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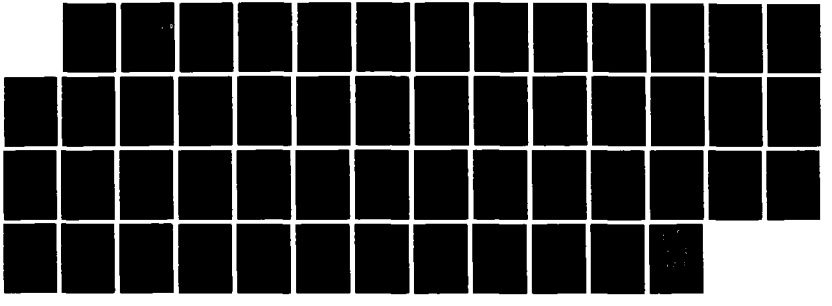

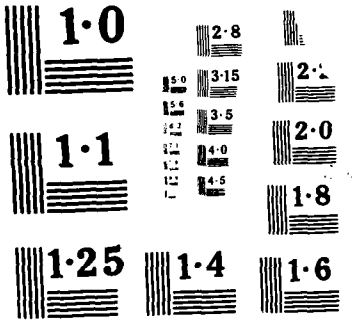
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LOGISTICAL SUPPORT FOR THE HEAVY-LIGHT MIX

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This monograph addresses the logistical considerations of attaching a heavy brigade to a light infantry division.

It first examines the historical background of combined arms to demonstrate the necessity of creating such a force. It then limits the scope by historically validating ammunition, fuel, and maintenance as the priority sustainment functions for a heavy unit. Further examples describe organizations and procedures which have successfully supported a heavy-light mix of forces in the past. These

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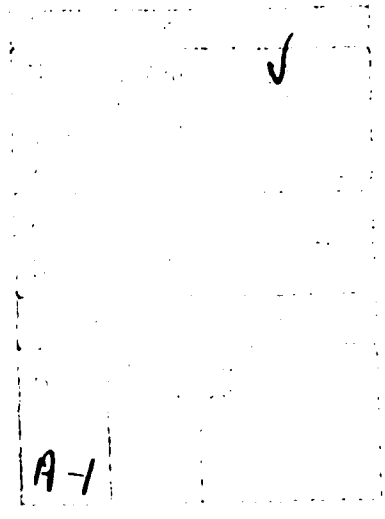

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ABSTRACT

LOGISTICAL SUPPORT FOR THE HEAVY-LIGHT MIX by MAJ Thomas Schmidt, USA, 42 pages.

This monograph addresses the logistical considerations of attaching a heavy brigade to a light infantry division.

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Table of Contents

I. Introduction.

The United States Army has no fewer than seven types of combat divisions in its force structure. This is a clear indication that it perceives a need for flexibility and no single type of division can meet all anticipated requirements. The latest addition to the force structure is the light infantry division (LID). Designed for strategic mobility, it is lacking in antiarmor firepower, tactical mobility, and armored protection.[1] These are limitations anywhere, but against a heavily armored/mechanized threat such as the Warsaw Pact, they are definite vulnerabilities. However, the LIDs are a significant portion of the force structure and the commander must be prepared to use them effectively. This includes employment in a European scenario.

NATO can expect only short notice of an imminent Warsaw Pact attack. The strategic mobility of the LIDs will place them among the first reinforcements to arrive in theater. Despite their limitations they can contribute significantly to NATO's defense. The terrain of Western Europe -- variously mountainous, heavily forested, and/or urbanized -- provides ample opportunity for the effective use of light infantry.[2] . Restrictive terrain mitigates the limitations of the LIDs by making rapid mobility unecessary, providing protection, and maximizing the effect of the LID's short range antitank weapons.[3]

To enhance the tactical mobility and firepower of the

LID a commander can attach a heavy brigade to it. This may alleviate some of the vulnerability of the LID. But can the US Army logistics system support a heavy brigade attached to a light division?

II. Historical Overview.

Before one addresses the logistics problem, he must establish a reasonable probability that such a light-heavy force mix is desirable. It is assumed that the Army will use the LIDs in Europe, if only because they can get there sooner than anyone else[4] and because the terrain in Western Europe is suitable for the use of light infantry. The question remains: Should the commander create a light-heavy force mix?

A. Combined Arms Imperative.

The mutually supporting nature of infantry and armor is a fundamental premise behind the US Army combined arms concept. The seeds of this concept were sown during the first World War, but it took the successful German blitzkrieg into France in 1940 to drive the point home.[5] Advocates of combined arms warfare arose in nearly every major power during the inter-war years -- Fuller in Great Britain, Guderian in Germany, De Gaulle in France, Tukhachevsky in the Soviet Union, and Chaffee in the United States, among others.[6] They emphasized armor and mechanized infantry which could keep pace with the tanks.

Each had a keen understanding of the mutual support required for the success of either armor or infantry.

The German Army began World War II (WW II) with the most highly developed combined arms concept, organization, and training among the European powers. The 1939 Blitzkrieg in Poland provided valuable lessons regarding the proper mix of heavy and light forces. Their Panzer divisions had proved too unwieldy for many commanders, while their light divisions lacked firepower.[7] Changes in division structures made over the ensuing winter resulted in a much more balanced force. This is the force that swept across France in 1940. Even the armored spearheads which penetrated the Ardennes sector relied on infantry to effect the crucial crossings of the Meuse River.[8] The infantry-armor mix, in the context of an even broader combined arms concept, was instrumental to the German success.

In contrast, the French Army had begun working toward combined arms too late to have an effective force when Germany attacked. Basing their doctrine on the superior strength of the defensive, the French spent their money on the Maginot Line rather than mechanized or armored forces. Armor built in the late 1930's was dispersed throughout the force structure. The few light mechanized divisions lacked the firepower to match the Panzer divisions they were asked to halt in 1940. The three hastily organized armored divisions had no experience in division-sized maneuver and in fact two of the three entered the battle of France in battalion-sized increments. The French employed the rest of their armor as battalion-size forces more

or less evenly dispersed across the entire front.[9] Reacting piecemeal to German penetrations, French armor lacked the mass and speed to block the Germans effectively. Though possessing a better tank, the French decision to employ it separately rather than as an element of a combined arms team, negated their advantages and contributed to their rapid defeat.

The Soviets were the next victims of the Blitzkrieg. Facing German formations whose combined arms execution peaked during their offensive into Russia, the Soviets lost one army after another.[10] Though they quickly recognized the advantages of German style combined arms, it was not until 1943 that the Soviets were able to produce enough tanks to implement a combined arms concept suitable for the wide open terrain of European Russia. Once they were able to work as combined arms, the Soviets began to sweep the German Army out of eastern Europe.

The British Army, having experienced the German attack across France, entered North Africa determined to employ effective combined arms. After initial success against the Italians, they were quickly overpowered by the Germans. While the British had adapted combined arms organization, they had not mastered the tactics. British combined arms consisted of battalion and sometimes brigade formations. Divisions and corps had not yet absorbed the techniques of fighting combined. As a result, battalion and brigade operations were scattered and uncoordinated efforts that had little effect on the larger battle. Only when Field Marshall Montgomery forced combined arms cooperation at all levels did the British army in North

Africa begin to meet with any sort of success against the Afrika Korps. [11]

The United States Army, given the luxury of time, recognized the need and prepared for combined arms warfare. The June 1944 edition of FM 100-5, Operations, stated that an infantry force fighting a combined arms enemy must be supported by tanks [12] and, conversely, the primary role of armored infantry was to support tanks. [13] To complement this concept, the army experimented with several organizations prior to entering the war in Europe. By 1943, US divisions were approximately balanced between armor and infantry. Many lessons were yet to be learned regarding tactics of combined arms warfare, but this structure remained in place for the rest of the war. [14]

Several years after WW II, the US Army received a costly review of the combined arms lessons learned during WW II. In June, 1950, the North Korean Army launched an all-out attack into the Republic of Korea (South Korea). Though the Korean Peninsula was generally considered unsuitable for armored warfare, the North Korean columns of infantry were led by tanks. Neither the South Korean Army nor the first US forces to encounter the North Koreans were equipped to stop tanks. When terrain, obstacles, or the limited antitank capability available did manage to halt a North Korean tank column, the defenders quickly found themselves outflanked by infantry and forced to withdraw. The 1st Marine Division, a combined arms organization with its M-26 tanks, was the first US unit consistently able to halt the North Korean units it engaged.

The time it took to relearn the need for and practice of combined arms warfare undoubtedly cost many US soldiers their lives. [15]

The short military history of the Israeli Defense Forces (IDF) has seen their ground forces evolve from an early infantry force into an armor-oriented organization with only a few poorly equipped infantry units in 1973. Based on their experiences in the 1956 and 1967 wars, the IDF came to believe that a potent armor force was sufficient to win the ground war. Prior to the 1973 war, Israeli infantry was neglected almost to the point of extinction. [16] The devastating effect of the new antitank guided missiles probably caused more than one Israeli commander to cry to higher headquarters that: "I need infantry...I need infantry!". [17] Changes since 1973 have moved the IDF, though still heavily armor-oriented, toward a more balanced force with better equipped and trained infantry.

The experiences of WW II, Korea, and the Mid East wars have shown us time and again that neither infantry nor armor can sustain combat without the support of the other. While the Light Infantry Division can certainly contribute to the defense of Europe, history has shown us that an infantry-armor mix as part of a well-trained combined arms team will be far more effective. In the future we will not have the time to relearn the lessons of history.

A foundation of our doctrine is combined arms warfare. In a European scenario, the LIDs must be able to fight combined. While numerous articles have proposed attaching a

light force to a heavy unit, we must be equally prepared for the opposite. Experience in the Ardennes and Korea have shown that terrain may hinder use of armor, but rarely will it completely eliminate armor capability. Soviet armies likely to participate in an invasion of western Europe are all tank/mechanized infantry forces. Their doctrine demands rapid penetration of NATO defenses and quick exploitation of success.

