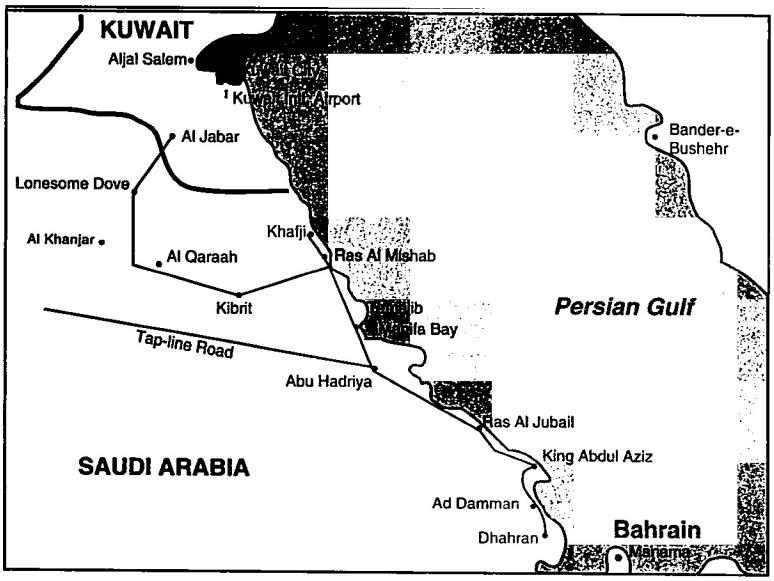
When it became evident that U.S. Army forces along with the British lst Armored Division would execute a sweeping envelopment through Central Saudi Arabia into Iraq, the lst Force Service Support Group planners immediately recognized the importance of the east-west oriented Tap-Line Road to movement of the Army units and supplies. They also recognized that the sizable pool of U.S. Army boats at Dharan could not be used by the Army in executing its move. Although Marine forces also were to move west, a decision was reached to keep Marine forces off the Tap-Line Road. An expeditionary road west from Al Mishab to Kibrit, Al Qaraah, and then north to Lonesome Dove was built by I MEF Seabees. Materiel was moved north to Al Mishab, both by road and sea, allowing maximum use of U.S. Army boat assets in moving Marine units and equipment along the north-south littoral. The plan proved its merit as the Tap-Line Road quickly became a major restriction to theater movement, and Marine ma-

teriel flowed north and west by every conceivable means of transportation.

Ports, air facilities, and road networks must support and serve major sources of supply. The principal driver of the transportation requirement is ammunition. A 30-day supply of ammunition for a Marine division is approximately 65,000 short tons. The receiving, storing, and movement of that ammunition must be a primary focus of the operational logistics plan.

Considerable engineering effort goes into safely storing large quantities of ammunition and a major portion of the MEF's transportation is required to move these vital assets. Siting of ammunition must include careful consideration of safety, security, and responsiveness to future maneuver of the force. The ability to move and store ammunition may well be the "long pole" in the operational tent. It certainly will play heavily in supporting the commander's options.

Covered storage must complement the transportation network. The operational logistician may well become temporary custodian of a significant portion of the Marine Corps' resources, and protection of these assets requires many sizable facilities. It is imperative that ships are unloaded for future use and that ports are cleared making the movement, storage, and protection of the MEF's vital resources a high priority task.



