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CSS of a Heavy-Light Force in a Desert Environment

**A Monograph
by**

**Major Yves J. Fontaine
Ordnance**

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developed for a hypothetical air assault scenario involving heavy/light forces using current doctrine and force structure. Based on historical and training lessons learned, and insights gleaned from the support concept developed for the hypothetical scenario, an assessment is offered about the adequacy of CSS doctrine. As part of the doctrinal analysis, requirements and solutions to support a heavy division augmented with a light brigade in the offense are identified.

The analysis concludes that the logistics imperatives, with the addition of a coordination/synchronization imperative, are adequate to provide guidance to logisticians for developing a support concept for a heavy/light force. The analysis of the scenario concludes that a light brigade attached to a heavy division must bring a substantial support slice. The heavy division is not capable of supporting the attached light brigade. Corps must act as primary support in water resupply, graves registration, and transportation.

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ABSTRACT.

CSS of a heavy/light force in a Desert environment.
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The monograph first establishes a doctrinal base using the logistics imperatives, followed by an analysis of historical precedents for logistics support of light forces used with heavy forces during World War II, the 1973 Middle East War, and at the National Training Center. Historical experience suggests pushing logistics support forward to combat elements, maintaining a strong logistical base, improvising water resupply procedures, and coordinating constantly as key factors to properly support a heavy/light mix in a desert environment. Drawing from these experiences, a concept of support is developed for a hypothetical air assault scenario involving heavy/light forces using current doctrine and force structure. Based upon historical and training lessons learned, and insights gleaned from the support concept developed for the hypothetical scenario, an assessment is offered about the adequacy of CSS doctrine. As part of the doctrinal analysis, requirements and solutions to support a heavy division augmented with a light brigade in the offense are identified.

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I INTRODUCTION:

The U.S. Army has various types of divisions in its force structure to provide flexibility and deployability throughout the world. A recent addition to the force structure is the light infantry division (LID). The LID offers flexibility to accomplish missions globally and against a variety of forces. It can deploy rapidly, fight as part of a larger force in mid- to- high intensity conflicts or independently in low intensity conflicts.⁽¹⁾ As a result, LIDs may become a force of choice for future conflicts.

Through history, the U.S. Army discovered that light forces have utility far beyond fighting "pure". There are numerous historical precedents supporting the notion that light forces can augment heavy forces in battle to achieve maximum combat power.⁽²⁾

Although writings about the tactical feasibility of a heavy- light mix are numerous, the logistical support of such a combined force needs analysis. The purpose of this study is to examine the challenges of CSS for a heavy/light force in a developed theater. The study will determine if existing doctrine provides adequate guidance to logisticians on how to develop a support concept. The study will identify revisions required to support offensive operations of a light brigade attached to a heavy division in a desert environment.

The study will first establish a doctrinal basis for the support of such an operation, followed by an analysis of historical precedents of logistics support for light forces employed with heavy forces during World War II, the 1973 Middle East War, and at the National Training Center. Drawing from these experiences, the study will develop a concept of support for an air assault scenario with heavy/light operations. The study will determine the adequacy of current doctrine in providing guidance to logisticians planning and providing CSS for a heavy/light force.

II. ANALYSIS OF DOCTRINE:

Doctrine is defined as the condensed expression of the Army's approach to fighting campaigns, major operations, and engagements. Tactics, techniques, procedures, organizations, support structures, equipment and training are derived from it. Doctrine must be rooted in time, tested in theories and principles, yet forward looking and adaptable to changing technologies, threats, and missions (3).

The U.S. Army Airland Battle doctrine, set forth in FM 100-5, Operations, is based on four tenets: initiative, agility, depth, and synchronization.(4). The CSS imperatives, which were developed by the CSS doctrine writers to meet the challenges of AirLand

Battle, provide the Army the ability to arm, fuel, fix, transport, and protect the force. The CSS imperatives are: anticipation, integration, continuity, responsiveness, and improvisation (6). A description of each of these imperatives establishes the doctrinal base for analysis.

- Anticipation: anticipate future events by understanding the commander's intent and foreseeing events as the situation develops, allowing the commander to keep the initiative. Anticipation is supporting the current operation and planning for future operations (48 to 72 Hrs).

- Integration: sustainment must be integrated with the operation of the forces. The support concept must fit in the total concept of operation.

- Continuity: pauses impede continued success. CSS operators have the responsibility to ensure that an operation does not become insupportable at any stage.

- Responsiveness: the ability to meet changes and requirements on short notice. The ability to respond to situations quickly, to maintain momentum of combat forces.

- Improvisation: a mental state mainly, forcing logisticians to seek new innovative ways to solve support problems. (7).

Overall, the CSS imperatives, created to support the operational tenets, also support the commander's intent. (7). The imperatives are the foundation of the forward support concept- a philosophy that CSS must be provided to U.S. forces forward anywhere in the world and in sufficient quantities. (8).

III. ENVIRONMENT:

Recently, the focus of our foreign policy has switched from Europe to South America and the Middle

East. The U.S., as a world power, must be able to deploy the Army outside its borders to protect strategic interests. For example, the continuous tensions between Arab countries and Israel, problems in North Africa, and in Iran surface the political necessity to have forces ready for contingency operations. Military operations in desert environments are, thus, among the more probable contingency requirements, and the importance of the Army's light infantry forces, with their capability to deploy rapidly and fight effectively in such an environment, is emphasized.

In order to train, prepare, and perform well in desert combat operations, it is necessary to understand the environment and its impact on combat forces.

FM 90-3, Desert Operations, defines deserts as "arid, bare regions of the earth incapable of supporting normal life due to the lack of fresh water." (2). There are three types of deserts: mountain deserts made of barren hills and mountains separated by dry flat basins, rocky deserts made of plateaus of slight relief with flat areas, and sandy deserts made of flat areas covered with sand and gravel. The lack of water is the single most significant characteristic of desert, making water supplies tactically and strategically important. Roads and trails are scarce but transportation can generally travel in any direction. (10).

The impact of desert conditions on logistics is great. Due to the harsh environment, high standards of maintenance on equipment are essential. The heat and dust affect cooling and lubricating systems requiring increased levels of support particularly in maintenance, repair parts, and class III lubricants.(11). The requirements for transportation increase to support the rise in demands for logistics. The additional vehicles on the roads further results in a need for still more maintenance, repair parts, class III and purified water.(12). Furthermore, CSS units supporting the fighting forces generally do not find readily available host nation support, from maintenance and transport, through all classes of supply, including the critical commodity of providing water.

Water is particularly vital in this environment and local supplies might not be available. Water consumption and purification requirements are extensive, increasing by 50% when soldiers deploy in an arid environment and water shortages constantly threaten to impede operations.(13). Back up plans must be available to ensure adequate support. If water must be rationed, it should be for a short period of time and only in units engaged in light activity.(14). Coordination between engineers and CSS units is crucial in providing adequate amounts of water as detection, drilling and

construction support are engineer tasks while water supply operations such as purification, storage, and distribution belong to CSS assets. Water availability, both potable and non-potable, always looms as critical to the mission accomplishment of the force, and is among the most significant challenges posed within the CSS arena in desert operations.

IV. HISTORICAL PERSPECTIVE.

A. Light forces in the desert during World War II-
(map at appendix 1).

World War II (WW II) saw the rise of mechanization, and the German "BLITZKRIEG" which overran Europe. In 1941, North Africa was the scene of conflict between the Axis powers and Great Britain. This period of WW II provides many examples of heavy/light operations in a desert environment. A representative operation is the second battle of El Alamein where British forces, using a mix of light infantry and armor, took the offensive against the Axis forces.

As an overview, in September 1942, Rommel's Africa Corps reached its culminating point at El Alamein, mainly due to the German extended lines of communication and shortages of supplies. Field Marshall Montgomery decided to counterattack and give the Germans the "coups de grace". (15).

Field Marshall Montgomery realized that it was useless to throw armor forces against prepared defensive positions. He planned to use dismounted infantry to clear lanes through the enemy defenses followed by an armor exploitation. The plan called for a night attack using dismounted infantry with the 9th Australian Division, the 51st Division, the 2nd New Zealand Division and the 1st South African Division in the northern sector (main effort) attacking on line, clearing lanes through German minefields to facilitate the armor penetration through these lanes. (15).