Our mechanized and armored divisions habitually maintain a counterattack force to limit and eliminate penetrations. The LID must be capable of the same reaction. Organically, they are not. To provide the speed, firepower, and protection they need to defeat a determined tank/mech attack, we must consider attaching a heavy brigade to the LID defending in Europe.

B. CSS Priorities: Fuel, ammunition, maintenance.

Before creating such a force, a commander must consider the sustainment requirements. While a heavy division can support an attached light force with relative ease, the opposite may not hold true. One of the problems which then confronts the logistician is how to support the heavy brigade logistically.

The US Army has painfully come to realize that we cannot ignore logistics preparations and hope to deal with them as problems arise. Logistics requirements must be anticipated and planned for prior to the start of combat operations.

Attaching a heavy brigade to a Light Infantry Division poses several unique problems for the logistician. Though requirements in several types of supply and services are relatively unchanged -- e.g., food, clothing, medical -- there are obvious differences in the amount and type of fuel, ammunition, and maintenance needed. Planners must recognize the critical nature of these requirements (fuel, ammo, and maintenance), estimate their impact on the logistics system, and insure that the proposed force mix can be supported before it is employed in the field.

The following examples illustrate the importance of fuel, ammunition, and maintenance to continued operations. A later section will deal with the logistics organizations and procedures which supported the tactical user.

German Army Group A in Russia in 1942, Patton's 3rd Army in its dash to the Rhine, and the Soviet 4th Tank Army during the Vistula-Oder campaign are but a few examples of major operations being stopped or delayed due to logistical shortcomings. Fuel -- specifically its distribution -- was the limiting factor in all three of the operations mentioned above. Army Group A experienced tremendous tactical success in its drive across southern Russia. However, though fuel had been stockpiled and was available, the Germans were unable to transport enough of it forward to sustain momentum. As German lines lengthened into the Caucasus, lack of fuel at the front as much as any Soviet action halted the advance. [8]

Patton's problem in 1944 was similiar. Pursuing German

forces since the Allied breakout from the Normandy beachhead, 3rd Army's line of supply rapidly outgrew the capability to keep the army supplied. As priority of supply was given to Montgomery's Army Group, the situation deteriorated. Despite expediencies such as the now famous "Redball Express", 3rd Army ground to a halt on 2 September and again in early October. Though lead elements held crossings over the Moselle, the pursuit had ended. The Rhine would have to be crossed in the face of a defending enemy, rather than a fleeing one. [19]

The Soviet preferred method of conducting offensive operations in WW II included deep penetrations and exploitations by armored mobile groups. This was a key to their rapid advances during the Vistula-Oder Operation in 1945. Again, resupply of fuel limited the degree of success enjoyed. The 2nd Guards Tank Army was forced to discontinue offensive operations for four days due to lack of fuel. The 4th Tank Army reached its deep objective -- the Oder River. However, lack of fuel limited their crossing of the river to just one tank brigade. [20] Studying this and similiar operations in later years, the Soviets have come to believe that, " The prompt fuel supply...was one of the basic problems, the solving of which frequently determined the outcome of not only the army-level, but also the front-level offensive operations.". [21]

While adequate fuel will allow maneuver and mobility, we must also be in a position to destroy the enemy. Destruction requires ammunition. Like fuel, ammunition shortages

impacted on their share of operations both during and since WW II. The most serious instance occurred on the Brittany peninsula. [22] Essentially , VIII Corps (US) was unable to reduce the German defenses at Brest primarily due to a shortage of artillery ammunition. This shortage was the result of poor strategic planning, lack of tactical planning, shortage of transportation, disagreement on the amount of ammunition required, confusion concerning support relationships, and just about any other problem one can envision. Though not typical of supply operations in WW II, this experience demonstrated the numerous things that can hinder effective resupply of ammo. If Clausewitz was correct in saying that " Fighting is the central military act" [23] and war "is resolved by bloodshed", [24] then the critical nature of ammunition is obvious. Supporting Clausewitz's assertion, the US, Soviet, and German armies all made resupply of ammunition, along with food and fuel, the top three priorities of their supply system.

Fuel and ammunition are essential only as long as there are weapons systems using them. The lethality of the modern battlefield promises significant attrition of these systems. At the same time the US Army's ability to replace large numbers of systems is severely limited. The key to keeping an effective force on the battlefield is to repair damaged systems quickly and far forward. This was one of the first lessons learned by the German army in WW II. Despite the outward success of the invasion of Poland, the German army found itself nearly immobilized after advancing halfway

through the country. This situation arose because the Germans located maintenance facilities far to the rear. Soldiers needed at the front had to evacuate vehicles over 200 kilometers before repairs could be undertaken. Later actions found German maintenance personnel located well forward with the combat units. [25]

Perhaps the best and most applicable example of the impact of maintenance on a battle or war derives from the 1973 Arab-Israeli war. Repair of battle damaged equipment was a major source of resupply and reinforcement for the Israeli Defense Forces (IDF). For example, one battallion virtually wiped out by the loss of 19 of 21 tanks on 8 October, was able to reassemble a force of 25 tanks by 9 October. This type of regeneration of combat power was not unusual. It derived from a system of maintenance designed to keep firepower on the battlefield. Ordnance personnel were attached to combat battalions and maintenance facilities up to and including general support level were located within 20 kilometers of the front. [26] The Israeli effort in 1973 is set apart from similiar US accomplishments in WW II because of the increased lethality of weapons -- particularly anti-tank guided missiles, compressed time, and lack of a significant strategic stockpile of replacement equipment. These factors, similar to what the US could anticipate in a European war, made a successful maintenance and resupply program that much more critical.

While the examples above illustrate the importance of fuel, ammunition, and maintenance to successful combat

operations, they also give some indication of the factors behind success and failure in providing them. In these and other cases, fuel was generally available in theater. An inability to get it forward was the most prevalent problem. Though ammunition expenditures were often strictly controlled throughout a theater, planning and allocating transport was again the discriminator between success and failure. When maintenance facilities were located far to the rear, forces were unable to cope with battle damage. The time, transport and personnel needed to evacuate damaged equipment compounded the problems of the original loss. When located far forward and organized to provide on site repair, maintenance efforts contributed to success. German, American, and Soviet support systems in WW II evolved in recognition of these factors.

C. Successful systems and procedures.

It was and is the responsibility of the strategic and operational planners to insure that adequate supplies are available for campaigns and major operations. The logistics system must in turn be capable of providing these supplies and services to the tactical user. The following examples detail some of the characteristics of successful logistics systems and procedures.

As mentioned, the German Army invaded Poland with a highly centralized logistics system. While this proved adequate for the short Blitzkrieg campaigns in Poland and France, the problems of long supply and evacuation routes

were recognized. As the campaigns in North Africa and later Russia continued over extended periods, the Germans found that consolidated maintenance units were unable to keep a sufficient number of tanks in the field. By 1943, execution of maintenance had become highly decentralized. [27] Each tank company had a maintenance detachment for on-site repairs. Repairs requiring 12 or more hours to effect, were evacuated to the maintenance company at regimental level, where they could be held for 14 days. The detachment moved with the combat element, while the regimental company was located within 70 kilometers of the front. If the tank regiment anticipated a surge requirement, additional maintenance and evacuation companies were available from Army or Army Group level. Supplies of ammunition and fuel were also pushed down to the regiment, again from Army level. Hence, the German tank regiment was not tied to any specific division or corps organization. Rather, it could operate with any other unit or, when necessary, independently.

Like the Germans, the Soviets had the ability to assign tanks where they were needed rather than having them tied to a specific organization. Though large tank formations became the rule, Soviet tank brigades were organized to be self sufficient in terms of fuel, ammunition and maintenance for several days. After that period, resupply would be pushed from Army level, often even Front level, down to the brigade or regiment. To insure adequate and timely resupply to the tank units Army level depots were often made mobile by loading their entire stocks on trucks and following forty to

fifty kilometers behind the fighting forces. Following the philosophy that "It's not the troop's job to think of the rear, but the rear's job to think of the troops.", [28] Soviets could employ their tank formations as dictated by the tactical situation. Army and Front rear services would ensure that they were supplied.

The US system was based on the same desire to provide flexibility to the combat commander. The field army was intended to be both a combat and an administrative agency, while corps would be combat headquarters only. Nondivisional battalions and the battalions and regiments of the divisions were designed to mesh directly with Army level support. The system bypassed the corps and sometimes division. For food, fuel, and ammunition "division and corps are not in the channel of supply, except in emergencies." [29]

In accordance with these concepts, separate tank battalions and tank destroyer battalions contained sufficient transportation to pick up supplies, including fuel and ammo, from Army level supply points. Their organic maintenance sections were capable of first and second echelon maintenance as well as the evacuation of more severely damaged equipment to collection points. Though sometimes allocated to specific corps, higher level maintenance, supply, and transportation assets were generally controlled at Army level. While theater priorities of supply could result in shortages at Army level, the system of supplying heavy units attached to infantry divisions was effective. For example, despite the poor tactical outcome of the 28th Infantry Division's battle

for Schmidt, the attached 707th Tank Battalion and 893rd Tank Destroyer Battalion were able to keep themselves supplied with ammo and fuel, even when nearly surrounded in the Kommerscheidt salient. [30] Maintenance teams, though their mobility was severely limited by the terrain, were available and attempted to repair or evacuate all but the completely destroyed systems. These accomplishments were independent of the infantry unit to which they were asssigned.

US corps often attached combat commands (CC) of the armored divisions to infantry divisions. Since the support structure was independent of the infantry division to which the CC was attached, the commander had great flexibility to employ the armor force where the situation dictated. For example, during the early stages of the First United States Army's (FUSA) breakout and pursuit of German forces -- the Cobra and Mortaine campaigns -- CC A of the 3rd Armored Division (AD) was attached to the 9th Infantry Division (ID) from 10 to 16 July and the 1st ID from 1 to 12 August. [31] At the same time, CC B was attached to the 1st ID (20-29 July), the 4th ID (1-4 August), the 1st ID (4-7 August), and the 30th ID (7-12 August). [32] Such rapid attachment and detachment of the armored combat commands was common not only in the offense but also in the defense. During the German Ardennes offensive, CC B, 3 AD, went from its parent unit to the 30th ID on 20 December and returned on the 24th. [33] Throughout the battle of the Bulge the CCs of the armored divisions were used to increase the firepower of the infantry units in defensive positions, to counterattack German

penetrations, or to seal gaps caused by the movement of other units. How were these rapidly shifting combat elements supported?

