CHAPTER I

THE COST OF TECHNOLOGY

TWO EXAMPLES

First Example: An American Division on the Defense (3)

Early in August 1950, the Fourth North Korean Infantry Division attacked the Western Front of the American-South Korean bridgehead of Pusan. The division was battle-weary and had been reduced from 11,000 to 5,000 soldiers. Shortly before the attack, 2,000 untrained recruits had brought the division again up to 7,000 men, representing about 65% of the authorized strength.

The defending American 24th Infantry Division was, with its 14,500 soldiers, superior to the attacker by a ration of 2 to 1. It defended an uncommonly favorable position. From a commanding hilly ground, it looked down into the valley of the 400 to 800 m wide Naktong River which separated the Americans and North Koreans. Low but precipitous mountain ranges rising to 311 m traversed the defense area with its few roads. The skies belonged without limitations to the American Air Force. The North Koreans did not even have anti-aircraft support in the front area. Resupply was in accordance with American scales and capabilities. It flowed undisturbed from the Harbor of Pusan to the front which was located close by (Figure 1).

All the trumps accordingly lay unequivocally in the hands of the defender with his towering superiority. In spite of this situation, the attacking North Koreans succeeded in negotiating the Naktong in a night attack with the first attempt. They rapidly penetrated deep into the American defense area, annihilated elements of the division artillery and almost would have broken through into the free space on the other side of the American defense. It was only with difficulty that the Americans were able to prevent a breakthrough, contain the enemy attack and ultimately dispose of the penetration. For this purpose, they had to bring up extensive forces, typically composed almost exclusively of infantry or engineers which were employed as infantry during times of greatest emergency. The American division which was already far superior according to every modern theory required as additional combat forces: one infantry battalion, one engineer battalion operating as infantry, two infantry regiments and, finally, a complete brigade of the Marine Corps which, with its 4,700 Marines was not very much weaker than the attacking North Korean division.

Second Examples: An American Division on the Attack

Almost at the same time, the 25th American Infantry Division reinforced to 24,000 men went on the attack at the southwest edge of the bridgehead of Pusan (4). They were to take ground toward the west and force the North Koreans to divert troops from other threatened sectors of the Front. The uncommonly favorable flying weather was an advantage for the offensive. The American Air Force supported the Army with flying units so great in number that the pilots in the

Front area often ran out of targets and requested permission to fly on into the enemy rear area (5).

The attack of the American division likewise passed through mountainous terrain as high as 783 m. The division, however, did not have to cross a wide river like the attack of the Fourth North Korean Division. In addition, it only encountered a very weak enemy. The defending Sixth North Korean Infantry Division was reduced in strength from 11,000 to 6,000 and perhaps even to only 3,600 men. Its only support was a likewise half-destroyed infantry regiment dwindled away from 2,800 to 1,500 and perhaps even 1,000 men (6).

Again, the North Koreans were hopelessly inferior in personnel and materiel. The Americans again had all the trump cards. Their attack encountered the completely surprising simultaneous offensive of the North Koreans. Only after heavy initial engagements was it possible to force the North Koreans onto the defensive and attack. The Sixth North Korean Infantry Division dropped to a strength of between 3,000 and 4,000 men. In spite of these losses and in spite of the powerful superiority of the Americans, the North Koreans, however, soon went on the counterattack. In an operation carried out characteristically at night and in the early morning hours as well as across the mountains, they smashed through to the American division artillery and wiped out a number of batteries. Finally, when elements of the attached reinforcements had to be redeployed to the hard-pressed 24th Infantry Division, the 24,000 Americans had to admit defeat by a few thousand poorly armed North Koreans. The 25th American Infantry Division retreated to its initial positions. It had hardly gained a foot of ground, and had not been able to force the diversion of a single North Korean soldier from another Front sector.