When the attack started, the British had 3:1 tactical superiority. British artillery fire was devastating, destroying German armor and antiarmor guns pinpointed by reconnaissance elements. The infantry found that the task of breaching the minefields was more challenging and extensive than anticipated. (16). The battle turned into confusion because of the stubborn German defense. Montgomery ordered the X Armor Corps forward prior to the infantry completing clearance of all avenues. X Corps passed through the infantry on 24 October and found themselves facing more minefields and enemy forces which had retreated to alternate fighting positions in depth. (17). The battle became one of attrition rather than maneuver; units found themselves mixed and confusion reigned. The Germans repulsed the

attack. After five days of heavy fighting, the armored forces withdrew. Field Marshall Montgomery established a combined arms force to breach at all costs the enemy lines in the north of the sector using the same tactical approach as before.⁽¹³⁾ On 1 November, the dismounted infantry led the attack which allowed the penetration to occur.⁽²⁰⁾

Logistically, while preparing and during the battle, neither British nor German forces could find local support. The Africa Corps had to ship supplies across the Mediterranean from Italy to the port of Tripoli and transport supplies, including water, hundreds of miles to the combat forces without the use of rail. The long lines of communication, an effective British air interdiction effort and German equipment maintenance problems caused a loss of supplies and German shortages on the front lines.⁽²¹⁾

The British, on the other hand, realizing that home base lay 14,000 miles away, decided to establish depots forward to support the battle. They established ports close to the battle and pushed supplies forward as far as combat unit locations. Prior to the battle, the British plan called for very large reserves of all classes of supplies. The British established large dumps in the forward areas with an accumulation of seven days of supplies in the north, five days of supplies in

the south, and four days of supplies in reserve. Supplies were pushed to the combat forces using ground and rail transportation assets. (22).

The British used a priority and push forward system to replenish the combat forces. The replenishment procedures for infantry and armor formations differed somewhat. The infantry followed a coordinated forward support system. Ammunition, rations, and water vehicles remained in unit trains (first line vehicles) while the fighting forces moved forward. A second line of vehicles replenished the first line vehicles on site. Following replenishment, first line vehicles would move forward and rejoin the fighting forces. Armor regiments replenished using an echelon system. 50% of critical supplies were carried forward under regimental control. Brigade support was used as backup and pushed supplies forward. When armor combat elements needed replenishment, regimental vehicles pushed forward to support. (23).

In order to man the force, British replacements arrived at a reinforcement control post located in the vicinity of the Army Headquarters. This site included a training camp. Established priorities and coordination/control of the movement of these forces forward prevented clogging of the forward areas with unnecessary personnel. (24). Medical support followed

the same forward support mentality. The British realized that early surgical intervention would save lives. Therefore, they established field surgical units at field dressing stations, casualty clearing stations, and medical centers. Mobile casualty clearing stations operated close behind the advancing troops. Casualties were evacuated by ambulances at the line of departure or as soon as the minefields were cleared. Ambulances moved forward through the minefields to provide support close to the dismounted infantry forces. Casualties were then moved rearward to the clearing stations. (25).

In order to supply the force, the British followed a forward support and push concept. To support the need for high demands of ammunition, the British established depots and pushed class V to the combat units during darkness. (26). Class III followed the same procedure, although the British found that conservative usage estimates were required to insure adequate stocks were available for operations in slow moving terrain and darkness. (27). Water supplies were also pushed forward. To support the infantry, the British invented a method to carry water using 40 gallon drums which were loaded on troop carrying lorries. In a defensive posture, drums would be unloaded and remain with the infantry platoons along with 3 days of supplies. (28).

British transportation requirements were high. The

road delivery service, subdivided in two echelons, transported supplies forward to the combat units. This service was augmented by an air forwarding service with the mission to ship urgent supplies forward. Rail was used to the extent possible. In order to transport infantry, the British experiences had shown that much time was saved by having dismounted infantry carried by tanks to the attack positions. Problems did occur, however, when individual tanks and troops were forced to deviate from the main axis of attack to avoid obstacles and enemy fires. Dispersion resulted and cohesion/control was lost. Additionally, enemy fire directed toward tanks affected the infantry. (25).

In summary, the ability of the British to achieve superiority of force depended on the foresight of commanders and on correct assessments of logistics requirements. The British used a push forward supply system backed up by a strong logistical base. The logistical doctrine allowed support to the heavy/light forces. The British established priorities in personnel replacements, used innovative procedures to transport dismounted infantry forward into battle and to transport water and supplies to the forward forces. Finally, they coordinated and synchronized a forward replenishment system to support the combined forces.

When analyzing the battle in view of the CSS

imperatives, it is clear that the British forces achieved victory, in part, by establishing a system capable of effectively supporting rapidly advancing heavy and light combat forces. Specifically, the British addressed the CSS imperatives as follows:

- Anticipation: the British anticipated a long battle, and did not want to depend on long LOCs. They established large reserves of supplies and reinforcements prior to the battle using ports and depots in the vicinity of the battle.

- Integration: the British integrated the concept of support to support a heavy/light mix by the use of the push system.

- Continuity: the British established caches, and prestocked depots near the front lines. The depots served the British during the pursuit.

- Responsiveness: the British used the forward support system continually. The system was responsive to demands based on established depots and unit distribution.

- Improvisation: the British repaired the railway to allow forward resupply. They fabricated 40 gallon drums for water to support the infantry in the attack.

B. Arab- Israeli War 1973: (map at appendix 2).

The Arab-Israeli War of 1973 emphasized the requirement for balanced and continuous coordination of

land, sea, and air efforts. The war showed that the tank could not be emphasized at the exclusion of infantry forces, artillery, missile, and air power. (30).

The main objectives of the Egyptians in 1973 were to recapture the land lost to Israel in the Six Day War in 1967, and to remove the stigma of cowardice and ineptness of the Arab soldier. (31). The Egyptians intended to breakthrough across the Suez canal, penetrate the defensive Bar Lev line, and regain lost territories. To accomplish this, the Egyptians massed 800,000 troops. 2200 tanks, 2300 artillery pieces, 150 air defense artillery (ADA) batteries, and 550 aircraft. Five infantry divisions and a mix of armor and infantry separate brigades backed up by three mechanized divisions and two armor divisions deployed along the canal. (32). The first wave of 8000 dismounted soldiers planned to cross in small water dinghies under the cover of artillery fires and air support, seizing and holding ramparts across the canal, searching for and destroying Israeli tanks with new weapons of destruction such as rocket propelled grenades and sagger missiles. (33).

The Egyptians first waves attacked on October 6 1973 at 14:20 hours, preceded by a dense artillery barrage and an infiltration of Rangers and tank hunting detachments sent forward to paralyze Israeli armor and interfere with troop movement. (34). Engineers followed

the first waves using water guns to open gaps in the Bar-Lev line. (36). Ferries, operating under the protection of air defense, allowed armor to cross the canal and strike deep into Israeli territory. Air assault commandos struck deep in Israeli territory to interdict supply routes but were destroyed mainly by Israeli anti-air fires. (36). In less than 6 hours, a total of 80,000 men crossed the Suez canal on a front of 170 KM. (37). The Egyptians had breached the Bar-Lev line and broken the myth of an undefeated Israeli Army. However, in order to assist Syria in its attack on Israel, the Egyptians continued their attack Eastward, leaving their ADA umbrella. This was a fatal mistake. The Israeli Air Force, combined with constant Israeli armor counterattacks, repelled the Egyptians across the Suez canal. (38).

Logistically, even though the Egyptians sent the infantry forces across the canal with a basic load of 24 hours of food and a little over four pints of water per man, shortages in supplies occurred rapidly. Once bridgeheads were established, 100,000 men, 1020 tanks, and 13,500 vehicles needed resupply. The Egyptian logistics system could not fulfill the back up support mission. Logistics operations could not support the force because of the confusion of battle, the large quantity of casualties blocking supply routes, and the

crowded bridges across the Suez Canal. The Egyptian concept of support did not take into consideration the fog of war. Nor did it take into consideration the mass of equipment and soldiers which had to pass through the established bridgeheads resulting in traffic jams at the bridgeheads. The problem was accentuated by increased requirements on the northern bridgeheads due to the failure of the crossing in the southern sector, and by the constant attacks of the Israeli Air Force. (32).

An innovative Egyptian approach to the logistical support of light infantry surfaced during the crossing of the Suez canal. Attacking infantry expected Israeli armor and air attacks while crossing the canal. The equipment to defeat the attacks was available in rocket propelled grenades and sagger missiles, but these were too heavy to carry by the light infantry. The Egyptians calculated that a soldier could not carry more than 60 pounds during an attack and remain combat effective. Food, flour, and water constituted 25 pounds and ammunition/grenades comprised the remaining 35 pounds. The other critical equipment, including mortars, ATGM, and flamethrowers could not be carried into battle by individual infantry foot soldiers. The Egyptians attempted to solve the problem by distributing the load among groups of infantrymen but still could not alleviate the weight problem and its impact on the

attacking force. The Egyptians devised a cart to carry the heavy supplies of a group of attacking infantry soldiers, thereby improving their fighting ability. (40).