Division and corps operations orders and after action reports from FUSA elements in the European campaigns contain only minimal references to logistics. This is understandable in light of the FUSA standard operating procedures and directives. These stressed the priority of class I, III, and V supply while insisting that Army would supply these items down to the user level. This relieved the divisions and corps of much of the logistical burden. [34] In one instance, a corps offerred to provide transportation to enable increased stockage at forward ammunition supply points (ASP) and expedite throughput of artillery ammunition to the firing batteries. FUSA replied that they would effect the desired increase and throughput using Army assets. The corps would not have to provide transportation. [35]

Normally, battalions drew fuel from truckheads established by the Army Quartermaster units. Army level Ordnance Ammunition units would establish forward ammunition supply points within reach of using units. Army level maintenance units would support down to the division level with contact teams still farther forward. Vehicles and weapons were evacuated to a collection point where the higher headquarters would assume responsibility for them. Whenever possible, a replacement would be issued on the spot. [36]

When the system was working as designed, divisions and corps were largely relieved of logistics responsibility.

When the operational situation warranted, Army was able to assign additional quartermaster or ordnance units to weight their effort.[37] In at least one case, FUSA attached a forward ASP directly to a combat command (CC A, 3 AD), itself attached to an infantry division.[38]

FUSA did not hesitate to use unusual methods to support its forces. When units were unable to recover widely scattered vehicles with their own resources, FUSA converted an evacuation company into a collection company putting available manpower where it was most needed.[39] When distribution of ammunition and other supplies overloaded unit assets, Army assigned an ammunition handling unit to haul supplies.[40] FUSA felt that centralized control of logistics assets gave them more flexibility in providing decentralized support. As the campaign progressed centralization increased. For example, all ordnance units previously assigned to the corps were pulled back to army level in April 1945.[41]

Centralized control by army did achieve logistical flexibility which in turn allowed tactical and operational fexibility. When the Army assumed responsibility for supplying their units down to user level and assisting with maintenance as far forward as possible, corps and divisions were able to shift combat units to critical spots immediately, with little logistical disruption. A combat command drew supplies from the nearest truckhead or ASP, established by Army. Maintenance, collection, and evacuation units served on an area basis and could be readily augmented

by the centrally controlled assets at Army level. Logistically it made little difference to the combat command whether they were with their parent division or attached to an infantry division. The majority of their support came from the Army level and remained effective. Though assets were centrally controlled, FUSA's objective was to provide decentralized support throughout the Army. Initiative and dedication within the supply system allowed FUSA to meet this objective.

The more mobile and lethal battlefield of the 1973 Arab-Israeli war saw a more centralized but otherwise similar system. In the Sinai, ordnance teams were assigned to tank battalions for first and second echelon maintenance. Third echelon was accomplished by forward companies of the division maintenance units. The division base company provided fourth echelon maintenance within 40 kilometers of the front. Roving detachments made on-site repairs or evacuated tanks to collection points as appropriate. Supply was accomplished through centralized stocks and transportation with deliveries down to the user level. [42]

These examples show that at the division and lower level this combination of maintenance forward and supply from echelons above corps to the user has historically been successful. When stocks were available and priority was given to fuel and ammunition, heavy units were able to continue fighting. Corps and division played a comparatively small role in logistical support, especially in the case of heavy units fighting for infantry headquarters.

III. Current CSS Capabilities and Future Trends.

In the US Army today, the corps and division have a much more significant role in logistical operations. The corps, with combat, administrative and logistical functions is more analagous to the WW II Army than to the corps of that time. With its variety of nondivisional combat, combat support, and combat service support units, the corps is able to influence the battlefield directly with combat power and indirectly through established sustainment priorities. Unlike the WW II corps, it is an essential player in the logistics system, as was the WW II Army. Given the similarity of roles and capabilities of the WW II Army and the modern corps, one can apply the experiences of WW II's Army to today's corps. The corps' capabilities and limitations must be considered -- along with those of the division -- when sustainment plans are made.

The original question concerns the US Army's ability to support a heavy brigade attached to a light infantry division. While the heavy brigade will bring a Forward Support Battalion (FSB) from its parent division DISCOM, it will lose the capability contained in the heavy division DISCOM's Main Support Battalion (MSB). To what extent can the LID DISCOM make up this loss? If shortfalls exist, can Corps compensate? Or, must the US Army change its logistic system before it can even contemplate a heavy-light mix of this nature? The rest of this study will attempt to answer

these questions.

This example will use units from the notional troop list used in the US Army Command and General Staff College instruction. Assume that a balanced brigade, the 3rd, from the 52nd Mechanized Division has been attached to the 21st Infantry Division (Light), which in turn has sent its 3rd Brigade to the 52nd Mech. Both units remain in the 10th Corps which also includes the 208th Armored Cavalry Regiment, the 23rd and 25th Armored Divisions, and listed Corps troops and the 10th Corps Support Command (COSCOM). (Troop List attached as Appendix A)

The US Army concept of logistical support appears to take the lessons learned from history to heart. FM 100-5, Operations, states that firepower, agility, and endurance can make the difference in a battle. [43] To assist the combat commander in developing and employing these capabilities, the combat service support (CSS) planner must provide adequate ammunition, fuel, and maintenance. This corresponds to the key sustainment functions - arming, fueling, and fixing. [44] Among the principles governing the planning of support for the tactical commander are:

- Support must be continuous and adequate.
- CSS functions should be performed as far forward as possible.
- Committed units must be supported by "push" packages rather than by requisition. [45]

Combining these key functions and principles, a central part of the US Army CSS concept is to provide fuel and ammunition from higher to user and perform as much maintenance as possible as far forward as possible. This concept corresponds to the successful methods of supply and maintenance observed in the historical examples discussed.

The organization of the DISCOM in the J-Series Table of Organization and Equipment (TOE) is designed to complement this CSS concept. In the areas of fuel, ammunition, and maintenance, responsibility for support rests with the main support battalion and the forward support battalions (FSB).

In this example the 3rd Brigade, 52nd Mech Division is accompanied by its habitually associated FSB. The figures given in Student Text 101-2, Planning Factors, specify the requirements for fuel, ammunition, and maintenance man-hours for the brigade in a defensive posture in Central Europe. (Calculations in Appendix B) The Forward Support Battalion's TO&E delineates the FSB's capability to meet these requirements.

3rd Brigade will require over 380 tons of ammunition the first day they are heavily engaged and 230 tons resupply daily thereafter as long as they remain engaged. The FSB is capable of transloading 300 tons daily. Subtracting the basic load already on the combat vehicles on day one (180+ tons), the resupply requirement is clearly within the capability of the FSB, though combat losses of truck assets may eventually require augmentation from division or corps assets. Since the ammunition supply is transported from

Corps directly to the Ammunition Transfer Point established by the FSB in the Brigade Support Area, the loss of the Main Support Battalion at DISCOM is not a factor.

The fuel requirement for the brigade plus the FSB totals 187,421 gallons of diesel and 12,740 gallons of MOGAS - just over 200,000 gallons. The organic assets of the battalions are capable of storing and issuing 85,200 gallons at a time.The FSB is capable of storing and issuing 53,600 gallons on the ground while transporting and distributing an additional 83,600 gallons - a total of 137,200 gallons. While the MSB has a considerable capability to store and distribute fuel, they distribute to the FSBs, not the user. Hence the loss of the MSB again has no effect on the problem. The COSCOM is willing and capable of transporting and supplying fuel directly to the FSB. As the battalions can move more fuel than the FSB can supply, the FSB is the limiting factor. The apparent shortfall of over 60,000 gallons in the FSB's capacity must be addressed.

Several factors taken singly or in combination should serve to alleviate this apparent problem.

- Assets of the battalions could draw fuel directly from the COSCOM, thereby eliminating the bottleneck at the FSB. Making two trips a day, they can issue 170,400 gallons a day. Added to the FSB's ability to issue 83,600 gallons a day, the total capability is raised to 254,000 gallons, more than enough to meet the 200,000 gallon requirement.

- FM 63-2-2, Combat Service Support Operations: Armored, Mechanized, and Motorized Divisions, states that, "when a

divisional brigade is deployed out of sector, a provisional support organization consisting of DISCOM units is formed, attached to, and deployed with the brigade". [46] In this case, the DISCOM support will be limited , as the remainder of the division will also be in combat. However, in terms of this particular problem, the 5000 gallon tankers normally used to bring fuel to this FSB could be attached to it. While allocation of these tankers depends on the situation, expecting five (out of thirty-five)seems reasonable. This would eliminate 25,000 gallons of the shortfall.

- Planning factors assume 100% equipment availability. Using the loss rates from ST 101-3, first day losses will total approximately 10%, reducing subsequent requirements by approximately 20,000 gallons.

- The COSCOM has four medium truck companies, each with forty-five 5000 gallon tankers, and four petroleum supply companies, each with the capability of storing and/or distributing fuel in 5000 gallon tankers, 10-50,000 gallon storage tanks, or 55 gallon drums. Twelve (of the 240) tankers would solve the problem, as would one storage tank team with one 10,000 and one 50,000 gallon tank.

- With four combat battalions available, the brigade could have two standing down when the tactical situation permits. This will cut the requirement by approximately 83,000 gallons a day (based on 1 Armor and 1 Mech standing down).

Given the numerous ways in which fuel requirements can be reduced or supply capacity increased, the FSB should be

capable of meeting the fuel requirements.