In both battles, the Americans may not always have been successfully led. In addition, the morale was not equally high in all units in the opinion of the official American history of the war. On the other hand, the American units consisted at the least of active trained soldiers. Contrarily, the Fourth North Korean Infantry Division carried out the combat with 2,000 untrained recruits which, in part, did not even have weapons or uniforms. Moreover, out-and-out elite formations participated in both combats on the American side. These included, among others, the famous 27th Infantry Regiment and the First Brigade of the Marine Corps. Both formations, just like many others, were skillfully led and fought well. The astonishing successes of the apparently hopelessly inferior North Koreans can consequently not be adequately explained by the lack of leadership or morale of the Americans. Further reasons must be evolved which could possibly have played the decisive role. It has been suggested that the American divisions were wrongly constructed, accordingly wrongly armed and correspondingly wrongly organized and consequently wrongly led. All the same, the official American work on the Korean War couched its final judgement in the following sentence: "Superior technology, far from leading to an easy victory, produced no victory at all." (7) This is the judgement to which the assessment of R. Komer, a very influential American today in the USA and NATO, concerning the utility of advanced technology in the Vietnam War is joined almost without change (8). Accordingly, it remains to investigate whether the causes for

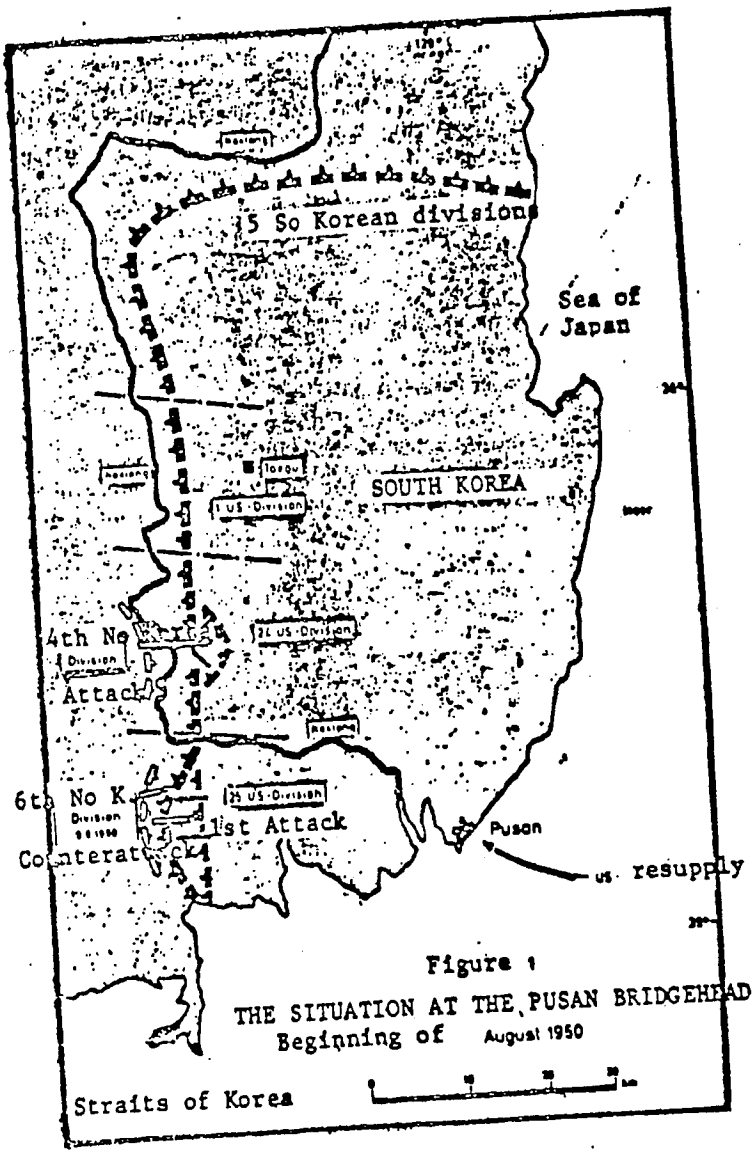

Figure 1

THE SITUATION AT THE PUSAN BRIDGEHEAD
Beginning of August 1950

the astounding failures of the Americans in Korea -- and perhaps not only there -- are to be sought essentially in the armament and equipment as well as in the organization and tactics of the American divisions resulting there from and consequently in their degree of reliance on technology. The answer to the question raised thereby is superficially only of war-historical interest. The question would even be damaging and would lead us astray in our time if it would lead to a general skepticism of technology and advanced technology. Rather, the question should help us to ascertain what price all modern armies, accordingly also our own, have to pay for the great and uncontested advantages of technology. In spite of a truly vast flood of publications on the subject of defense technology, there has as yet been very little public consideration given this question. If the cost of technology is determined, the important question should then be asked as to when and under what conditions this cost appears to be justified and when it is too high for the advantages offered.