Organizing the Logistics Force

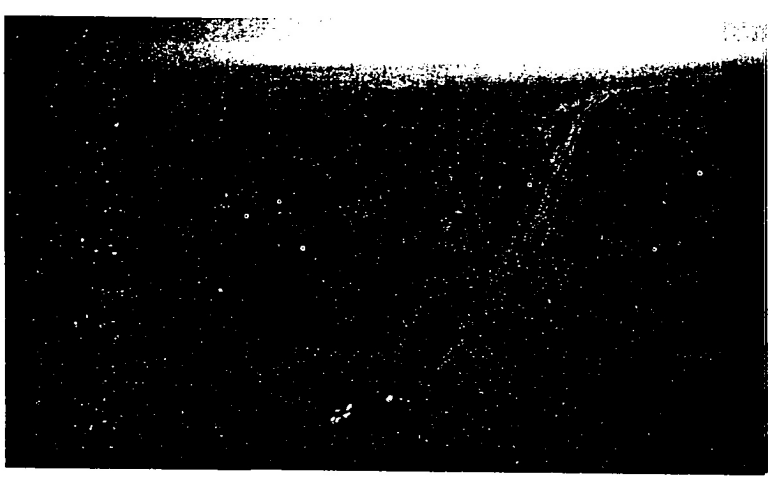
It is the logistics organization that provides the bridge between materiel sources and the combat forces. The logistics organization must integrate the efforts of naval, joint, combined, and host nation support (HNS) forces to effectively support the operational commander.

Host nation support for line haul was a significant factor in DESERT SHIELD/DESERT STORM. At one point the 1st Force Service Support Group had approximately 1,200 trucks and almost as many drivers under contract to support the MEF. The Headquarters of the 6th Motor Transport Battalion, a Select Marine Corps Reserve unit, was mobilized to oversee the HNS transportation effort and was vital to logistics operations throughout the campaign. Utilization of Reserves in that nontraditional role is but one example of the challenge to organize forces at the operational level of logistics.

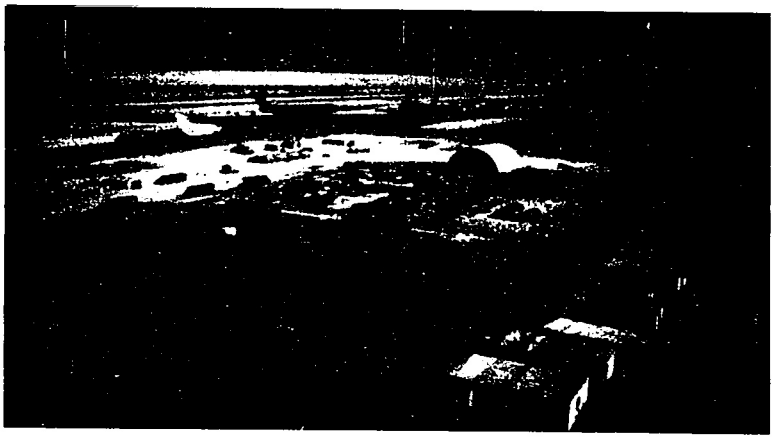
Combined forces must share logistics facilities and, in some cases, join logistics forces. The assignment of the British 7th Armored Brigade to the 1st Marine Division for most of DESERT SHIELD required constant cooperation and coordination between the logistics agencies of both units. Many combined logistics operations, such as military police and ammunition supply, were established.

Other U.S. forces can make unique contributions to the logistics support of the MAGTF. During the 10-day intense buildup of the logistics support base at Kibrit and Khanjar just prior to DESERT STORM, the U.S. Air Force provided approximately 500 C–130 sorties into assault airstrips to deliver critical supplies and equipment. The U.S. Army's tremendous logistics professionals, such as the 10th Transportation Battalion and the 240th Quartermaster Battalion, provided support to Marine forces during portions of DESERT SHIELD and DESERT STORM. These units and many others bring important resources to the battlefield and can contribute in a major way to the solution of logistic problems.

In DESERT SHIELD and DESERT STORM a general support/direct support organizational approach was used to group units at the respective operational or tactical level. While this is not the



Expeditionary road in northeast Saudi Arabia.



Strategic airlift at Jubail Air Facility.

only workable solution, it proved to be very effective because of the distances and large numbers of forces involved. A command and control organization that grouped direct support and general support units under relatively small command cells was adopted in the initial phase of DESERT SHIELD. This organization was expanded when II MEF forces were deployed to I MEF command for the conduct of DESERT STORM. The 2d FSSG(-)(Rein) was given the direct support mission and designated as the Direct Support Command. Command and control of the widespread logistics force was greatly facilitated by this organization for combat.