In summary, the Egyptians' use of light infantry forces as the assault force across the Suez Canal worked initially due to surprise, new technology, and superior readiness over the Israeli forces. The Egyptians had a sound tactical and logistical plan to cross the canal but did not adequately plan resupply operations within the bridgeheads. The lack of bridges and the failure of the Egyptians to plan for the friction of war resulted in mass confusion and ultimately in a lack of support. Thus, the Egyptian error was one of lack of coordination and synchronization among units crossing the bridges over the Suez Canal. Although logistics cannot be identified as the primary cause for failure of the Egyptian attack, it certainly played an important part.

Whereas in the preceding vignette, the British successfully applied the logistics imperatives, contributing significantly to the overall success of the operation, here it is instructive to explore those same imperatives to discover the seeds of failure. The Egyptians applied, or failed to adequately apply, the logistics imperatives as follows:

- Anticipation: the Egyptians did not anticipate the confusion and movement problems into and within the

bridgeheads, nor did they anticipate a long battle and long lines of communication. This lack of anticipation resulted in a shortage of logistics after the initial 24 hours of battle.

-Integration: the initial distribution of logistics was integrated with the concept of operation. The attack, however, culminated before resupply could occur due to the clogged roads, crowded bridges, and lack of coordination. Replenishment procedures were not integrated with the concept of operation.

-Continuity: the lack of replenishment prevented continuous support to the combat forces. Combat forces lived on meager supplies following the initial 24 hours of battle until clearance of the bridgeheads.

-Responsiveness: the lack of anticipation of the movement problems resulted in a lack of response to the requests for resupply.

-Improvisation: the Egyptians had success here with their improvised cart which carried the infantry soldiers' heavy equipment. The cart played a significant role in the successful crossing of the Suez Canal.

C. NTC experiences and lessons learned.

Lessons learned at the National Training Center (NTC) assist the U.S. Army in continually orienting its force modernization and restructuring efforts to assure

it can deter and, if necessary, defeat its enemies. The NTC has shown that there is a definite role for light infantry forces fighting with heavy forces.

NTC has confirmed the heavy/light concept in the desert as viable and identified CSS as a potential problem area. The problems and possible solutions in CSS for a heavy/light mixed forces listed below are based on insights from the NTC, and observation reports sent to the Center for Army Lessons Learned at FT. Leavenworth.

General: NTC identified the support structure of a light force as austere, requiring logistics backup support when consolidated with a heavy force. There are important compensating factors when one compares the support requirements needed to support a heavy force versus the requirements needed to support a light force. For example, total tonnage needed and total end items requiring repairs are 1/2 to 1/3 less in a light division as compared to requirements in a heavy division. The light force, thus, does not need excessive backup support when consolidated with a heavy force. (41). A significant difference, however, between the two types of forces involves philosophy of support. In order to provide forward support to the combat forces and to counter the austere CSS organization, the light forces use a push system philosophy to support the

forces, where supplies are pushed forward for rapid replacement and floats are exchanged for damaged items. The heavy forces, on the other hand use a pull system whereby requisitions are processed to request resupply. Repairs are made forward as much as possible, and end items are evacuated when found non-repairable. The push system requires additional transportation assets to push supplies to the combat forces or to prestock items in a cache for expected stay behind forces. The differing systems require coordination when pulled together to support a heavy/light force (4.2).

Command and Control: NTC indicates, based on the different support philosophies, a need for effective coordination and synchronization between heavy and light forces when consolidated, to provide proper integration of support concepts. To accomplish this, the concept of light forces providing liaison officers to the controlling heavy force has proven particularly effective. Liaison officers coordinate daily requirements in support of the light forces. (4.3).

Supply: The significant problems encountered at the NTC involved: 1) class II where demands for nuclear, biological, chemical (NBC) equipment increased due to greater wear and tear experienced by dismounted soldiers, 2) class IV where, due to the excessive weight and a lack of lift assets organic to the light forces, a

push system to the battalion level is required (44) and, 3) class V where the light forward area support team (FAST) cannot push ammunition to the light forces due to the limited equipment available, thus requiring units to accommodate a supply point distribution system. (45). Also, the different weapon systems used by the light forces (M16A2, 9mm, M102, 60mm), in addition to the large consumption of 5.56mm ammunition, grenades and pyrotechnics required by such a force, warrant special coordination. (46). These problems are solvable but surface the need for special coordination when joining heavy and light forces.

Transportation: Light forces move at a significantly slower speed than heavy forces in any operation and, thus, need transportation assets to support rapid moves. Attaching transportation assets to light forces, however, may cause additional problems. Light forces become strapped by a long logistical tail when transportation assets are attached to them. (47). Tasking transportation support units on a mission basis for the requirement provides the essential needs. Coordination facilitates the integration of the light forces transportation requirements with the available heavy forces assets.

Maintenance: Light forces have less equipment and fewer types of line items to maintain, justifying their

small maintenance capability. The maintenance concept in support of light forces calls for quick repairs or direct exchange of damaged equipment. However, the increased requirements for exchangeable items caused by the quick replacement philosophy impact on the availability of class VII floats and class IX. Proper coordination and anticipation of these requirements facilitates replenishment. (43).

Medical: NTC shows that the medical evacuation system of the light forces is austere. The light forces have limited means of transportation to evacuate casualties, and require augmentation in evacuation assets. During one rotation at the NTC, the medical personnel planned for evacuation and treatment of casualties, identified routes, and established collecting points. However, due to the intensity of the fight, units could not get the casualties to the collecting points. The result was an unacceptably large number of losses due to untreated wounds. (43).

V. TACTICAL SITUATION:

This study has identified historical precedents in logistics support of light forces used with heavy forces during two wars and at the National training Center. I now propose to develop a concept of support for a tactical scenario drawing from the CSS experiences

identified thus far.

We have seen from history that infantry forces can be used successfully in a heavy/light mix. Prior to analyzing the support concept for a heavy/light mix under a specific scenario using present force structure and doctrine, we need to look at the present organization, limitations and capabilities of the light infantry division, and form a CSS structure to support the attachment of a light brigade to the heavy division.

The organization of the light division is depicted at appendix 3. The major elements of the division include three maneuver brigades, division artillery, combat aviation brigade, division support command (DISCOM), and division troops. (50). In this scenario, a light brigade is attached to a heavy mechanized division in a developed theater. The brigade and attached combat support (CS) and CSS slice elements are depicted at appendix 4.

As the historical analysis has established, logistics support for a heavy/light mix requires a good understanding of the current, ongoing and future needs of each organization. As established in FM 71-100, Division Operations, when a light brigade is sent out of sector to a heavy division, it should be attached to the division. FM 71-100 also notes that the light brigade would deploy with an austere combat support (CS) and

combat service support (CSS) allocation and would require transportation and additional maintenance assets. (51). FM 63-2-2, Combat Service Support Operations Divisions, identifies the heavy DISCOM as the element to provide logistics support on an area basis. (52).

The NTC experience identified liaison officers as necessary to properly coordinate heavy/light requirements. Based on this, a FASCO (forward area support coordination office) cell augmented by elements of the LID DISCOM material management center (MMC) allows coordination and synchronization between the heavy and light support forces. The organization of the FASCO is depicted at appendices 5 and 6. In my judgement, the two officers and three enlisted personnel assigned to the FASCO (TOE 63022L) require augmentation from the LID DISCOM MMC, primarily to coordinate and synchronize the two different support philosophies used by the heavy and light forces. Specifically, as shown in appendix 6, the DISCOM should augment the FASCO with representatives in all classes of supply and transportation. The total liaison team consists of 14-20 soldiers with the primary missions to manage requisitions not filled at the forward area support team (FAST), to locate repair parts in the heavy division division support area (DSA) or at corps, to coordinate

with the movement control center (MCC) on transport requirements, to facilitate float transactions, to facilitate the light division push system, and to command and control all light support assets in the heavy division sector. Although not supported in doctrine, I also believe that the LID should send a representative from the G-4 staff section to act as liaison with the gaining Corps CSS elements. This liaison can provide coordination for possible Corps support.