The final category we have determined to be of critical importance is maintenance. Referring again to ST 101-3, it is apparent that the first day of battle brings the heaviest losses -- 54% of assigned tanks. Using this same percentage for the Bradley Fighting Vehicle (BFV), one can anticipate losses of up to 63 tanks and 58 BFVs. Of these, organizational and direct support maintenance can expect to repair 80%, or 50 tanks and 46 BFVs, to be repairable by organizational and direct support maintenance. Repairs average 10 man-hours, or 960 man-hours total requirement for day one. Recovery operations will add considerably to the actual turn-around time for repairs, but do not add to the number of mechanics required.

In addition to the maintenance teams assigned to the FSB, the DISCOM can augment the FSB with a Tank or Mechanized System Support Team for each maneuver battalion. These teams are intended to locate with the battalion they support. Available man-hours in these teams plus appropriate personnel from the FSB total 1310. This is apparently sufficient to meet the requirements. Howe . ese man-hours are distributed over numerous no .nterchangeable repair categories. If greater than pected percentage of damage is done to turrets, for example, he man-hours represented by the tracked vehicle repairman may be irrelevant. In normal circumstances, the FSB would receive backup Intermediate Direct Support Maintence from the main support battalion. In this situation this is not available. Cross training of

mechanics is a step that must be accomplished in peacetime to alleviate this wartime problem.

The LID DISCOM, which in many cases exchanges damaged equipment rather than repairing it, and which requires augmentation from the corps support command if it is to do any significant repair at all, can provide sympathy, but not much else. The FSB must look elsewhere for not only this backup maintenance, but also division level supply and maintenance management, class IX repair parts support, and maintenance evacuation. These services had been provided by the Main Support Battalion and the division materiel management center (DMMC).

One solution is to bypass the division level and have the FSB tie in directly with COSCOM MMC, supply and maintenance units. FM 63-3J, Combat Service Support Operations - Corps, states that:

> " To be responsive, CSS must be flexible. There can be no one way of doing things. CSS planners must not be tied to the traditional methods of support. They must not hesitate to tailor organizations and methods for specific situations." [47]

With this attitude, the necessary support relationships can be established. Supply requests, to include class IX, can be sent from the FSB directly to the Corps MMC, which normally supplies the division MSB anyway. The same supplies are coming from the same source to the same user. This procedure has eliminated one intermediate handler. Corps is still able to account for supplies and the user gets what he needs. If necessary, the figures can be forwarded from corps to the division for statistical purposes. Maintenance support

teams can be used to tailor the appropriate IDSM unit to provide inspection and evacuation services at a collection point established by the FSB. Equipment not repairable by the FSB can be taken from this collection point to the designated corps maintenance unit, which provides support on an area basis. Again, this method skips an echelon, but preserves the results without altering any units basic functions in any way. It changes some procedures and the flow of paperwork and materiel. It does not circumvent accountability or responsibility.

At this point it is evident that the Corps can, by tailoring support units and adjusting procedures (e.g., an evacuation policy adjusted to meet specifically the need of the 3rd Brigade), support a heavy brigade attached to the light infantry division. A strength of our combat service support system is the realization that logistics planners and operators must be responsive, flexible, and able to exercise initiative. A willingness and capability to throughput supplies is essential in meeting the fuel and ammunition needs. The flexible "building block" nature of the COSCOM permits them to tailor maintenance units to meet the requirements of the situation. However, the single most significant strength is not the COSCOM but the forward support battalion. The FSB organization embodies the concept of supplying and fixing well forward. It has sufficient capability to interface directly with the COSCOM and continue normal operations in the absence of the Main Support Battalion and the rest of the DISCOM. Because of the

capabilities of the FSB, one can attach it to a LID without having to change the essential nature of the LID DISCOM. When the need for this particular task organization has ended, the Brigade and its FSB can be returned to their parent unit with minimum turmoil to the LID.

Despite the overall success in supporting the heavy-light mix there are several shortcomings that should be addressed. First is the shortfall in fuel storage and distribution capacity of the Forward Support Battalion, which can cause problems even within the heavy unit DISCOM framework. Secondly, the responsibility to control requisition and issue of supply may prove to be too much of an administrative burden to the FSB. Finally, if the FSB is the key to successfully attaching the heavy force to the light force, we are limited to the brigade level when considering such an attachment.

This conclusion is supported by the experience of the 10th Mountain Division (LI) at the National Training Center (NTC).[48] During Exercise Celtic Cross IV, the 2nd Brigade was augmented with an armor battalion, the 2-77th Armor. Their conclusions were essentially, that light infantry logistics structure cannot support a heavy force. The heavy force must bring its own CSS augmentation , specifically transportation, resupply, and maintenance. Resupply emphasis must be on fuel and ammunition. The after action report recommends that a heavy battalion be OPCON rather than attached. This would appear to be stretching the resources of the FSB, which must then support the battalion, rather thin.

It would seem more in concert with the CSS concepts already discussed, to augment the heavy battalion with a slice from the FSB and necessary DISCOM and COSCOM elements and attach it. The FSB may be flexible and agile enough to support a battalion OPCON to a light force, but they will certainly sacrifice a great deal of flexibility and agility with respect to the rest of their supported brigade. Neither the FSB (-) nor the detached section can operate as effectively as the FSB as an entity. The unity of command achieved through attachment must also be considered. The LID's responsibility to assure the unit's support may lead to better utilization in combat.

The petroleum problem can be alleviated in several ways. The most convenient, especially in Central Europe, is through host nation support.[49] In-ground storage and issue facilities -- gas stations -- are common throughout Germany and so to are tank trucks. In a defensive posture with the LID, the heavy brigade can request additional POL storage and distribution capability through host nation support agreements. The alternative of increasing the number of tankers assigned to the FSB appears the least likely solution at this time due primarily to budget constraints. Increased maintenance, fuel, and personnel requirements and limited strategic lift assets are other undesireable side effects of this option. A final possible solution is in the form of the newly tested Inland Petroleum Distribution System (IPDS).[50] Though this tactical pipeline is designed for an immature theater and not intended to reach to the brigade support

area, there is no doubt that it could be so employed in Europe if the circumstances warranted. Unfortunately, the least likely solution -- more tank trucks -- is also the most desireable. It addresses the most difficult part of the fuel problem -- distribution to the user -- which the other alternatives do not.

Finally, the solution to the materiel management burden is already making its way into the system. The decentralized automated service support system (DAS3) in combination with the unit level logistics system (ULLS) was tested by the 197th Infantry Brigade at the NTC and found to be "combat ready".[81] The ULLS computers at company and battalion level and the DAS3 computer in the brigade support area were linked to the direct support unit standard supply system (DS4) in the rear at Ft Irwin. Requisitions initiated at company level were automatically relayed through the systems to the rear, consolidated, and added to the higher requisitions. This energized the supply system to fill the requisitions and concurrently generated a printout of usage and on-hand supplies of repair parts. The maintenance posture of the brigade was significantly enhanced while the administrative burden of material management at the brigade level was automated and reduced to near zero. With these systems deployed throughout the Army, there is no reason the heavy brigade cannot link directly into the DS4 at COSCOM, greatly increasing the efficiency of their maintenance and materiel management operations.

These programs are already being implemented and the

necessary equipment is being fielded. They are typical of the logistics community's effort to satisfy the doctrinal sustainment imperatives Anticipation, Integration, Continuity, Responsiveness, and Improvisation.[32] As the logistics community moves toward refining the operational concepts of Army 21 and developing the needed technology and equipment, we can anticipate further progress in these areas.

The Army 21 logistics concept calls for flexible, timely, and reliable support.[33] Organizations will be tailored to meet the situation. Emphasis in supply will be delivery to combat unit users. Maintenance will move toward simplification through direct exchange of modules and components. Repair of high tech equipment will be accomplished far forward by mobile maintenance teams. Research is focused on decreasing bulk and weight of supplies, increasing hauling and handling capability of transport, better reliability of all equipment, and increased use of robotics and automation. The thrust of logistics in Army 21 appears to be to relieve the combat elements of as much responsibility as possible by using combat service support units as far forward as possible.

This philosophy seems to be an extension of current practices. The combat unit commander can look forward to an ever increasing combat service support capability designed to give him maximum flexibility. Today this flexibility allows us to do things like mixing light and heavy forces. In the future, the initiative of the combat force commander will be matched by the flexibility of the logistician. Working

together, they can employ any available force, any way it is needed.

IV. Conclusion.

Assuming that the light infantry division would participate in a central European conflict, history demands it fight as a combined arms force. Essential combat service support for the heavy component of the combined arms team consists of food, fuel, ammunition, and maintenance. While the light infantry division can support the food requirement, fuel, ammunition and maintenance support must come from outside the LID.

Though some shortfalls exist, the forward support battalion of the heavy brigade can effectively support the brigade when attached to a light infantry division. However, to do this the FSB must establish a relationship directly with the corps support command. Neither the parent DISCOM nor the LID DISCOM can provide support to the FSB in this situation.

Though Celtic Cross IV concluded that a heavy battalion cannot be attached to a light brigade, this may not necessarily be true. It would be correct to conclude that the LID cannot support the heavy battalion, however, it does not follow that the battalion cannot be supported. In WW II, tank battalions and tank destroyer battalions were created in part to insure that infantry units had heavy support. When assigned to an infantry unit, these battalions were supported

with fuel and ammunition primarily from army level, as were the armored division combat commands fighting with infantry units. Had a COSCOM been available for Celtic Cross IV, they assuredly could have established the necessarysupport relationships to support the 2-77th Armor.

AirLand Battle is a combined arms doctrine based on agility, initiative, depth, and synchronization. Light infantry without heavy augmentation is severely limited in its ability to carry out these concepts. The US Army logistics system is determined to support the warfighting doctrine by insuring its own flexibility, responsiveness, and initiative. Applying the warfighting and the support concepts to the light infantry, it is vital that they have a heavy capability and imperative that they find a way to support it. With the current forward support battalion structure and the flexible nature of the corps support command, the army can support a heavy brigade when it is attached to the light infantry division. Though the role of the light infantry division will still be to defend restricted terrain, the ability to control a heavy brigade will allow it to exercise greater initiative, increase its agility, provide depth in the defense, and give it the opportunity to synchronize significantly greater combat power. The US Army's ability to support the heavy brigade attached to the light infantry division is implicit in our doctrine. In this case, the facts support the implication.