THE FIRST PART OF THE COST: FIGHTERS BECOME RARE

Since man first used a rock as a throwing or striking weapon, the warrior has attempted to increase his bodily strength by technical means. Right down to the beginning of modern times, this has not resulted in a decrease in the number of available soldiers. The reasons for this are clear: The technical resources of ancient times, accordingly the sledgehammer and stone axe, bow and arrow, sword and shield, required the services of scant personnel working in an armament industry or for maintenance and supply.

This was modified for the first time with the arrival of firearms and later quite drastically with mechanization and motorization. A great many men fit for military service were retained in the homeland owing not only to the needs of supplying the civilian population but also increasingly those of the armament industry (9). Many men could not become soldiers at all. Of those persons, however, who became soldiers, most found employment again in the rear services and ever fewer became used as fighters. The new weapons and transportation resources required not only soldiers for their service but they required, above all, their own and very soon extensive resupply and maintenance services -- which quite often also had to be secured by the combat forces. Further, the mass armies of modern times also required their own command and support forces whose personnel likewise came from the combat forces.

The development into nations which consisted even in wartime predominately of nonsoldiers and into armies which consisted predominately of nonfighters was initially only accomplished quite slowly. The infantry regiments of Frederick the Great still were able to bring 95% of their soldiers with weapons into contact with the enemy and, in the case of cavalry regiments, this was even almost 96% (10). The command and supply forces of Frederick's Army encompassed at the same time only about 10% of the personnel of the entire army (11). The soldier still was, in contract to the situation today, as a rule also a fighter.

The development nevertheless went further. From decade to decade, it subtracted more soldiers from the combat forces and placed them on the gun, set them at the wheel of a resupply truck or at the field desk of a staff. Those

soldiers who, weapon in hand, were to encounter the enemy became ever less frequent. The combat force dwindled in size whereas the support forces, above all artillery and engineers, became greater in number, and the command and supply forces grew still more swiftly.

Today, only a few soldiers still carry out the characteristic task of the fighter which is to seek out the enemy and bring firepower to bear on the enemy. The picture becomes especially clear when attention is directed beyond the divisions. To be seen in vast numbers in the rear area are the supply troops of the high command, military police, engineers, communicators, transportation units, depot and maintenance workshops -- and between these troop units other ones which are to provide for their security. In this way, the modern armies have become armies of nonfighters. For most soldiers, battle only interrupts their typical tasks. Therefore, it must remain a little desired exception (12).

Owing to reliance on technology, our armies today have available immense firepower as well as heavily armored elements. They pass for being highly mobile. These are great advantages which also justify high cost in many situations. Of course, the armies are small and their combat elements have become still smaller. This must become critical wherever the dearly bought advantages of technology cannot be decisively employed (13). As early as the Korean War, the American division -- an entirely motorized infantry division which hardly disposed of armored tracked vehicles — had with about 16,000 soldiers almost 4,800 vehicles. 4,800 of their soldiers were accordingly drivers. In order to supply the vehicles and maintain them, resupply and maintenance units were necessary in which additional soldiers were serving. As an estimate, two-fifths of the soldiers consequently had the task of keeping the division mobile. One first part of the cost of technology, the cost of mobility of the division, consisted in waiving the combat employment of two fifths of the soldiers. This is no mean cost even for very high mobility.

The soldiers of the other three-fifths of the division personnel, however, again served mostly in other service support units, in staffs and with the communicators, with the engineers or with the combat support forces. The divisions were exclusively oriented for mobility and far-reaching firepower. They were equipped for this purpose. The infantryman who was able to encounter the enemy at night, at short ranges, in the forest and in mountains or valleys with rifle, automatic weapon and hand grenade had become an anachronism. He no longer corresponded to the image which one had of a modern unit with high mobility and firepower and which progress-oriented exploited all capabilities of technology.