In addition to providing a FASCO liaison cell, the LID DISCOM also supports the brigade in all classes of supply, in maintenance repairs, and in medical support through its forward support companies as depicted in appendix 5. The forward support company of the medical battalion provides treatment, triage, and initial resuscitation. It provides ground evacuation from maneuver elements and has the capability to hold 20 patients for 72 Hrs. (S³). The forward supply and service company provides support in receipt, storage, issue of classes I, II, III, IV, VII and operates an ammunition transfer point (ATP). (S⁴). The forward maintenance company is capable of repairing fire control, power generation, engineer, artillery equipment, and wheel vehicles (TOE 43147L - 61 soldiers). Based on the NTC experience, the company is

augmented by class IX supply personnel with a basic load of authorized stockage list (ASL) lines and by a missile maintenance contact team with appropriate spare parts, both provided by the headquarters company of the maintenance battalion. (SS).

Overall requirements:

The light brigade will be used in an air assault to capture key terrain and facilitate the passage of the heavy forces. The light forces can expect the heavy force to link up on the objective between 24 to 48 hours. The quantity of supplies required to support the offensive is shown at appendix 7.

Since the light elements are not able to move much organic transportation with them during the air assault, and the lessons of history indicate that heavy and light forces should not count on host nation support when operating in a desert environment, CSS operators must devise a system to quickly resupply the combat units. As experienced at the NTC, logistics packages (Logpacks) made of necessary critical supplies are built to unit level at the FAST and forwarded to units during resupply actions and at link up. (SS).

Air Assault scenario:

The light brigade attached to the heavy force, augmented with combat aviation assets is airlifted at night to capture two key terrain features 15 -20

kilometers deep in enemy territory. The specific missions of the light forces are: to seize the designated objectives, to kill anti-tank elements in the area, and to retain control of the objectives until link up is made with the heavy forces, 24 to 48 hours later. The air assault force consists of the three infantry battalions, with artillery assets, engineer assets, signal assets, and forward CSS. (Approximately 1800 soldiers in the attack force - see appendix 8).

Given this tactical problem, and based on lessons learned from history and the NTC, I propose a concept of support which has light forces assaulting with two days of supplies and establishing a forward support area on the objective for possible resupply actions, leaving the majority of CSS behind the forward edge of the battle area (FEBA). Direct support maintenance contact teams capable to repair small arms and armament, and forward medic elements are attached to the assault force to provide forward support.

Since the historical analysis identified the establishment of forward depots as crucial to properly support combat forces in battle, the FAST locates with the forward support battalion (FSB) behind the FEBA, and consolidates logpacks of critical supplies in anticipation of resupply missions. The combat aviation battalion establishes forward arming and refueling

points (FARPS) behind the forward line of own troops (FLOT) for classes III and V support to air assets.

Planning and provisioning for the air assault forces is intended to be such that resupplies will not be needed prior to the heavy force link up with the light forces on the objectives. However, a plan for such resupply action is conceived using logpacks identified for specific units (battalion level) in anticipation of possible delays to the operation. Critical supplies most likely needed on the objective include water, and classes V, VII, and IX. Logpacks are built at the FAST location and airlifted following coordination with the air assault forces. Air resupply assets return with casualties. Coordination between liaison MMC, division MMC, corps MMC and the assault element is accomplished with the available communication equipment and plays a crucial role in providing the correct resupplies on the objectives. In order to provide support to the air assault forces as soon as linkup with the heavy forces is accomplished, FAST elements remain ready to move behind the heavy force elements to rejoin the light forces on the objective. The FAST elements move with a Forward Support Battalion.

The British in the battle of EL ALAMEIN realized that early medical intervention would save lives. The British established a forward medical support system to

support combat troops in battle. In order to provide similar support, FAST medical elements are pushed forward and airlifted with the combat elements on the objective. The FAST augments the combat forces by a medical capability of fourteen medical personnel. The element consists of the forward support medical company treatment squads with class VIII. The remainder of the medical company remains at the FAST and supports as needed, particularly in the evacuation of casualties. Furthermore, the company is ready to move and join the assault forces as link up is accomplished.

The casualty evacuation capability of the brigade is austere. (57). Assets available consist of divisional UH-60s used for resupply and air ambulance assets from corps. These assets provide continuous air evacuation of casualties. A corps medical company is also OPCON to the FAST for ground evacuation of casualties from the objectives as linkup is made between heavy and light forces. The corps medical company assets consist of twenty four high mobility multi-purpose wheeled vehicles (HMMWV) capable of carrying four litters each. The combination of corps medical ambulance assets, corps air ambulance assets and FAST assets allows quick evacuation of casualties, a requirement identified in the historical analysis as critical to success in battle. The division main support battalion (MSB) assets are

available but will probably be overcommitted as soon as the heavy division enters the battle.

Fuel for the light force should not be a serious problem in an air assault operation. The aviation assets draw class III from the established forward arming and refueling points (FARPS). Vehicles taken to the objective will have full tanks when airlifted, which should suffice until the link up with the heavy force is accomplished. FAST elements use class III on the move to the objectives and replenish on the objectives. Corps uses throughput procedures to resupply class III to the FAST during the operation.

To arm the force, the light force deploys with two days of supply, broken into unit logpacks, and airlifted on the objective. The daily requirement to arm the major weapon systems of the light force is calculated at 230 short tons per day (see appendix 7). The FAST supply and service company has the capability to transload 250 short tons per day and support the requirement. Resupply of ammunition to the light force on the objectives, if needed, is accomplished by air assets using logpacks. The corps resupplies the FAST using throughput procedures.

The concept of operation calls for the heavy force to attack and join the light force on the objectives within forty-eight hours. The FAST accompanies the

heavy force with the available stockage on hand in order to replenish the light force on the objectives. To accomplish this, and based on a similar NTC experience, an additional requirement for transportation assets to carry the ammunition stockage forward surfaces. (59). The specifics on transportation requirements are addressed subsequently.

Providing maintenance support to the force requires coordination as both light and heavy support units have their own unique methods of supporting their respective units. The FAST slice contains a maintenance company designed to accomplish minimal repairs with emphasis on replacing damaged equipment. Corps normally provides back up support. (59). In this case, the heavy division MSB can provide back up support since the quantity of equipment requiring evacuation is likely to be minimal (see appendix 7). Evacuation of damaged equipment occurs using air resupply assets or waits until linkup. Additionally, the NTC experience shows that the replace versus repair concepts identified above require the system to provide more floats for support. Therefore, upon attachment to the division, the light force CSS slice must bring adequate floats (such as 60mm mortars, M16 rifles, DRAGONS), and critical authorized stockage list (ASL) lines to repair artillery pieces, wheel vehicles, and missile launchers. These assets should

remain under the control of the MMC liaison team, in anticipation of the high combat losses and equipment failures.

The maintenance company provides forward maintenance repair teams to the assault force with repair parts and class VII floats to repair or exchange damaged equipment as far forward as possible. The remainder of the maintenance assets locate in the FAST and move to the objective with the heavy force.

A key player in the class IX and class VII arena is the MMC liaison cell. The cell ensures that the FAST brings ample supplies to sustain the operation and that coordination with the heavy division, corps MMC and movement control center (MCC) liaison on resupply of critical items is effective. Both factors need to be coordinated prior to attachment of the light brigade to the heavy division.

In order to supply the force, the corps pushes all classes to the FAST. However, special considerations surface in support of water requirements, graves registration, and survivability requirements.

The light force needs 33,000 gallons of water to sustain in a desert environment (see appendix 7). This requirement includes all functions involving water such as laundry, cooking, and personal hygiene, and as such, overstates the requirement for this forty-eight hour air

assault operation. If we calculate 1800 soldiers on the objective, with each soldier able to survive with three gallons per day of drinking water, (50), one gallon carried in four canteens (two on the soldier and two in the pack) and the remainder carried in five gallon cans, the daily drinking requirement for the assault force totals 5400 gallons. Replenishment of water supply, as the British demonstrated in Africa, requires improvisation. In this scenario, air resupply to the air assault force and the use of logpacks with five gallon cans for a total of 1100 cans for the elements on the objective (550 on hand and 550 for resupply and exchange) support the requirement.

Water purification to support the force in an arid environment also surfaces as a crucial step in the planning process. The division MSB has the capability to provide five water points but will already be overtasked by the demands of the division (requirement of 210,000 gallons/day in a desert environment for a division of approximately 17,000 soldiers against a capability of 120,000 gallons/day in the MSB). (51). Therefore, the corps supply and service company must serve as backup and provide water purification to the heavy force and the attached brigade.

Graves registration (GRREG) is another area of concern. Even though, initial issue of equipment is

available on the objective through the forward CSS elements, the FAST does not have a GRREG team assigned to process remains and, thus, requires backup support in collection and evacuation of remains. The heavy force MSB does not have, by table of organization and equipment (TOE), the capability to provide such support. (S2). Therefore, the corps supply and service company must serve as backup to provide evacuation and a collection point for the remains.