ST 100–3
APPENDIX E
TROOP LIST
Section I. 10TH (US) CORPS

FORCES AVAILABLE FO

		DIVISIONS								
TYPE	20TH INF DIV	21ST INF DIV(–)	52D MECH DIV	53D MECH DIV*	54TH MECH DIV*	55TH MECH DIV*	47TH AASLT DIV	102D ABN DIV	23D ARMD DIV	25TH ARMD DIV
MANEUVER: Gnd HQ (with atch assets)*	[illegible]	[illegible]	[illegible]	1st Bde HQ 2-77 Mech (M2) 2-2 Armor (M1) 2-3 Armor (M1)	1st Bde HQ 3-77 Mech (M2) 3-2 Armor (M1) 3-3 Armor (M1)	1st Bde HQ 4-77 Mech (M2) 4-2 Armor (M1) 4-3 Armor (M1)	1st Bde HQ [illegible] AASLT [illegible] AASLT [illegible] AASLT	1st Bde HQ 1-311 Abn 1-312 Abn 1-313 Abn	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	2d Bde HQ 2-78 Mech (M113) 2-79 Mech (M113) 2-4 Armor (M60)	2d Bde HQ 3-78 Mech (M113) 3-79 Mech (M113) 3-4 Armor (M60)	2d Bde HQ 4-78 Mech (M113) 4-79 Mech (M113) 4-4 Armor (M60)	2d Bde HQ [illegible] AASLT [illegible] AASLT [illegible] AASLT	2d Bde HQ 1-314 Abn 2-315 Abn 1-316 Abn	2d Bde HQ [illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	3d Bde HQ [illegible] Mech (M113) [illegible] Mech (M113) [illegible] Armor (M60) [illegible]	3d Bde HQ [illegible] Mech (M113) [illegible] Mech (M113) 3-5 Armor (M60) 3-25 Armor (M60)	3d Bde HQ 4-80 Mech (M113) 4-81 Mech (M113) 4-5 Armor (M60) 4-25 Armor (M60)	3d Bde HQ [illegible] AASLT [illegible] AASLT [illegible] AASLT	3d Bde HQ 1-317 Abn 1-318 Abn 1-319 Abn	3d Bde HQ [illegible]	[illegible]
Avn HQ (with organic assets)*	20th Avn Bde HQ [illegible]	21st Avn Bde HQ [illegible] 194th Aslt Hel Co (UH 60) 195th Aslt Hel Co (UH 60)	52d Avn Bde HQ [illegible] [illegible] 52d Aslt Hel Co (UH 60) [illegible]	53d Avn Bde HQ 153d Atk Hel Bn (AH 1) 53d Aslt Hel Co (UH 1) 53d Cmd Avn Co	54th Avn Bde HQ 154th Atk Hel Bn (AH 1) 54th Aslt Hel Co (UH 1) 54th Cmd Avn Co	55th Avn Bde HQ 157th Atk Hel Bn (AH 1) 55th Aslt Hel Co (UH 1) 55th Cmd Avn Co	47th Avn Bde HQ 165th Atk Hel Bn (AH 1) 166th Atk Hel Bn (AH 1) 167th Atk Hel Bn (AH 1) 168th Atk Hel Bn (AH 1) 160th Aslt Hel Bn (UH 60) 161st Aslt Hel Bn (UH 60) [illegible] 47th Cmd Avn Bn	102d Avn Bde HQ [illegible] Atk Hel Bn (AH 1) 190th Aslt Hel Co (UH 60) 19[illegible] Aslt Hel Co (UH 60)	23d Avn Bde HQ [illegible] Atk Hel Bn (AH 1) [illegible] Atk Hel Bn (AH 1) 23d Aslt Hel Co (UH 60) 23d Cmd Avn Co	[illegible]
Cav HQ	1-23 Cav (Air) HQ [illegible]	2-25 Cav [illegible] HQ [illegible] LRS Det*	1-23 Cav HQ Trps A&B (Gnd) (M3) Trps C&D (Air) (AH 1) LRS Det*	2-23 Cav HQ* Trps A&B (Gnd) (M3) Trps C&D (Air) (AH 1) LRS Det*	3-23 Cav HQ Trps A&B (Gnd) (M3) Trps C&D (Air) (AH 1) LRS Det*	4-23 Cav HQ** Trps A&B (Gnd) (M3) Trps C&D (Air) (AH 1) LRS Det*	1-30 Cav (Air) HQ Trps A-D (Air) LRS Det*	1-28 Cav (Air) HQ** Trps A-C (Air) (AH 1) Trp D (Gnd) LRS Det*	1-22 Cav HQ Trps A&B (Gnd) (M3) Trps C&D (Air) (AH 1) LRS Det*	[illegible] Cav HQ [illegible] LRS Det*
COMBAT SUPPORT: FA (noting habitual assets)*	20th Inf DIVARTY HQ 20th Tgt Acq Btry 1-45 (155 T) FA (1st Bde) 1-46 (155 T) FA (2d Bde) 1-47 (155 T) FA (3d Bde) 1-48 (155 T/203 SP) FA	21st Inf DIVARTY HQ 2-45 (105 T) FA (1st Bde) 2-46 (105 T) FA (2d Bde) 2-47 (105 T) FA (3d Bde) Btry A 2-48 (155 T M198) FA	52d Mech DIVARTY HQ 1-40 (155 SP) FA (1st Bde) 1-41 (155 SP) FA (2d Bde) 1-42 (155 SP) FA (3d Bde) 52d MLRS Btry 52d Tgt Acq Btry	53d Mech DIVARTY HQ 2-40 (155 SP) FA (1st Bde) 2-41 (155 SP) FA (2d Bde) 2-42 (155 SP) FA (3d Bde) 53d MLRS Btry 53d Tgt Acq Btry	54th Mech DIVARTY HQ 3-40 (155 SP) FA (1st Bde) 3-41 (155 SP) FA (2d Bde) 3-42 (155 SP) FA (3d Bde) 54th MLRS Btry 54th Tgt Acq Btry	55th Mech DIVARTY HQ 4-40 (155 SP) FA (1st Bde) 4-41 (155 SP) FA (2d Bde) 4-42 (155 SP) FA (3d Bde) 55th MLRS Btry 55th Tgt Acq Btry	47th AASLT DIVARTY HQ 1-61 (105 T) FA (1st Bde) 1-62 (105 T) FA (2d Bde) 1-63 (105 T) FA (3d Bde)	102d Abn DIVARTY HQ 1-57 (105 T) FA (1st Bde) 1-58 (105 T) FA (2d Bde) 1-59 (105 T) FA (3d Bde)	23d Armd DIVARTY HQ 1-50 (155 SP) FA (1st Bde) 1-51 (155 SP) FA (2d Bde) 1-52 (155 SP) FA (3d Bde) 23d MLRS Btry 23d Tgt Acq Btry	25th Armd DIVARTY HQ 2-50 (155 SP) FA (1st Bde) 2-51 (155 SP) FA (2d Bde) 2-52 (155 SP) FA (3d Bde) 25th MLRS Btry 25th Tgt Acq Btry
ADA**	1-439 ADA HQ Btrys A&B (Vulc SP) Btrys C&D (Chap)	2-43[illegible] ADA HQ Btrys A&B (Gun Stinger)	1-441 ADA HHB (Stinger Plt) Btrys A–C (Gun Stinger)	2-441 ADA HHB (Stinger Plt) Btrys A–C (Gun/Stinger)	3-441 ADA HHB (Stinger Plt) Btrys A–C (Gun/Stinger)	4-441 ADA HHB (Stinger Plt) Btrys A–C (Gun/Stinger)	1-443 ADA HQ Btrys A–C (Gun Stinger)	1-442 ADA HQ Btrys A–C (Gun/Stinger)	1-440 ADA HHB (Stinger Plt) Btrys A–C (Gun/Stinger)	2-44[illegible] ADA HHB (Stinger Plt) Btrys A–C (Gun Stinger)
Cml**	20th Cml Co HQ 1st–3d Plts (Decon) 4th Plt (Smoke)		52d Cml Co HQ 1st–4th Plts (Decon) 5th Plt (Smoke) 6th Plt (Recon)	53d Cml Co HQ 1st–4th Plts (Decon) 5th Plt (Smoke) 6th Plt (Recon)	54th Cml Co HQ 1st–4th Plts (Decon) 5th Plt (Smoke) 6th Plt (Recon)	55th Cml Co HQ 1st–4th Plts (Decon) 5th Plt (Smoke) 6th Plt (Recon)	47th Cml Co HQ 1st–3d Plts (Smoke Decon)	102d Cml Co HQ 1st–3d Plts (Smoke Decon)	23d Cml Co HQ 1st–4th Plts (Decon) 5th Plt (Smoke) 6th Plt (Recon)	25th Cml Co HQ 1st–4th Plts (Decon) 5th Plt (Smoke) 6th Plt (Recon)
Engr (noting habitual assets)*	20th Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde) Co D Co E (Brg)	21st Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde)	52d Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde) Co D Co E (Brg) (Ribbon)	53d Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde) Co D Co E (Brg) (Ribbon)	54th Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde) Co D Co E (Brg) (Ribbon)	55th Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde) Co D Co E (Brg) (Ribbon)	47th Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde)	102d Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde)	23d Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde) Co D Co E (Brg) (Ribbon)	25th Engr Bn HQ Co A (1st Bde) Co B (2d Bde) Co C (3d Bde) Co D Co E (Brg) (Ribbon)
MI**	20th MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (Svc Spt)	21st MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv)	52d MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (EW)	53d MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (EW)	54th MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (EW)	55th MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel/Surv) Co C (EW)	47th MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (Svc Spt)	102d MI Bn HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (Svc Spt)	23d MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (EW)	25th MI Bn (CEW) HH&Svc Co Co A (C&J) Co B (Intel Surv) Co C (EW)
MP (noting habitual assets)*	20th MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th–6th Plts (GS) 20th Div Band (OPCON)	21st MP Co HQ 1st–3d Plts 21st Div Band (OPCON)	52d MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th–6th Plts (GS) 52d Div Band (OPCON)	53d MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th–6th Plts (GS) 53d Div Band (OPCON)	54th MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th–6th Plts (GS) 54th Div Band (OPCON)**	55th MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th–6th Plts (GS) 55th Div Band (OPCON)**	47th MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th Plt (GS) 47th Div Band (OPCON)**	102d MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th Plt (GS) 102d Div Band (OPCON)**	23d MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th–6th Plts (GS) 23d Div Band (OPCON)	25th MP Co HQ 1st Plt (DS) (1st Bde) 2d Plt (DS) (2d Bde) 3d Plt (DS) (3d Bde) 4th–6th Plts (GS) 25th Div Band (OPCON)*
Sig**	20th Sig Bn HQ Co A (CO) Co B (Fwd Comm) Co C (Sig Spt Ops)	21st Sig Bn HQ Co A (Cmd Comm) Co B (Sig Spt)	52d Sig Bn HQ Co A (CO) Co B (Fwd Comm) Co C (Area Sig)	53d Sig Bn HQ Co A (CO) Co B (Fwd Comm) Co C (Area Sig)	54th Sig Bn HQ Co A (CO) Co B (Fwd Comm) Co C (Area Sig)	55th Sig Bn HQ Co A (CO) Co B (Fwd Comm) Co C (Area Sig)	47th Sig Bn HQ Co A (Cmd Comm) Co B (Fwd Comm)	102d Sig Bn HQ Co A (Cmd Comm) Co B (Fwd Comm)	23d Sig Bn HQ Co A (CO) Co B (Fwd Comm) Co C (Area Sig)	25th Sig Bn HQ Co A (CO) Co B (Fwd Comm) Co C (Area Sig)
CSS: Organic Spt Cmd (noting habitual assets)**	20th Inf DISCOM HQ DMMC 20th AG Co 20th Fin Co 20th Maint Bn 20th Med Bn 20th S&T Bn	21st Inf DISCOM HQ 21st Med Bn 21st S&T Bn 21st Maint Bn 21st TAMC	52d Mech DISCOM HQ MMC** 52d TAMC 52d Main Spt Bn 1st Fwd Spt Bn (1st Bde) 2d Fwd Spt Bn (2d Bde) 3d Fwd Spt Bn (3d Bde)	53d Mech DISCOM HQ MMC** 53d TAMC 53d Main Spt Bn 1st Fwd Spt Bn (1st Bde) 2d Fwd Spt Bn (2d Bde) 3d Fwd Spt Bn (3d Bde)	54th Mech DISCOM HQ MMC** 54th TAMC 54th Main Spt Bn 1st Fwd Spt Bn (1st Bde) 2d Fwd Spt Bn (2d Bde) 3d Fwd Spt Bn (3d Bde)	55th Mech DISCOM HQ MMC** 55th TAMC 55th Main Spt Bn 1st Fwd Spt Bn (1st Bde) 2d Fwd Spt Bn (2d Bde) 3d Fwd Spt Bn (3d Bde)	47th AASLT DISCOM HQ MMC** 47th Avn Maint Bn (AVIM) 47th Maint Bn 47th Med Bn 47th S&T Bn	102d Abn DISCOM HQ MMC** 102d Avn Maint Co (AVIM) 102d Maint Bn 102d Med Bn 102d S&T Bn	23d Armd DISCOM HQ MMC** 23d TAMC 23d Main Spt Bn 1st Fwd Spt Bn (1st Bde) 2d Fwd Spt Bn (2d Bde) 3d Fwd Spt Bn (3d Bde)	25th Armd DISCOM HQ MMC** 25th TAMC 25th Main Spt Bn 1st Fwd Spt Bn (1st Bde) 2d Fwd Spt Bn (2d Bde) 3d Fwd Spt Bn (3d Bde)