At the time of DESERT STORM over 14,000 sailors and Marines, as well as thousands of joint, combined, and host nation forces, were part of the I MEF logistics support force. This force operated in three separate nations with lines of communications over 250 miles. Every individual in that organization played an important part in I MEF's success.

Command relationships with units from other Services were varied and in some cases were not formally established. We quickly found that command relationships are important, but relationships between commanders are paramount. Many of the Army and Air Force units came to the FSSGs in direct support roles, and their commanders could not have been more loyal and supportive had a more formal relationship existed. Throughout the theater logistics structure in Operations DESERT SHIELD and DESERT STORM, the mutual support between logistics commanders was outstanding and an absolute key to success.

Sourcing the Resources

Sourcing the tremendous volume of materiel that the MEF will require is another important consideration for the operational logistics planner. If the MEF forward arrives by amphibious means, the first 30 days of all classes of supply will normally arrive with the amphibious force. A maritime prepositioned force also brings a solid 30 days of all classes of supply to the Marines that it supports.

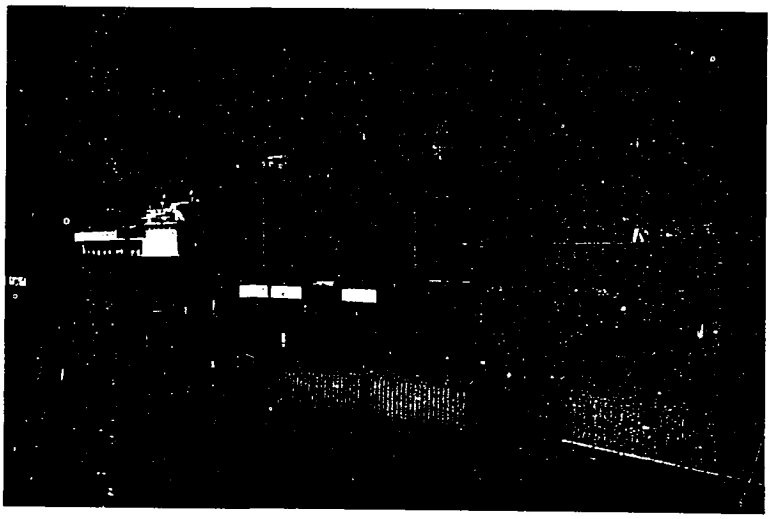
The withdrawal of prepositioned war reserves from the stores system and their arrival in theater provide much needed sustainment for combat systems. Host nation support can also be a significant factor in sustained operations ashore and should always be exploited.

Personal support items must not be forgotten. Sundry packs and deployable exchange blocks provide some support, but they are restricted by the availability of strategic lift and exchange personnel. Host nation support can help fill the gap; however, these entrepreneurs must be subjected to military oversight to ensure that security, service, and appropriate pricing are maintained.

Water, one of the "Big Three" commodities, is always a major consideration. Sourcing decisions are necessarily impacted by transportation requirements, and the difficulty of transporting water on the modern battlefield will drive many decisions. Producing potable water was never a real problem in DESERT SHIELD and DESERT STORM, since both the water purification equipment and the Persian Gulf were readily available. Moving the water to rapidly maneuvering Marine forces was a problem, however, requiring constant attention. If the requirement for chemical decontamination had arisen the problem would have been greatly exacerbated and reallocation of significant transportation assets would have been required to meet the need.

Sourcing and transportation of fuel, the second of the "Big Three," will also be a major challenge. Although ample fuel was sourced by the host nation in DESERT SHIELD and DESERT STORM, its movement was a constant issue. Outstanding support from the U.S. Army's 240th Quartermaster Battalion ensured success at the operational level. Another key to I MEF success was the use of a single fuel—aviation grade—on the battlefield. U.S. Marine Corps fuel-handling assets simply cannot support multiple fuel delivery and service.