To their horror, the American divisions, however, found themselves falling back precisely on the infantryman as the North Koreans infiltrated at night through the cluttered, hilly terrain. They simply went around the widely scattered strong points of the weak infantry and only began their attack on the artillery and headquarters. The mobility granted by the engine and for which such a high price had been paid was of scant utility to the divisions since they were to hold their ground. In addition, the Americans finally noted that divisions which reputedly are high mobile because of their motorization or mechanization are confined to roads in specific areas and are accordingly extremely nonmobile. The

U.S. concept of defense

Americans could hardly even utilize their firepower. The widely dispersed enemy presented hardly any worthwhile targets and attacked mostly at night. For this reason, the American divisions had to fail. They did not have an appropriate type of mobility and neither did they have the type of firepower nor the branches required by terrain and opponent. The Americans had overlooked -- and still overlook today -- that mobility and firepower are no absolute values which are available in any terrain and at any time. It turned out that firepower and mobility even of mechanized forces are terrain-dependent, accordingly cannot be put into action under certain conditions of terrain and visibility. The field forces reputedly highly mobile and reputedly exceedingly strong in firepower was at the wrong place with worthless trumps (14).

The situation with the North Koreans was completely otherwise. They had started the war with divisions which were organized just like the Russian non-motorized infantry divisions toward the end of the Second World War (15). The American Air Force, however, very early destroyed a part of the artillery as well as most of the self-propelled gun detachments and weak armored units. The divisions accordingly dwindled down to their infantry, a few heavy weapons, mortar troop units and correspondingly small resupply services. They developed therewith an astonishing capability to resist high losses (16).

The insensitivity to losses on the part of the North Koreans is in sharp contrast to the exceeding loss-sensitivity of high technology units. Given the high personnel strength of the divisions, the losses are concentrated on the small combat forces. The combat forces will have to bear the losses almost alone in nonnuclear warfare. In nuclear warfare, the enemy will indeed have an effect with nuclear weapons in the hinterland and thereby also inflict heavy losses on the rear services. However, the combat forces not only have to endure nuclear, but also the nonnuclear fire. They will certainly suffer the heaviest losses even in nuclear combat whereas, in nonnuclear combat, they will bear the losses almost alone.

The weapons effect of the enemy is accordingly concentrated with high-technology armies on a quite small category of persons, i.e., on the combat forces. If the high-technology divisions lose only 50% of their personnel, they are no longer effective. The combat forces are then blooded. Most of the surviving soldiers are with the command and supply troops, from division headquarters through the maintenance companies down as far as the division depots (17). The existence of these soldiers has militarily no longer any meaning. The combat forces which these men are to lead and supply have vanished. The situation with the North Koreans was quite different. The North Korean units reduced to their infantry units and correspondingly light supply troops were still quite effective with 50% of their assigned strength. Above all, they still had an infantry which was still fully capable from an infantry standpoint of coping with a numerically far superior and indeed high technology opponent. This would have been meaningless for a battle in North Africa or for mobile operations in the Ukraine. The battles of movement were carried out there in wide open spaces and decided by mechanized forces. It was the infantry combat capability, however, which decided the battle when fighting in the Korean mountains.

All modern armies have been developed into high-technology armies. This alone already furnishes proof that this development even with our army is not responsive either to an arbitrary action or error or even chance but is due to important reasons. Owing to the high cost which it requires, high-technology is, however, only justified when the dearly bought technical means can be employed. Otherwise, the enormous expenditure for high-technology units cannot be justified. The development to high-technology units must accordingly always become doubtful in cases when terrain or enemy can prevent the employment of technical resources (18). This was clearly the case in Korea where combat frequently had to be carried out in hilly territory which confined the high-technology units to a few roads and robbed them of their dearly bought mobility. This can, however, also be the case in Germany where the enemy can seek night combat in order to limit the operational capabilities of long-range weapons and where populated areas, forests, hilly terrain and widespread industrial zones are to be found.

Weather with low visibility, night time and broken covered terrain, accordingly forests and builtup areas, today also still require the infantryman. For infantry combat, however, the giant technical apparatus of an armored brigade operated by several thousand men and supplied by additional thousands through the division, corps and territorial army can make available hardly more than 250 men. Even an armored infantry brigade provides less soldiers for dismounted combat than an infantry battalion 40 years ago. These few soldiers must carry out the combat for river corssings and especially combat for builtup areas, forests, industrial areas and hilly regions. Naturally, the commander will seek to have them given support. However, the possibilities for this are limited. At night and in builtup areas as well as in the forests, the soldiers fighting dismounted are extensively alone (19). A large part of the technical apparatus of the brigades is then wasted for who would want in all good cheer to use the tank battalions or even the tank destroyer companies for night combat in builtup areas or forests? Even the artillery will have considerable difficulties in powerfully supporting the infantrymen in a rather large builtup area or even in an extensive forest territory (20).