To survive on the objectives and establish a defense while waiting for the linkup with the heavy force, the light force needs mines and barrier material. The 290 short tons needed to support the brigade (see appendix 7) are airlifted with the light force onto the objective along with two bulldozers and a small emplacement excavator (SEE) to establish a defensible position.

Air transportation to the objective requires coordination. The requirement to lift the brigade on the objective is calculated at appendix 8. By TOE, the lift capability of the corps consists of:

- 27 UH-60 in the heavy force. (S3).
- 108 UH-60 at corps.
- 64 CH-47 at corps. (S4)

If we anticipate an equipment readiness rate of 75%, the available lift assets total:

- 21 UH-60 in the heavy force.
- 81 UH-60 in the corps.
- 48 CH-47 in the corps..

The liaison officer aviation guide of the 101 Airborne Division describes the UH-60 as capable to carry either 21 soldiers or four short tons of supplies sling loaded, and the CH-47, either 33 soldiers or ten short tons of additional supplies sling loaded. (es). Thus, the brigade clearly needs corps assets to move. The move requires 80 UH-60 to lift 1700 soldiers on a single lift to secure the objectives or to lift @320 short tons. The second lift brings the remainder of the supplies, the 18 M102 Howitzer and remaining soldiers. The attack also requires at least 31 CH47 to transport the heavy equipment.

Synchronization, coordination, and staging procedures are the keys to a successful operation. Soldiers, equipment and supplies are divided into unit fighting positions in a staging area to ensure their delivery to the right place on the objective. Coordination and synchronization are critical to ensure that air assets are available in the required quantity to support the lift. The movement control cell of the FAST plays a crucial role in the planning and coordinating of such an operation. The cost of such a lift is incurred in maintenance down time and in a

decreased availability of air assets to other missions in the corps.

This air assault scenario assumes that the appropriate numbers of aircraft are available to accomplish the mission. The availability of aircraft in the quantity desired, however, is questionable due to the numerous requirements which surface during an operation. A shortage of aircraft will force the commander to prioritize the type and quantity of assets airlifted to the objective. In this case, combat soldiers should have initial aircraft priority in order to capture the objectives. As the objectives are captured, however, the commander should switch the priority to include logistics elements, such as ammunition and medical support. The commander must be careful not to fall in the trap Rommel encountered in Africa and reach a culminating point prior to the accomplishment of the mission. The commander who mixes his forces in such a way that they have the combat power to strike and destroy the enemy and have logistical power to regenerate in preparation for the next strike wins battles.

As the heavy force deploys to join the light forces on the objective, an additional transportation requirement presents itself- the movement of FAST assets with the heavy force to the objective. The FAST

elements need assistance in transporting approximately 300 short tons of supplies forward (see appendix 7). A light truck company from corps (2 1/2 tons) or a light truck platoon from the transportation company of the heavy division MSB (5 ton) can meet the requirement. The corps assets are likely to be the most available to support the mission. The MSB transportation assets will probably be tasked to support the division on the attack concurrent with the requirement to move the brigade.

In summary, the requirements to support a light brigade attached to a heavy division are depicted at appendix 9. Support shortfalls surface in evacuation of casualties, maintenance back up, water resupply, graves registration, and transportation. The heavy division MSB does not have the capability to lift a brigade on an objective, nor does it have the capability to support water requirements, casualty evacuation, and graves registration. The MSB is capable to support the maintenance effort of a light brigade given the necessary repair parts in addition to the understanding of possible backup by Corps units. The cost of providing support is high as assets are lost for the duration of the mission and cannot be used for other divisional requirements. Even though doctrine establishes the DISCOM as providing logistics support on an area basis within a designated geographical area, we

have seen that, due to the lack of capabilities within the DISCOM, the support of a light brigade attached to a heavy division should become a mission for the Corps.

The light brigade attached to a heavy division, by doctrine, would deploy with CSS elements organized in a FAST and controlled by a FASCO. In this scenario, because of the magnified coordination requirements of a mixed force, I included in the FAST headquarters not only a FASCO but also a slice of the light infantry division MMC, augmenting the FASCO with additional coordination capabilities in all commodities and transportation. The augmented FASCO is capable of ensuring complete integration of the two support systems (push and pull) in anticipation of future requirements. The FASCO plays, as we have seen throughout the scenario, an important role in coordinating support requirements regardless of whether corps or the heavy division provide the back up support.

VI. CONCLUSIONS:

We have analyzed the available current doctrine, pertinent historical vignettes, and the challenges of a present day tactical support requirement for an airmobile operation in order to gain insights concerning the challenges of supporting a heavy/light force in desert combat. A number of significant results emerged from the analysis.

History shows that adhering to the logistics imperatives assists the logistician in formulating a valid concept of support for the operation, while ignoring the imperatives results in an improper concept of support and most likely in logistics problems during the operation. At EL Alamein, the British anticipated a long battle, established forward depots, integrated the support concept into the concept of operation, provided continuity and responsiveness of support through a forward support system and improvised the repairs of rails and the development of water drums to resupply the combat soldiers forward. The British provided an example of the proper use of the CSS imperatives in formulating a logistics plan that worked. At the Suez Canal, the Egyptians did not anticipate the confusion and movement problems across the bridgeheads nor did they anticipate an extended war and did not establish forward depots. The Egyptians integrated the

concept of support with the concept of operations in support of the initial crossings, but failed to integrate the replenishment plan with the plan to move the forces beyond the bridgeheads. The resulting lack of continuity and responsiveness in support adversely affected Egyptian combat power. The Egyptians improvised through the development of a cart to assist the assault forces in crossing the Suez Canal. The Egyptians provided an example of a CSS concept which had numerous difficulties to support the combat soldiers due to the lack of attention to the CSS imperatives. At the NTC, units anticipated the additional supply and transportation requirements necessary to support a heavy/light force. The use of liaison elements to integrate and coordinate the support concept of a heavy/light force mix provided responsive and continuous support to the combat soldiers. Finally, the support concept for the air assault scenario anticipated support requirements for a light brigade, and proposed a FAST capable to provide support for the initial 48 hours. The FASCO provided command and control of all FAST elements in the heavy force area. The FASCO, augmented with MMC elements from the LID DISCOM, allowed coordination and synchronization between the heavy and light forces. The augmented FASCO acted as a liaison team, and played a crucial role in the management of

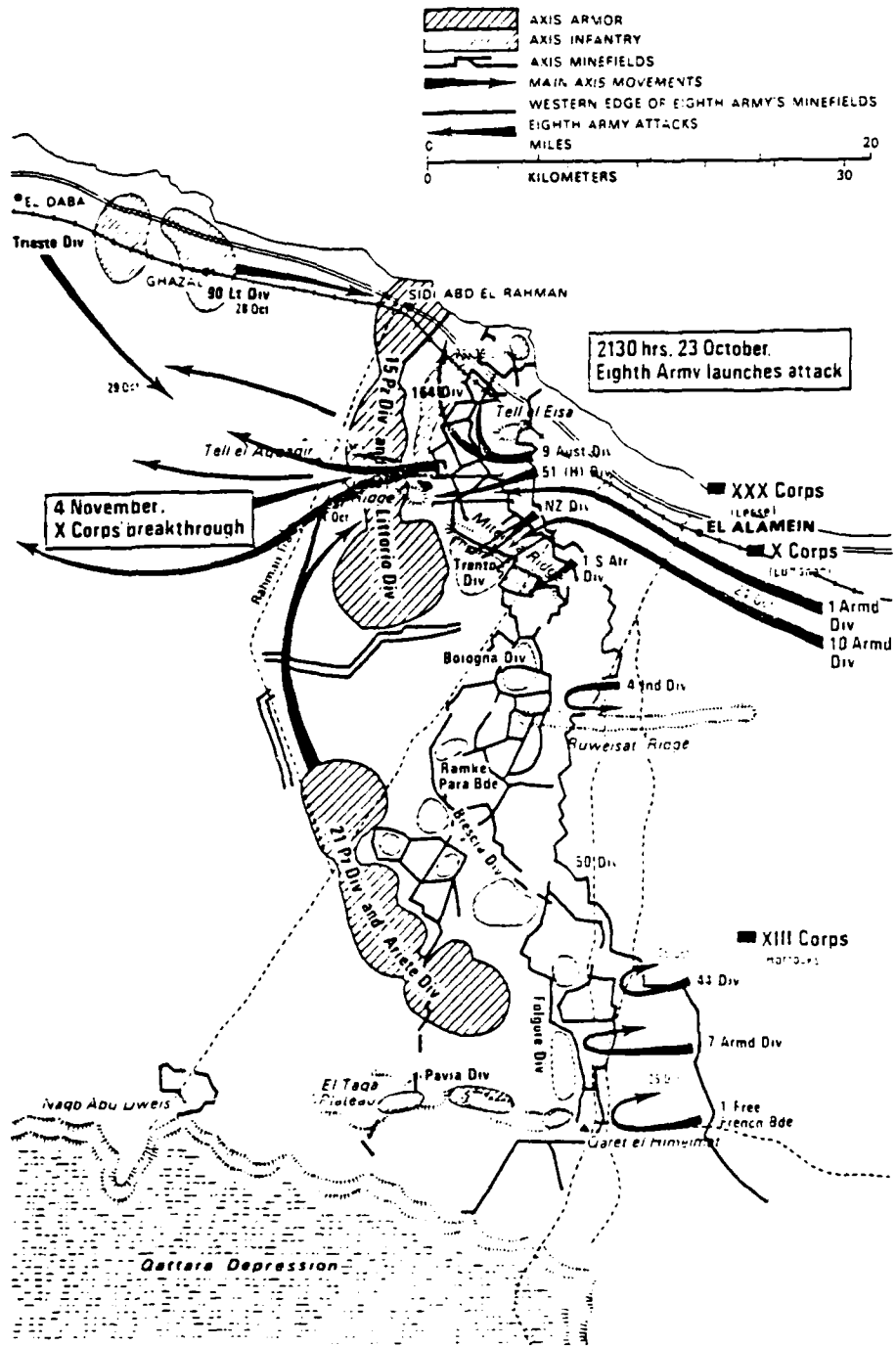
requisitions throughout the system. It located repair parts, coordinated transportation requirements, and facilitated float transactions. The most important role played by the augmented FASCO, however, involved the synchronization between the push logistics system of the light forces and the pull system used by the heavy forces.