Organized under H series TOE with H series equipment CONUS based.
Organized under L series TOE CONUS based TPFDL unit.
Organized under L series TOE with a majority of J series equipment forward deployed.
Organized under J series TOE with a mix of H and J series equipment CONUS based TPFDL unit.
Organized under L series TOE forward deployed.
This does not imply that assets can not be added or transferred from the HQ to task organizing to meet the situation.
Howitzer batteries are organic to armored cavalry squadrons of the ACR.
CONUS based TPFDL unit.
Long range surveillance company detachment.
Organic to division aviation brigade.
Reserve Component roundout unit.
Remotely piloted vehicle.

10TH CORPS UNITS (Combat and Combat Support)

313TH SEP MECH BDE
- [illegible]
- 313th Engr Co
- MP Plt ... 313th Sep Mech Bde
- [illegible]

208TH ACR
- [illegible]
- 208th Spt Sqdn HQ
  - Trp A (S&T)
  - Trp B (Maint)
  - Trp C (Med)
  - Trp D (Av)

10TH AVN BDE (CORPS)
- 102d Atk Hel Gp HQ
  - 110th Atk Hel Bn (AH 64)
  - 111th Atk Hel Bn (AH 64)
  - 112th Atk Hel Bn (AH 64)
- 173d Atk Hel Gp HQ
  - 113th Atk Hel Bn (AH 64)
  - 114th Atk Hel Bn (AH 64)
  - 115th Atk Hel Bn (AH 64)
- 104th Avn Gp HQ
  - 116th Aslt Hel Bn [illegible]
  - 117th Aslt Hel Bn [illegible]
  - 121st Mdm Hel Bn [illegible]
  - 125th Cmd Avn Bn

10TH CORPS ARTY
- 66th FA Bde HQ
  - 2 611 (203 SP) FA
  - 2 612 (203 SP) FA
  - 2 641 (155 SP) FA
  - 2 642 (155 SP) FA
  - 2 643 (155 SP) FA
- [illegible] FA Bde HQ
  - 2 616 (203 SP) FA
  - 2 618 (203 SP) FA
  - 2 631 (155 SP) FA
  - 2 634 (155 SP) FA
  - 2 615 (155 SP) FA
- 68th FA Bde HQ
  - 1 206 (Lance) FA
  - 1 207 (Lance) FA
  - 1 208 (Lance) FA
  - 2 614 (203 SP) FA
  - 2 675 (MLRS) FA
- 69th FA Bde HQ
  - 2 608 (203 SP) FA
  - 2 609 (203 SP) FA
  - 2 638 (155 SP) FA
  - 2 639 (155 SP) FA
  - 2 640 (155 SP) FA
- [illegible] FA Bde HQ
  - 2 606 (203 SP) FA
  - 2 607 (203 SP) FA
  - 2 636 (155 SP) FA
  - 2 637 (155 SP) FA
- 680th TAB (Hv Corps)
  - HHS
  - Btrys A—C (RPV)
  - Btry D (Tgt Acq)

10TH ADA BDE
- 1 432 (Chap) ADA
- 1 433 (Chap) ADA
- 1 434 (Chap) ADA
- 1 435 (Gun Stinger) ADA
- 1 461 (Hawk) ADA

40TH CML BDE
- 401st Cml Bn
  - 411th Cml Decon Co
  - 421st Smoke Gen Co (M)
  - 422d Smoke Gen Co (M)
- 402d Cml Bn
  - 412th Cml Decon Co
  - 413th Cml Decon Co
  - 441st Smoke Gen Co (Mtr)
  - 442d Smoke Gen Co (Mtr)
  - 443d Smoke Gen Co (Mtr)
- 403d Cml Bn
  - 414th Cml Decon Co
  - 423d Smoke Gen Co (M)
  - 42?th Smoke Gen Co (M)
- 404th Cml Bn
  - 415th Cml Decon Co
  - 416th Cml Decon Co
  - 444th Smoke Gen Co (Mtr)
  - 445th Smoke Gen Co (Mtr)
- 431st Cml Co (Smoke/Decon)
- 451st Cml Recon Co

53D ENGR BDE
- 61st Engr Gp HQ
  - 500th Engr Cbt Bn (Corps)
  - 501st Engr Cbt Bn (Corps)
  - 502d Engr Cbt Bn (Corps)
  - 503d Engr Cbt Bn (Corps)
  - 570th Engr Bn (Comp)
    - 5045th Engr Aslt Fltbrg Co (Ribbon)
    - 5051st Engr Fltbrg Co (Ribbon)
    - 5059th Engr Mdm Girder Brg Co
    - 5070th Engr MAB Co
    - 5080th Engr Cbt Spt Equip Co
- 62d Engr Gp HQ
  - 509th Engr Cbt Bn (Corps)
  - 510th Engr Cbt Bn (Corps)
  - 511th Engr Cbt Bn (Corps)
  - 550th Engr Cbt Bn (Hv)
  - 571st Engr Bn (Comp)
    - 5001st Engr Surv Co
    - 5006th Engr Dptk Co
    - 5046th Engr Aslt Fltbrg Co (Ribbon)
    - 5060th Engr Mdm Girder Brg Co
    - 5081st Engr Cbt Spt Equip Co
    - 5115th Engr ADM Co (Corps)

20TH MI BDE (CEWI)
- 20?th MI Bn (CEWI) (Aerial Expl)
- 21?th MI Bn (CEWI) (Tac Expl)
- 22?th MI Bn (CEWI) (Ops)
- 25?th EHSC (OPLEX)

20TH MP BDE
- 20?th MP Bn
  - 270th MP Co
  - 271st MP Co
  - 272d MP Co
- 231st MP Bn
  - 273d MP Co
  - 274th MP Co
  - 275th MP Co
- 212d MP Bn
  - 276th MP Co
  - 277th MP Co
  - 278th MP Co
  - 279th MP Co
- 213d MP Bn
  - 280th MP Co
  - 335th MP Cd Co
  - 363d MP Scty Co

70TH SIG BDE
- 7?th Sig Bn [illegible] Corps
- 705th Area Sig Bn
- 706th Area Sig Bn