Organization, weaponry and equipment of a field force must be adapted to the probable mission and to the terrain of the probable operating area. The Americans failed in Korea owing to, among other things, a divisional organization which was adapted neither to the mission nor to the terrain. Korea is a country with much hill- territory although few builtup areas and forests. Germany has a great many highlands which immobilize even our mechanized units, meaning that they are confined to highways and roads. In addition, otherwise than in Korea, almost one-third of each square kilometer, almost 30% of the area is covered with forest which likewise restricts the mobility of mechanized units and decisively limits both visibility as well as capabilities of long-range weapons. And, finally, there is in every square kilometer on average one builtup area of 230 inhabitants whose houses, not as in Korea or in Russia, are constructed of solid stone. Any combat in Germany is accordingly unavoidably also a combat for builtup areas or forests and often enough also a combat in the hilly terrain. This leads to a series of urgent questions:

1. An attacking unit in the Bundeswehr is customarily directed to proceed "without regard to bypassed enemy units." This is proper and corresponds to the practice of the Second World War. However, at that time, the attacking armored units were followed by strong infantry forces which reduced the still-holding enemy and, in addition, the infantry component in the mechanized major formations was itself essentially stronger (21). Today, however, the following formations -- in the event that there are any of them at all -- also have hardly any infantry. Who then cleans up the extended forest zones of the Heath from where the enemy can continue to attack the following artillery, the headquarters, the resupply support units and the supply installations? Who liberates the hedgerow landscape of Schleswig-Holstein and the many towns, cities, factories and industrial zones of all the German land areas? Who throws the enemy motorized riflemen out of the forests of the Rhoen, the Steigerwald and the Rheinhardtswald into which tanks can venture only with a strong infantry protection?

2. In defense situations, the positions are located preferentially in open terrain or at best in a "defile" between towns and forests. There, they are properly located for our units are tailored for long-range fire and can only use this potential in open terrain. However, the expression "defile" is traitorous and, in addition, is wrong. It shows that we inadequately assess the meaning of covered terrain. The so-called defiles are not defiles at all. Even a mechanized opponent can, without effort, pass through our builtup areas and forests so long as we do not employ strong units there. He additionally finds protection there from our long-range fire and, above all, from our antitank guided missiles and our antitank helicopters. No less than Moltke gave warning more than 100 years ago: "The less chances for success are held by the frontal attack, the more certain will the enemy turn against our flank... supporting the wing on terrain only generally covered and difficult no longer corresponds to the situation for it is just that which the enemy must seek out" (22). What happens accordingly when the enemy passes around the defiles which are no defiles, at the latest after he sees himself impeded in the "defile" during a frontal approach? What happens when the enemy accordingly proceeds with strong forces through the forests and builtup areas? What happens in the event the enemy realizes in 1980 or 1990 what Moltke already realized as early as 1865? Who then prevents the enemy from employing tactics to which the Russian Army had resort in the First and Second World Wars and which brought astounding successes to the North Koreans and others as well? Did not in 1940 three German tank corps attack through the Ardennes and thereby through terrain which was poorly suited for combat of mechanized units but which could be penetrated without effort if insufficiently defended? At that time, two factors enabled one of the most brilliant victories of recent war history to happen: The erroneous belief of the defender that the mechanized attacker would avoid covered terrain and the decision of the attacker to use this terrain because it was insufficiently defended.

Are we willing and able to sufficiently defend covered terrain? Do we have field forces which we can employ in builtup areas, industrial zones, forests and highlands? Who of us can hold in night combat the Hessian Hills, the Spessart, the Odenwald, the Frankenwald and the Fichtelgebirge? The builtup areas, forests, highlands and industrial zones are much too large to leave them to the enemy without a fight. The enemy would simply march us out. However, should we plan to commit our mechanized units, accordingly a few MARDER and many LEOPARD 1s or even LEOPARD 2s, for builtup area and forest combat?