Warehouse at Jubail.



Maritime prepositioned ship offloading at Port of Jubail.

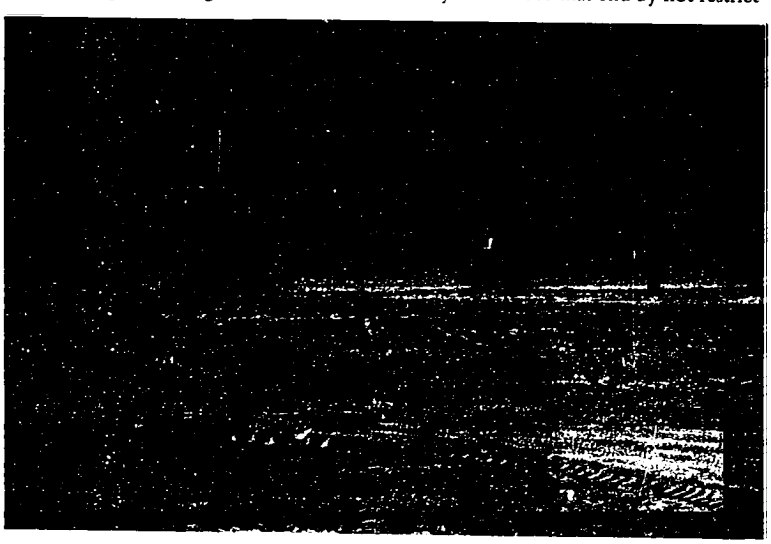
Additionally, the ability of I MEF Cobras to land and refuel from ground refuelers in Kuwait was critical to keeping those vital tank-killing assets on station, despite the smoke filled skies between them and their expeditionary bases. The requirement to have multifuel ground equipment, capable of operating for extended periods on aviation grade fuel, is absolutely essential to expeditionary combined arms forces.

The third and perhaps toughest of the "Big Three" is ammunition. Little doubt about its source, the beach or a port, but the challenge is storage and line haul. Experience in DESERT SHIELD/DESERT STORM would indicate that all logistics planning should start with ammunition. It will probably define the organization of the logistics battlefield and dominate the transportation resource. It may also dominate reconstitution efforts upon completion of a successful campaign.

Creating Logistics Flexibility

Logistics commanders must always remain focused on their primary job—to help the operational commander win. Creating and maintaining logistics flexibility will ensure that end by not restricting the operational commander's options and by responding to the uncertainty of the battlefield. The ability to create logistics flexibility will be impacted by the three elements of operational logistics discussed earlier. The effect upon the commander's future options should be a consideration in every major logistics decision. Flexibility can be created by forward positioning of materiel and organizations, but this introduces a degree of risk. Some degree of risk is essential; however, all risks must be acceptable to the operational commander. Intelligence support to the logistics commanders is a key to their posturing for maximum logistics flexibility. Additionally, a complete understanding of the operational commander's intent is critical.

Creative use of available resources is another factor in flexible logistics response. During Operation DESERT STORM a large number of commercial buses were leased and fitted with wooden racks to support evacuation of potential I MEF casualties. When DESERT STORM's great success produced relatively light casualties but tens of thousands of enemy prisoners of war, the buses were quickly stripped of litters and used extensively to remove prisoners from the immediate battlefield.



Cobras refueling from ground refuelers.

Providing the Commander's Intent

Logistics organizations will always be minimally equipped for command and control communications. The nature of their mission requires their personnel and equipment to be dispersed in small groups throughout the theater of operations. Additionally, logistics organizations are always potential targets for the enemy, particularly in the age of greatly extended lethal reach of combat systems. Lines of communication are susceptible to interdiction, but if the commander is to win, the logistics must continue to flow. It is apparent that every logistics sailor and Marine must know what the commander is trying to accomplish and continue to work toward that end regardless of the situation.