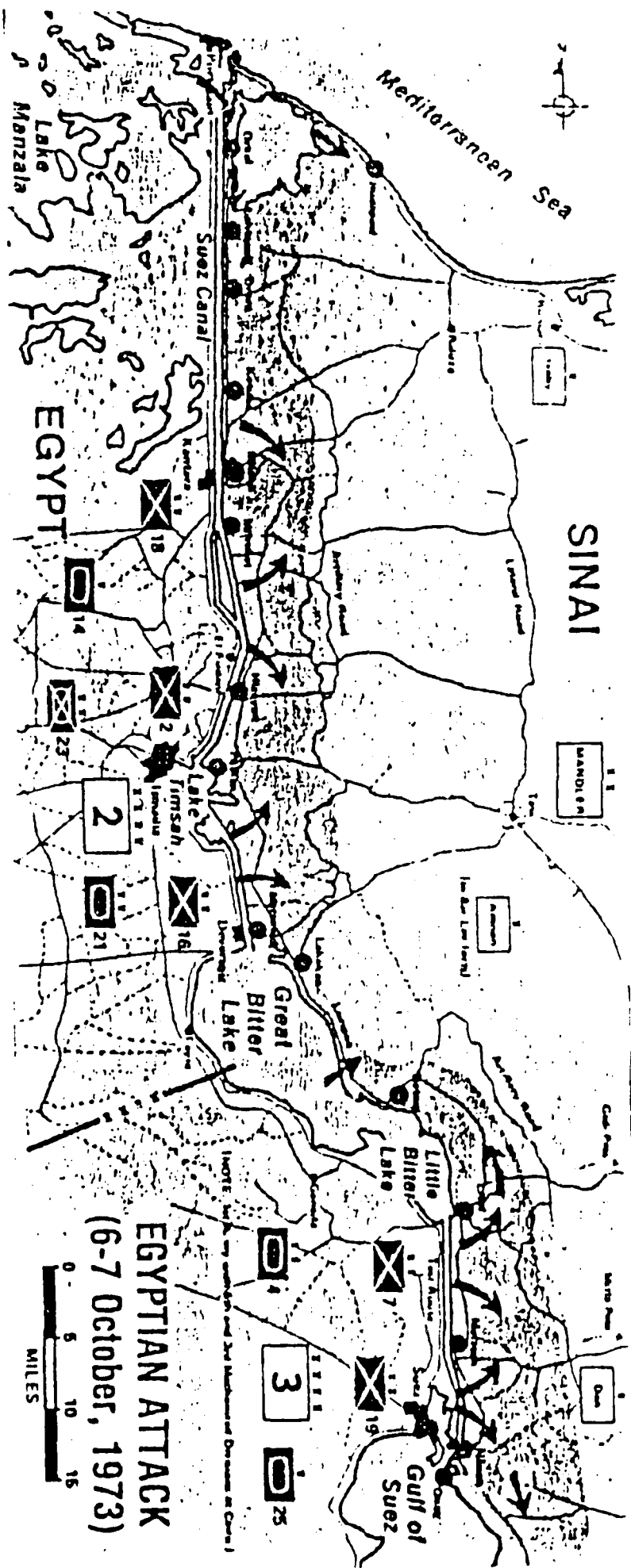
Even though the logistics imperatives are judged adequate in providing guidance to the logistician in the development of a concept of support for an operation involving heavy/light forces, a need for a revision to the imperatives surfaced throughout this study. To prevent any repeats of the CSS problems encountered by the Egyptians in 1973, and to assist logisticians in formulating the proper concept of support for a heavy/light mix, I propose the addition of another imperative: coordination/synchronization. History showed us that coordination/synchronization played an important role in CSS planning. The British success in supporting the operation at El Alamein related directly to coordination and synchronization in the replenishment procedures between combat and support troops. The lack of coordination and synchronization prevented the Egyptian CSS elements from crossing the bridgeheads to resupply the forward combat forces. The liaison cells, seen at the NTC and used throughout the air assault

scenario, served as coordinating elements between heavy and light forces, joined and integrated both support concepts, and responded to demands for support. A crucial role played by the augmented FASCO elements during the air assault scenario involved the continuous synchronization of the different support philosophies used by the heavy/light forces. Without the synchronization, shortages of supplies would occur, continuity and responsiveness of support would suffer and chaos would reign. I realize that to have integration, responsiveness, and continuity of support, a logistician must coordinate and synchronize. A force could not integrate concepts for support with the concept of operations without coordination. However, when mixed forces, using different support philosophies such as the pull/push philosophies used by heavy and light forces respectively, join, a need exists for special emphasis on coordination and synchronization prior to effecting any attachment. The coordination/synchronization must include memoranda of agreement, concepts of support under different scenarios, and appropriate task organization.

The impact of a proper CSS doctrine to support the heavy/light mix is crucial for the future of our Army. As previously mentioned, the LID will deploy around the world with heavy forces and augment such forces,