OTHER DIRECT REPORTING UNITS
- [illegible]
- [illegible] PSYOP Bn
- [illegible] RAOC

10TH COSCOM (Combat Service Support)

51ST AMMO GP (DS GS)
- 5?th Ammo Bn (Conv) (DS GS)
  - 503d Ord Co (Conv Ammo) (DS)
  - 504th Ord Co (Conv Ammo) [illegible]
  - 50?th Ord Co (Conv Ammo) [illegible]
  - 550th Ord Co (Conv Ammo) (GS)
  - 365th MP Scty Co
- 56th Ammo Bn (Conv) (DS GS)
  - 50?th Ord Co (Conv Ammo) (DS)
  - 501st Ord Co (Conv Ammo) (GS)
  - 50?th Ord Co (Conv Ammo) (DS)
  - 551st Ord Co (Conv Ammo) (GS)
  - 364th MP Scty Co
- 55?st Ammo Bn (GS)
  - 5??th Ord Co (Ammo) [illegible]
  - 5??th Ord Co (Ammo) [illegible]
  - 35?th MP [illegible]
  - 35?th MP [illegible]

80TH MED BDE
- 82d Med Co
  - 84th MASH
  - 85th MASH
  - 80?th CSH
  - 833d Evac Hosp
  - 835th Evac Hosp
  - 836th Evac Hosp
  - 800th Med Bn
    - 855th Med Amb Co
    - 865th Med Clr Co
    - 867th Med Clr Co
    - 890th Gen Disp
    - 8118th Med Det (Air Amb)
    - 8119th Med Det (Air Amb)
    - 8120th Med Det (Air Amb)
    - 8121st Med Det (Air Amb)
    - 8162d Vet Svc Det (Small)
    - 8827th Den Svc Det
    - 8886th Psychiatric Svc Tm
- 8??th MEDSOM Unit
  - 8115th Lab Tm
  - 8858th Med Equip Maint Tm
  - 8866th Spectacle Fabrication Tm (Mdm)
  - 8880th Blood Proc Tm
  - 8893d Blood Distr Tm
  - 8884th Blood Distr Tm
  - 8896th Blood Coll Tm
- 8??th MEDSOM Unit (Level 2)
- 83d Med Co
  - 86th MASH
  - 87th MASH
  - 810th CSH
  - 811th CSH
  - 837th Evac Hosp
  - 839th Evac Hosp
  - 837th Evac Hosp
  - 801st Med Bn
    - 850th Med Air Amb Co
    - 856th Med Amb Co
    - 866th Med Clr Co
    - 86?th Med Clr Co
    - 891st Gen Disp
    - 8103d Neurosurgical Tm
    - 8122d Med Det (Air Amb)
    - 812?d Med Det (Air Amb)
    - 8163d Vet Svc Det (Small)
    - 886?th [illegible] Svc Tm
    - 8887th Psychiatric Svc Tm

10TH P&A GP (PROV)
- 10th P&A Bn
  - 110th Repl Reg Org
  - 155th Dir Spt Postal Co
  - 160th Gen Spt Postal Co
  - 166th PSC (A)
  - 167th PSC (D)
  - 168th PSC (D)
  - 170th PSC (D)
  - 172d PSC (B)
- 11th P&A Bn
  - 110th Fin Svc Org
  - 111th Repl Reg Org
  - 171st PSC (D)
  - 173d PSC (D)
  - 174th PSC (D)
  - 175th PSC (D)
  - 176th PSC (D)
  - 177th PSC (D)

10TH POL GP (PROV)
- 33d Petrl Sup Bn
  - 257th Petrl Sup Co
  - 258th Petrl Sup Co
  - 298th Petrl Prod Lab Tm (Mbl)
  - 723d Trans Mdm Trk Co (Petrl)
  - 724th Trans Mdm Trk Co (Petrl)
- 34th Petrl Sup Bn
  - 259th Petrl Sup Co
  - 260th Petrl Sup Co
  - 721st Trans Mdm Trk Co (Petrl)
  - 722d Trans Mdm Trk Co (Petrl)

13TH SPT GP
- 90th Maint Bn (DS GS)
  - 932d Svc Co (Coll & Class)
  - 5519th Ord Co (GM) (GS Maint)
  - 9011th Maint Co Non Div (DS)
  - 9012th Maint Co Non Div (DS)
  - 9013th Maint Co Non Div (DS)
  - 9017th Maint Co Non Div (DS)
- 20th S&S Bn
  - 201st S&S Co (DS)
  - 202d S&S Co (DS)
  - 205th S&S Co (DS)
  - 223d Fd Svc Co [illegible]
  - 226th Fd Svc Co [illegible]
  - 227th Fd Svc Co [illegible]
- 23d S&S Bn
  - 250th Rep Parts Sup Co [illegible]
  - 25? Rep Parts Sup Co [illegible]
- 219th MAIC

14TH SPT GP
- 71st Acft Maint Bn (AvIM) (DS GS)
  - 720th TAMC (AvIM)
  - 701st TAMC (AvIM)
- 91st Maint Bn (DS GS)
  - 933d Svc Co (Coll & Class)
  - [illegible]
- [illegible] S&S Bn
  - [illegible]
- [illegible]

70TH TMT GP
- 771st TMT Bn
  - 709th Trans Mdm Trk Co (Cntnr Cgo)
  - 724th Trans Lt Mdm Trk Co
  - 735th Trans Lt Mdm Trk Co
  - 553d Trans Lt Trk Co
  - [illegible]
- 772d TMT Bn
  - [illegible]

OTHER DIRECT REPORTING UNITS
- 55th CA Tac Sup Bn
  - [illegible]

[illegible footnotes]

Ammunition Requirements

Tank, M1:

	rds/wpn	X # of wpns	X wt of rd	= STONs required
1st day:	78	58	72	162.9
next day:	47	58	72	98.1

BFV,M2:

25mm				
1st day:	96	54	1.87	4.8
next:	76	54	1.87	3.8
TOW				
1st day:	.8	54	98.8	2.1
next:	.6	54	98.8	1.6
4.2 Mortar				
1st day:	163	6	40	19.6
Next:	99	6	40	11.9

TOTAL:

1st day: 162.9(2) + 4.8(2) + 2.1(2) + 19.6(2) = 378.8
Next: 98.1(2) + 3.8(2) + 1.6(2) + 11.9(2) = 230.8

Fuel Requirements.

MOGAS, TK BN: 3.9(12) + 38(12) + 25(12) + 101(63) = 1438.8

MOGAS, MECH BN: 5.8(12) + 25.2(12) + 32.1(12) + 101(21.2) = 2898

MOGAS, BDE HHC: 8.9(12) + 9.4(12) + 4(12) = 267.6

MOGAS,FSB: 44.5(12) + 29(12) + 64.7(12) + 21.2(101) = 3799.6

Diesel, TK BN: .6(12) + 5(12) + 671.5(4.2) + 3758.7(5.7) + 3150.4(5.5) + 132(101) = 55,156.1

Diesel, MECH BN: 5.3(12) + 45.8(12) + 144.7(4.2) + 1654.3(5.7) + 1239.1(5.5) + 109.1(101) = 28,484.4

Diesel, BDE HHC: 5(12) + 8.3(4.2) + 72.7(5.7) + 76.6(5.5) + 13(101) = 2243.6

Diesel,FSB: 21(12) + 13.9(12) + 31.9(12) + 21(12) + 11.7(4.2) + 109.9(5.7) + 130(5.5) + 153(101) = 17,897.1

MOGAS Total: 1438.8(2) + 2898(2) + 267.6 + 3799.6 = 12740.8

Diesel Total: 55156.1(2) + 28484.4(2) + 2243.6 + 17897.1 = 187421.7

Total Fuel: 187421.7 + 12740.8 = 200,162.5

Maintenance Requirements

Number of M1 Tanks: 58 x 2 = 116

Number of BFVs: 54 x 2 = 108

Expected losses, 1st day: 54%

Repairable thru DS level: 80%

Average man-hours/repair 10

116 x .54 = 62.6 tanks lost

63 x .80 = 50.4 tanks repairable

108 x .54 = 58.3 BFVs lost

58 x .80 = 46.4 BFVs repairable

(50 + 46)vehicles repairable x 10 man-hours/repair = 960 man-hours on heaviest day

Endnotes

1. U.S. Army Command and General Staff College, FC 71-101, Light Infantry Division Operations, (Fort Leavenworth, KS, 1984, p. 1.

2. LTG John R. Galvin, " Heavy-Light Forces and the NATO Mission.", Infantry, (July-August 1984), p. 11.

3. Ibid, p. 11.

4. William J. Olson, "The Light Force Initiative", Military Review, (June 1985),p. 4.

5. CPT Jonathan M. House, Toward Combined Arms Warfare: A Survey of 20th Century Tactics, Doctrine, and Organization, (Fort Leavenworth, KS 1984), p. 86.

6. Ibid, pp. 53,63,65,76.

7. Ibid, p. 82.

8. Ibid, p. 86.

9. Ibid, p. 84.

10. Ibid, p. 97.

11. Ibid, p. 91.

12. U.S. Army, FM 100-5, Operations, (Washington,D.C., 1944), p. 7.

13. Ibid, p. 307.

14. House, Toward Combined Arms Warfare, p. 110.

15. Joseph C. Goulden, Korea, the Untold Story of the War, (New York, 1984), pp. 109-183. Chapters 4-6 of the book contain a good description of the opening stages of the war. The conclusions in this paragraph are drawn from that account.

16. John A. English, A Perspective On Infantry, (New York, 1981), p. 244.

17. Avraham Adan, On the Banks of the Suez, (Jerusalem, 1979). p. 204.

18. James L. Stokesbury, A Short History of World War II, (New York, 1980), p. 237.

19. Hugh M. Cole, The Lorraine Campaign, (Washington, D.C., 1950), pp. 52,296.

20. V. Odintsov, "Wartime Experience: Rear Service Support For Mobile Groups.", Readings in Soviet Operational Art, (Fort Leavenworth, KS, 1987), p. 444.