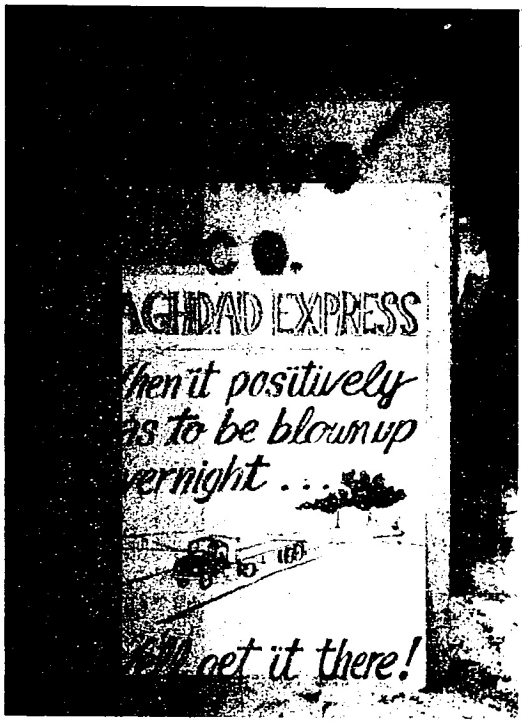
Every element of the MAGTF must work together under the umbrella of "intent." I MEF briefing teams, consisting of representatives of the MEF commander and the major subordinate commands, traveled throughout the MEF prior to Operation DESERT STORM to ensure that every Marine and sailor was

briefed on the commander's intent and the intent of major subordinate commanders. These briefings proved invaluable in clearing the battlefield fog surrounding the intense 100 hours of DESERT STORM combat.

Defining the Logistics Focus of Effort

The logistics commander will be constantly faced with prioritization issues at all levels. The commander cannot possibly deal with all individual decisions; he must instead provide the logistics focus of effort. The logistics focus of effort will normally be a subordinate logistics unit whose mission completion is critical to the success of the MAGTF. When I MEF initially deployed to Southwest Asia, the lst Marine Division was the absolute key to defense of the Jubail vital areas against a potential multidivisional armored attack by Iraqi forces. lst FSSG's Direct Support Group I was in direct support of the lst Marine Division and was accordingly designated as the logistics focus of effort. Prioritization within the lst FSSG then became fairly simple—priority to requests from Direct Support Group I. When I MEF was augmented and ordered to conduct an offensive to liberate Kuwait, the keys to success became the lst and 2d Marine Divisions' breach of the Iraqi defenses and assault into Kuwait. The Direct Support Command, 2d FSSG(-)(Rein), was designated the logistics focus of effort, and all priorities went their way. As the buildup for the offensive matured, it became obvious that our old nemesis, ammunition line haul, had become critical to success. The leased commercial tractor-trailers were breaking down in excessive numbers, and their repair and support had become almost overwhelming. At that point the operations of the commercial vehicle fleet, run by the 6th Motor Transport Battalion Headquarters, became the logistics focus of effort. Supply Battalion's contractors roamed the Gulf purchasing repair parts. Maintenance Battalion personnel left tactical equipment in the shops and sent mobile teams on the road to recover and repair commercial vehicles. The entire FSSG put their efforts behind this critical logistics element. Ammunition flow to the forward units was fully restored and the focus of effort returned to the Direct Support Command.

Host nation merchant providing post exchange services.



Company B, 6th Motor Transport Bn field headquarters.

The success of Operation DESERT STORM is a part of Marine Corps history, and the accomplishments of Marines and sailors in that campaign are a part of our tradition. We must now prepare for the next call for our Nation's legions. Part of that preparation must be the education and training of Marine logisticians for success at the operational level. A structured approach to this critical level of logistics planning and execution may be found in the elements that ensured our success in Operation DESERT SHIELD and DESERT STORM.

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