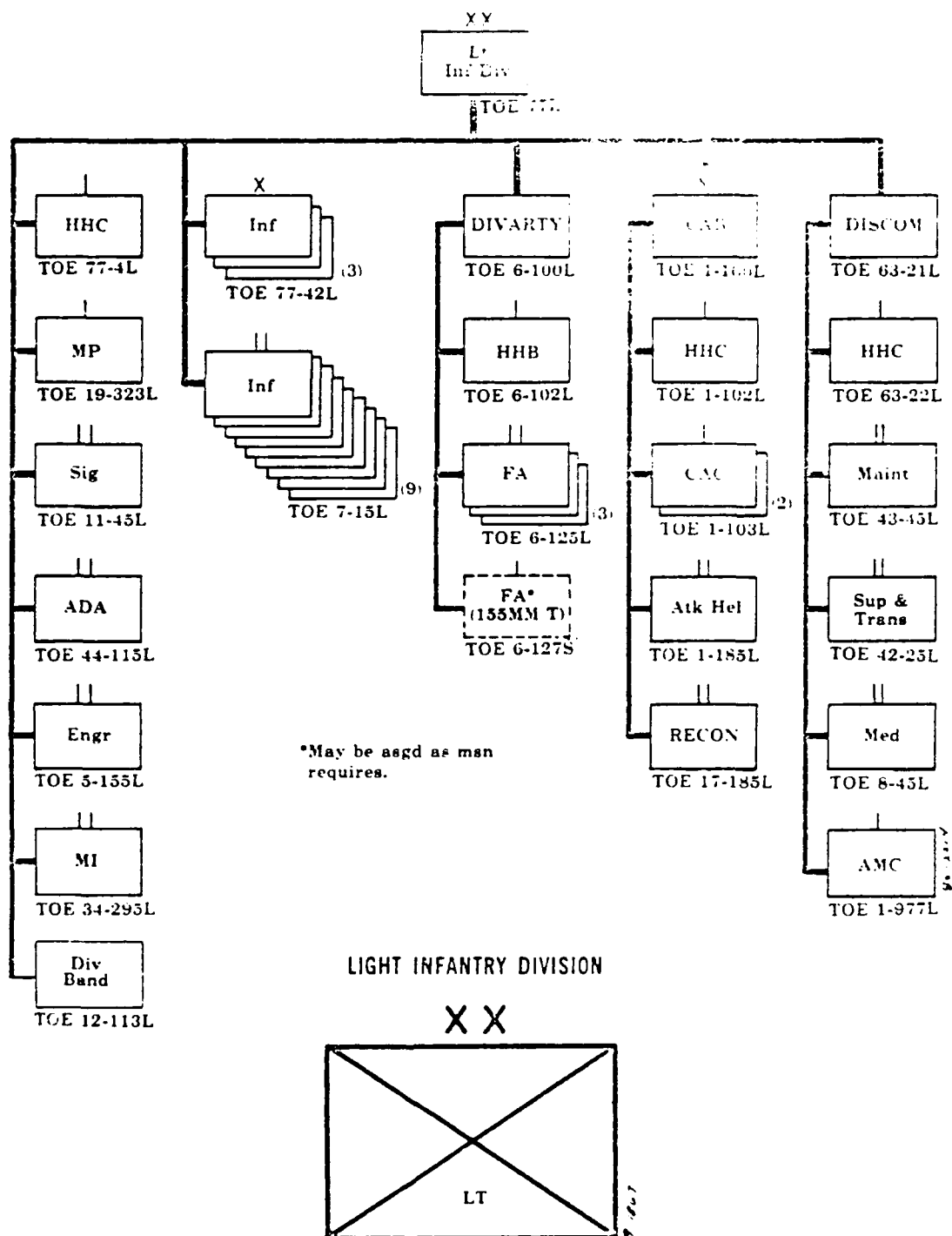
allowing the commander more flexibility in the use of his mechanized combat power. Adequate logistics imperatives are the only CSS doctrinal source available to provide guidance to logisticians required to plan CSS for a heavy/light mix force. This study finds that the addition of the imperative COORDINATION/SYNCHRONIZATION to the current logistics imperatives is essential in providing such guidance.





EGYPTIAN ATTACK
(6-7 October, 1973)

Section II. LIGHT INFANTRY DIVISION

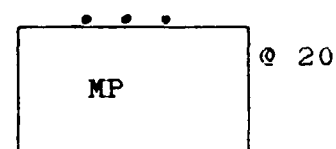
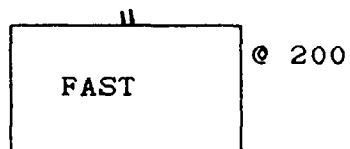
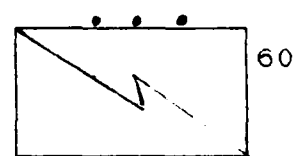
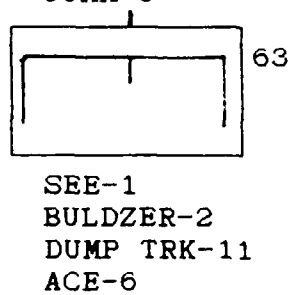
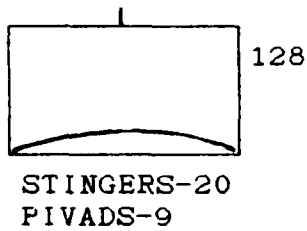
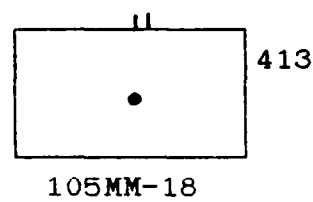
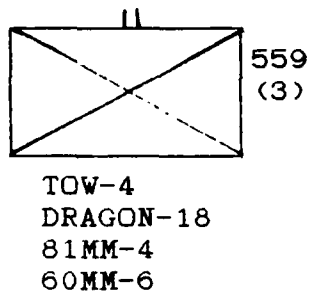
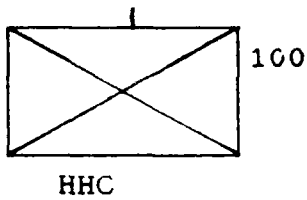
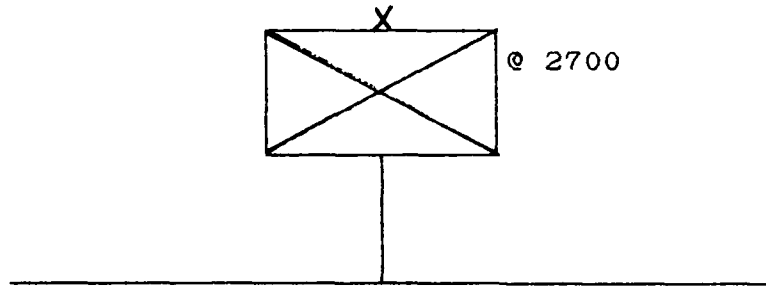


1. MISSION

a. This division is organized to destroy enemy armed forces and to control land areas, including population and resources in a low intensity setting and when properly augmented in a mid- to high-intensity setting.

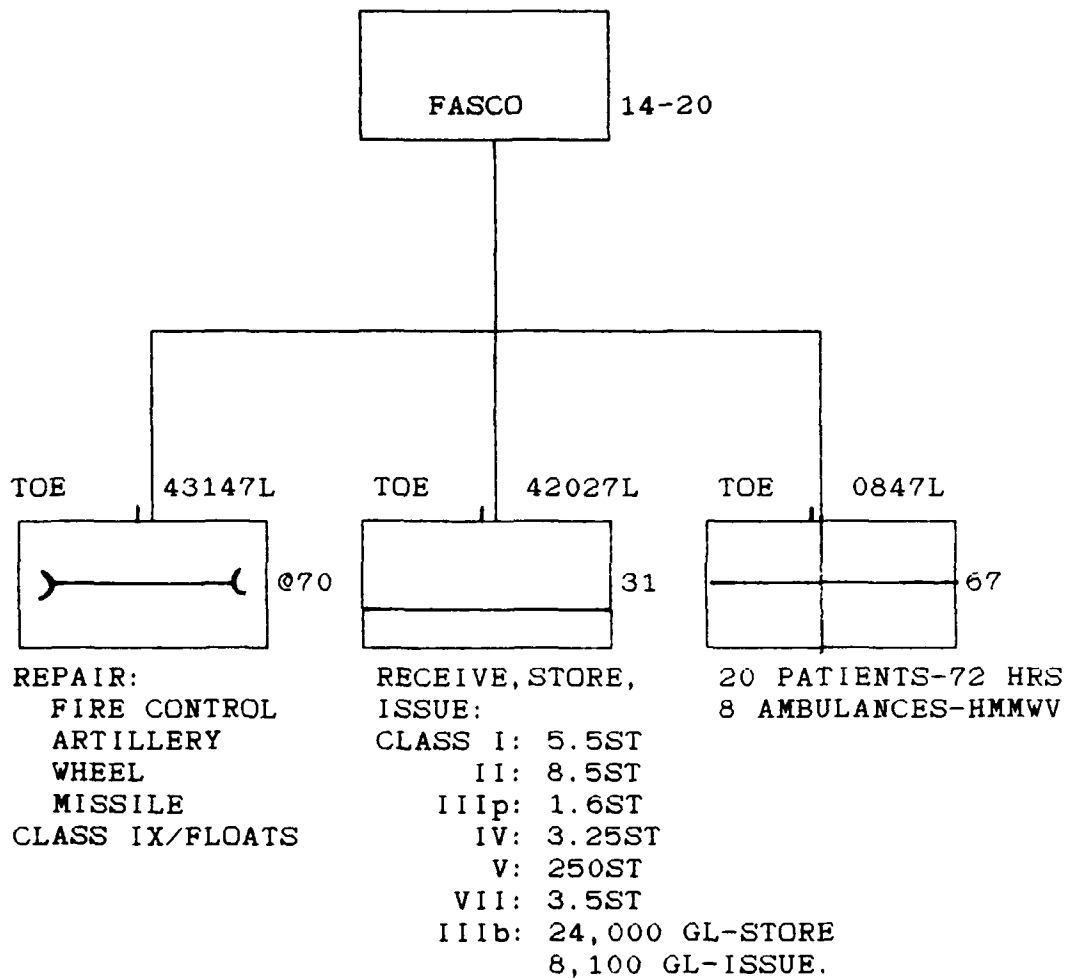
SOURCE: ST 101-1

APPENDIX 4.