21. Ibid, p. 444.

22. Roland R. Ruppenthal, Logistical Support of the Armies, Volume I, (Washington, D.C., 1985), pp.529-537.

23. Carl von Clausewitz, On War, (Princeton, 1976), p.227.

24. Ibid, p. 149.

25. House, Toward Combined Arms Warfare, p. 81.

26. U.S. Army Command and General Staff College, SI 63-1, Fundamentals of Combat Service Support, (Fort Leavenworth, KS, 1986), p.6-60.

27. Ibid, p. 6-13.

28. Nikolai Antipenko, " Logistics ", The Battle of Kursk, (Moscow, 1974), p. 239.

29. Kent R Greenfield, Robert R. Palmer, and Bell I. Wiley, The Organization of Ground Combat Troops. (Washington, D.C., 1947), pp. 364-365.

30. Charles B. MacDonald, Three Battles: Arnaville,Altuzzo, and Schmidt, (Washington, D.C., 1952), pp. 321-343.

31. VII Corps, Field Order # 6 (Revised), 5 June 1945, p. 2.

32. 3rd Armored Division, After Action Report for August 1944, 25 September, 1944, p. 2.

33. Charles B. MacDonald, The battle of the Bulge, (London, 1984), p. 444.

34. 1st US Army, Standard Operating Procedures, 1 December 1944, p.45.

35. VII Corps, G4 Operations Journal File, 19 September, 1944, Tab 106.

36. VII Corps, Admin Order #12, 3 July 1944, p. 2.

37. Ibid, p. 7.

38. 3rd Armored Division, Field Order # 1, 27 Jun 1944, p.1.

39. U. S. Army, Employment of Ordnance Staff Sections, Ordnance Combat Service Units, and Ordnance Service Units in

the European Campaign, p.9.

40. Ibid.

41. 1st US Army, Letter: Army Ordnance attalions in Support of Corps, 6 April 1945, p. 1.

42. US Army, SI 63-1, p. 6-63.

43. US Army, FM 101-5, Operations, (Washington, D.C., 1986, p. 10.

44. Ibid, p. 61.

45. Ibid, p. 72.

46. US Army, FM 63-2-2, Combat Service Support Operations, Armored, Mechanized, and Motorized Division, (Washington, D.C., 1985), p. 2-12.

47. US Army, FM 63-31, Combat Service Support Operations - Corps, (Washington, D.C., 1985), p. 1-5.

48. 10th Mountain Division, Celtic Cross IV After Action Report, 2 October 1986.

49. Boyd D. Houck, " Host Nation Support in Germany.", Army Logistician, March-April 1986, pp.2-5.

50. Bob Rosenburgh, "Testing the Petroleum Pipeline.", Army Logistician, May-June 1987, pp.16-17.

51. Deborah R. Godwin, " Deploying DAS3 and ULLS", Army Logistician, may-June 1987, pp. 22-24.

52. US Army, FM100-5, 1986, pp. 62,63.

53. US Army, Army 21, Interim Operational Concept, (Fort Monroe, VA, 1985), p. 5-18.

BIBLIOGRAPHY

Books

Adan, Avraham, On the Banks of the Suez. Jerusalem: Edanim Publishers, 1979.

Antipenko, Nikolai, "Logistics." Ivanov-Mumjiev, G.P. trans The Battle of Kursk. Moscow: Progress Publishers, 1974.

Bykofsky, Joseph and Larson, Harold, The Transportation Corps: Operations Overseas. Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1957.

Cole, Hugh M., The Ardennes: Battle of the Bulge. Washington, D.C.: Office of the Chief of Military History, United States Army, 1965.

Cole, Hugh M., The Lorraine Campaign. Washington, D.C.: The Historical Division, United States Army, 1950.

English, John A., A Perspective on Infantry. New York, NY: Praeger Publishers, 1981.

Goulden, Joseph C., Korea, the Untold Story of the War. New York, NY: McGraw-Hill Book Company, 1982.

Green, Constance M., Thomson, Harry C. and Roots, Peter C., The Ordnance Department: Planning Munitions for War. Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1955.

Greenfield, Kent R., Robert R. Palmer, and Bell I. Wiley, The Organization of Ground Combat Troops. Washington, D.C.: Historical Division, US Army, 1947.

Howard, Michael and Peter Paret, editors, Carl von Clausewitz, On War. Princeton, NJ: Princeton University Press, 1976.

Huston, James A., The Sinews of War: Army Logistics, 1775-1953. Washington, D.C.: Office of the Chief of Military History, United States Army, 1966.

Luttwak, Edward N. and Horowitz, Daniel, The Israeli Army, 1948-1973. Lanham,MD: University Press of America, 1983.

MacDonald, Charles B. and Mathews, Sidney, T., Three Battles: Arnaville, Altuzzo, and Schmidt. Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1952.

MacDonald, Charles B., The Battle of the Bulge. London: Weidenfeld and Nicolson, 1984.

Mayo, Lida. The Ordnance Department: On Beachhead and Battlefront. Washington, D.C.: Office of the Chief of Military History, United States Army, 1968.

Ross, William F. and Romanus, Charles F., The Quartermaster Corps: Operations in the War Against Germany. Washington, D.C.: Office of the Chief of Military History, U.S. Army, 1965.

Ruppenthal, Roland G., Logistical Support of the Armies. Volumes I and II. Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1959.

Van Creveld, Martin, Supplying War. London: Cambridge University Press, 1977.

Government Publications

U.S. Army, DA Pam 20 - 202, Historical Study, German Tank Maintenance in World War II. Washington, D.C.: U.S. Army, 1954.

U.S. Army, FM 63-2-2, Combat Service Support Operations - Division. Washington, D.C.: U.S. Army, 1985.

U.S. Army, FM 63-2J, Combat Service Support Operations - Corps. Washington, D.C.: U.S. Army, 1985.

U.S. Army, FM 63 - 20, Forward Support Battalion. Washington, D.C.: U.S. Army, 1985.

U.S. Army, FM 100 - 5, Operations. Washington, D.C.: U.S. Army, 1944.

U.S. Army, FM 100 - 5, Operations. Washington, D.C.: U.S. Army, 1986.

U.S. Army, FM 100-10, Combat Service Support. Washington, D.C.: U.S. Army, 1983.

U.S. Army, FM 101-10-2, Extracts of Non-divisional TOE. Washington, D.C.: U.S. Army, 1977.

U.S. Army Command and General Staff College, EC 71 - 100, Armored and Mechanized Division and Brigade Operations. Fort Leavenworth, KS: U.S. Army, 1984.

U.S. Army Command and General Staff College, EC 71 - 101, Light Infantry Division Operations. Fort Leavenworth, KS: U.S. Army, 1984.

U.S. Army Command and General Staff College, SI 63 - 1, Fundamentals of Combat Service Support. Fort Leavenworth, KS U.S. Army, 1986.

U.S. Army Command and General Staff College, SI 101 - 1, Organizational and Tactical Reference Data For the Army in The Field. Fort Leavenworth, KS: U.S. Army, 1987.

U.S. Army Command and General Staff College, SI 101 - 2, Planning Factors. Fort Leavenworth, KS: U.S. Army, 1985.

Articles

ALOG Staff Feature, "Unit Level Logistics System.", Army Logistician, September-October 1985, 7-9.

Brooks, Gerald E. and Godwin, Deborah R.,"Deploying DA33 and ULLS.", Army Logistician, May-June 1987, 22-24.

Galvin, John R., "Heavy-Light Forces and the NATO Mission.", Infantry, July-August 1984, 10-14.

Houck, Boyd D., " Host Nation Support in Germany", Army Logistician, March-April 1986, 2-5.

Landry, John R. and Sullivan, Bloomer D., "Forward Support Battalion." Military Review, January 1987, 24-30.

Odintsov, V. and Ovsyannikov, V., " Wartime Experience: Rear Service Support for Mobile Groups.", Readings in Soviet Operational Art, U.S. Army Command and General Staff College, 1987, 441-450.

Olson, William J., "The Light Force Initiative.", Military Review, June 1985, 2-17.

Rosenburgh, Bob, "Testing the Petroleum Pipeline." Army Logistician, May-June 1987, 16-17.

Wilson, Lawrence J., "Managing the Division's Class IX Supply." Army Logistician, November-December 1984, 6-9.

Monographs, Research Surveys, and Other Documents.

10th Mountain Division, After Action Report, Celtic Cross IV, October 1986.

1st U.S. Army After Action Report, European Theater of Operations, for November-December 1944, January, 1945.

1st U.S. Army Journal, G-4, 19 September, 1944.

1st U.S. Army letter, Army Ordnance Battalions in Support of Corps, 6 April 1945.

1st U.S. Army Standard Operating Procedures, 1 December 1944.

3rd Armored Division After Action Report for August, 1944, 25

September 1944.

3rd Armored Division After Action Report, 10 May 1945.

7th Corps Admin Order # 12, 3 July 1944.

7th Corps Admin Order # 16, 18 July, 1944.

7th Corps Field Order # 7, 1 August 1944.

7th Corps, Field Order # 6, Operation Cobra, July 1944.

Combat Command A, 3rd AD, After Action Report, .

Davenport, Brian W., Operational Sustainment: Defining the Realm of the Possible. Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1986.

Gardner, Gregory C., A Concept for the Tactical Employment of Light Infantry in Central Europe. Monograph, School of Advanced Military Studies, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1986.

House, Jonathan M., Toward Combined Arms Warfare: A Survey of 20th Century Tactics, Doctrine, and Organization. Research Survey, Combat Studies Institute, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1984.

U.S. Army Command and General Staff College, FM 100 - 15, Corps Operations, (Preliminary Draft). Fort Leavenworth, KS, 1987.

U.S. Army Ordnance Center, Employment of Ordnance Staff Sections, Ordnance Combat Service Units, and Ordnance Service Units in European Campaigns, undated.

U.S. Army, Army 21, Interim Operational Concept, Fort Monroe, VA, 1985.

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