3. The municipal area of Hamburg encompasses about 180 square kilometers of builtup terrain. An armored infantry division committed to the attack on a city of this size should accordingly not lose even 10 infantrymen for each squate kilometer -- and this often represents thousands of houses — if it desires to reach the other side of the city with its very last infantrymen. Subsequently, they will have to be withdrawn anyhow since their infantrymen have bled away their strength. What is a division to do, however, in whose combat sector a major city is located? Of course, we will seek to avoid combat around the great congested areas with consideration for the population. But, still, bypassing has its limits: What is a brigade to do which is to fight for cities or industrial zones of the size of Wolfsburg and Peine, the Volkswagen factory, Fulda, Gottingen, Schweinfurt or Hof? Which battalions, which companies mop up in the attack or defend small cities and towns of the extent of Soltau or Munsterlager, Baumholder, Wildflecken or Grafenwöhr?

These questions cannot be adequately answered by the term "mobile conduct of operations." The term would become empty talk. An operation is no longer mobile when it avoids because of forests almost 30% of German terrain and must bypass with the builtup areas a further 11%. The defender cannot neglect these large areas, and the attacker cannot avoid all of them. The most mobile conduct of operations in defense must prevent the enemy access through extended covered areas. The enemy would otherwise soon appear before our artillery and our headquarters and would attack the combat forces from the rear. In the attack, the most mobile conduct of operations cannot dispense with spaces free of the enemy for the artillery, the nuclear delivery systems, headquarters, command and support forces, supply installations and for the resupply traffic. It is precisely the to-and-fro movement of mobile combat which allows a flexibily led opponent to establish himself in the covered areas.

The defending enemy in the last war frequently voluntarily evacuated the builtup areas and forests. He dessisted from cutting off the resupply from the German armored wedges by left-behind infantry units. At that time, however, the enemy knew well that a cutoff unit would very soon be attacked by strong infantry formations and would inevitably be annihilated. Today, the enemy no longer has need for fear. Units passed by during a counterattack by a German mechanized major formation would in any rather large forested area and any large builtup area be just as safe as in mother's bosom. No one can bother them.

The attacking enemy often mounted his armored operations in open terrain during the past war. The reason is simple: Our strong infantry excluded the covered terrain from him. The situation is quite different today. Our infantry battalions planned for covered terrain are dissolved. In any event, they were no well-contrived construction. The MICV infantry has, however, no unlimited suitability for combat in covered areas. A good part of their potential rests in the mobility of the MICV and in the antitank guided missile. However, the mobility of the MARDER is difficult to utilize in forest combat and, in addition, the vehicle is extensively roadbound. The antitank guided missile cannot be used in the forest. There remains only the 20 mm cannon. Then, there are the five armored infantrymen who dismount together with their squad leader. They carry on the defense combat.

Purely on a computational basis and in the case of a linear setup, there is one such small squad every 100 to 150 m. Since the tactical commander requires echelon in depth and a reserve, the intermediate areas are, in reality, still much larger. Behind this is nothing. At most, there is here and there a small headquarters, a field kitchen or a dressing station. For the attacking as well as the defending enemy, there is accordingly no longer any reason for avoiding terrain which is covered and favorable for infantry. In the attack he can penetrate there. In the defense, he can fall back into these spaces and seek to harass the assaulting combat forces as they pass. This would not be dangerous in individual, narrowly confined spaces between Hannover and Braunschweig, between Paderborn and Unna as well as in the periphery of Schweinfurt. Forests are rare and the builtup areas are isolated in large, open spaces which can be dominated by armored forces. In other, at least equally large sections of Germany, however, such tactics would force penetration into the covered areas. Our MICV infantry units are, however, much too weak for this. Another infantry will soon no longer be part of the bundeswehr. But would it not be difficult to utilize our LEOPARD units on a regular basis for combat in builtup areas as well as in forests?

THE SECOND PART OF THE COST: FIGHTERS BECOME POORER IN QUALITY

The drastic reduction of the number of combatting soldiers is only a first part of the cost which mechanized armies have to pay for the advantages of technology. A further and more important part of the overall cost consists in the worsening of the quality of those personnel who can be assigned to the reduced-in-size combat forces. This is most obvious in the case of armored infantrymen and can be seen even more clearly with the tank crews.

The quality loss of combat force soldiers is most easily proven on the basis of intelligence ratings. Measurable values and numbers are available here. Intelligence is certainly not the only measure for the military capability of a soldier. However, the demands of modern combat and of many modern weapons are more difficult to cope with by untalented simpletons than by intelligent soldiers who can more easily and thoroughly master the training requirements. In addition, the field forces gain their noncommissioned officers and sergeants from conscripts assigned to them. The poor quality of conscripts then has a direct effect on the quality of the noncommissioned officers.