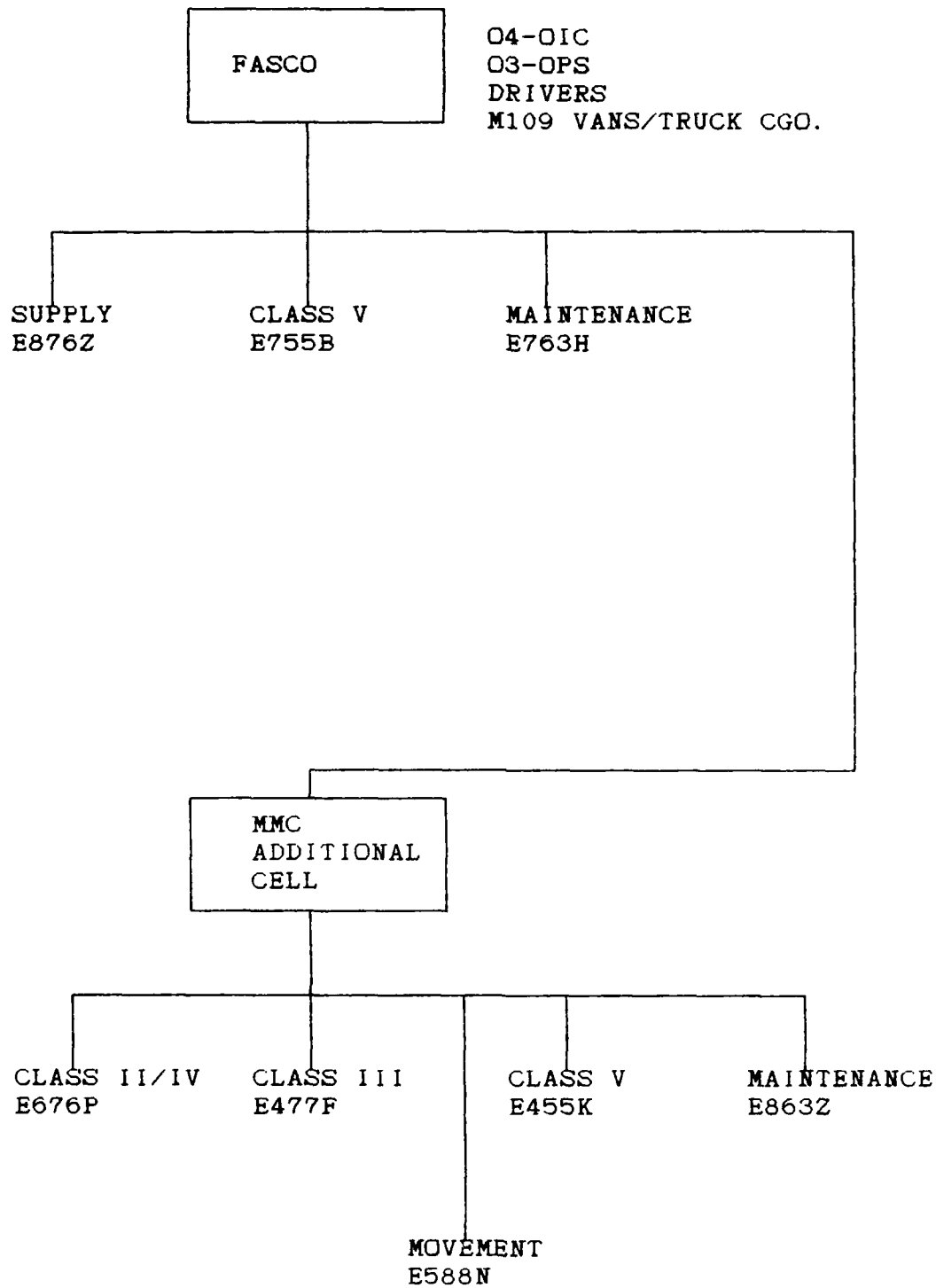
SOURCE: ST 101-1
FM 101-10-1/1.

APPENDIX 5.



SOURCE: ST 101-6.

APPENDIX 6.



APPENDIX 7.

BRIGADE REQUIREMENTS.

2700 SOLDIERS.

	<u>Factors</u>	<u>Required</u>
Class I:	4.03	5.5 ST
Class II:	3.67	5.0 ST
Class III(p):	.59	1 ST
Class VII:	15	21 ST
Class IX:	2.5	3.45 ST
Class VIII:	1.2	1.6 ST
Water:	12.2	33,000

Source: FM 101-10-1/2. Table 2-3.

Class III (b): using the light division expenditure in a Middle East environment (005), Fm 101-10-1/2.

Table 2-15.

- 7000 gal/day.

Class IV: using FM 101-10-1/2, table 1-22, and 1-25, 5km of frontage for triple standard concertina and a mix of AT/AP mines.

- 20ST concertina, 270ST mines for a total of 290ST.

Class V: using formula: $(rds/wp \times \# \text{ of wps} \times \text{wt of rds})/2000$. Fm 101-10-1/2. Table 2-16.

- 105 MM: 1st day: 203 ST, next days: 205 ST.
- 81MM: 1st day: 12.5 ST, next days: 6.8 ST.
- Dragon: 1st day: 3.6 ST, next days: 5.4 ST.
- M 16: 1st day: 6.7 ST, next days: 3.6 ST.
- 60 MM: 1st day: 8 St, next days: 4 ST.
- TOW: 1st day: 3.6 ST, next days: 4.2 ST.

Medical: using ST 101-6, G4 battle book, 1st day losses: 6.6%, next days: 3.5%. If we take +/- 2000 soldiers on the objective:

- 1st day: 37 soldiers killed, 95 soldiers wounded.
- next days: 20 soldiers killed, 50 soldiers wounded.

Maintenance: using ST 101-6, G4 battle book p. 2-5, 2-6.

On the offensive, a force would loose 15% of its equipment, 20% of the losses are non repairable (NR), 80% are repairable. Of the repairable, 20% can be repaired on site, 80% must be evacuated to DS or above. 20% of these can be repaired at the FAST in 24 hrs, the rest must be evacuated. If we apply these factors to the major equipment of the brigade:

NOUN	qty	loss	NR	on site	FAST	DS
105MM	18	2	1	1		
60MM	18	2	1	1		
DRAGON	54	8	2	2	1	3
M 16	2700	400	80	64	52	204
TOW	12	1		1		
STINGERS	20	3	1	1	1	
VULCAN	9	1		1		
81MM	12	1		1		

- maintenance repairs will be mainly in small arms and wheel vehicles.

APPENDIX 8.

ASSAULT ELEMENTS.

<u>UNIT</u>	<u># SOLDIERS</u>	<u>EQUIPMENT</u>
HHC	50	2- HMMWV.*
INF BN	1200	4- HMMWV.
ARTY BN	350	2- HMMWV/18- 105MM
ADA	128	9- HMMWV/ stingers, PIVADS
ENG.	40	2- BULLDOZERS, 1- SEE
FAST	50	

	@ 1800	

SUPPLIES:

Class V: 230 Short Tons.

Class IV: 290 Short Tons.

Water: 500-1100 - 5 gallon cans. (1 gallon= 8.3 pounds,
total= 20 short tons).

Classes I,VII,VIII,IX: @40 Short Tons.

* High mobility multi-purpose wheeled vehicle.

APPENDIX 9.

SUPPORT MATRIX.

<u>CLASSES</u>	<u>REQ.</u>	<u>AIR ASSAULT.</u> <u>CAPAB.</u> <u>FAST</u>	<u>CAPAB.</u> <u>DIV.</u>	<u>CORPS.</u>
I	5.5 ST	5.5 ST	N/A	
II	5.0 ST	8.5 ST	N/A	
III p	1 ST	1.6 ST	N/A	
IV	290 ST	3.25 ST	N/A	THRUPUT
V	230 ST	250 ST	N/A	THRUPUT
VII	21 ST	3.5 ST	N/A	THRUPUT
VIII	1.6 ST	1.6 ST	N/A	
IX	3.5 ST	3.5 ST	N/A	THRUPUT
III b	7000 gal.	24000 gal- STORE 8100 gal- ISSUE	N/A	THRUPUT
MED. EVAC	95	32	NONE	AIR- GROUND AMBUL.
MAINT.	100%	75%	25%	MINIMAL
TRANS.	AIR- 1700- TRPS 600 ST GROUND- 300 ST.	NONE	NONE	100%
WATER	30000 GAL.	NONE	NONE	100%
GRREG	37	NONE	EVAC	100%

SOURCE: FM 101-10-1/2.

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