The conscript is subjected to an intelligence test upon induction. The scores of students from special schools for the handicapped are on the average 5.43. Nongraduates of elementary schools receive 5.11, graduates of elementary schools 4.35, nongraduates of high school 3.42 and graduates of high school 3.05. These intelligence scores play an important role when the service branch is determined to which a conscript is called. Conscripts with especially poor marks may not, from the start, be called to the Federal Border Guard and to the Navy. Even the Air Force takes only a few of them. They remain reserved for the Army. The Army again, just like the other services, has established for each military activity, from loader and medical orderlies down to the voice intercept operator what intelligence scores must be attained by the conscripts planned for these employments. As expected, high requirements are almost exclusively placed on soldiers for rear services, especially for signal units and headquarters. The "dumb ones" accordingly remain in the Army and, above all, are assigned to combat forces and, in this case, the armored infantry. Anyone obtaining a score of 4.6 may become the loader of a tank gun and thereby satisfy a function which, in many types of tanks, has long since been taken over by a machine. Those who are

of the Wehrmacht approach - cf von Crefeld

still dumber and who attain a score of 5.4 (the score in the average attained by students of special schools for the handicapped) can only be sent to infantry and engineer units. As a rule, soldiers are even assigned to these branches who actually have a score of 5.8. Accordingly, the Army quite officially receives statistically the least intelligent recruits. The Army again allots the weakest of all to the armored infantry and to the engineers. A comparison may be made with the requirements which were stated for personnel of the infantry at the time of establishment of the Bundeswehr: "In two wars with heavy losses, a high toll was taken of the German infantry ... The future path of the German infantry must not again become one long ordeal ... Three requirements are above all to be placed on the 'infantry of tomorrow': The best personnel selection ... The lessons from the past war authoritatively require satisfaction of these high requirements for personnel composition." (23)

A deficiency of our Ministry of Defense is not mirrored in the procedure disclosed. The abnormal state of affairs would then be easy to set aside. On the contrary: In most recent times, the minimum requirements for the intelligence level of armored infantrymen have been raised. However, it can be foreseen that the good will demonstrated by this will remain without success. Not only because other branches of the service have thereupon immediately raised their minimum requirements but because the problem lies deeper. This is borne out by the fact that the problem is international and is to be found in other high-technology armies. Looking back over his 35 years of service, the Commander in Chief of the 8th American Army in Korea wrote: "The man on the firing line...must by his performance justify the very great cost in putting him there... I would be the last to attack the basic ability of the average American soldier, but ... the 'average' is not found in the infantry squad. Why? Because the input of recruits in the Army is screened again and again, with the best educated and most intelligent and capable shunted into the great mass of service and other technical units. And who ends up in headquarters' companies and even in special service detachments? Better than the average, you may safely bet .. So to put the matter bluntly, too large a proportion of the less-than-average end up in the front line squads. There are gallant and effective men mixed with them .. but they are hampered by the ones who can't or won't get with it. In my opinion this simply won't do ... the fighter should be a selected man." (24)

In spite of General Howze's statement that "this simply won't do," nothing however could be changed since the problem can be at best coped with to a minor extent in high-technology armies, but is in principle insoluble. This can be seen in that, 12 years later, the "Beard Report" informs the American Congress: When making the transition from the conscript to the volunteer Army, the training regulations had to be modified such that they would be suitable for a minimum reading capacity of soldiers. Reading capacity now required is eighth grade level rather than eleventh grade level. This reduction of requirements took place at a time when the Army was being given an increasingly complex equipment. The reading capability of almost one-third of the recruits is only now fifth grade level or less .. The majority of soldiers of these lower categories is utilized in the combat force units. (25)

This problem will only be understood when it is acknowledged than an unavoidable compulsion exists here. It is the result of the fact that our high-technology army requires a great many more intelligent conscripts than are

actually available among the recruits (26). Most units operating in the rear area can hardly make use of unintelligent, unreliable or troublemaking soldiers. Those with the least capabilities therefore pass through all screening until --- passing the Air Force, Navy and Federal Border Guard by --- they finally arrive in the Army and there are assigned to the combat forces. In this case, the tanks still have an advantage. The concentrated and costly technology of the battle-tank convinces many persons that specific minimum requirements are unavoidable here. The dregs are then good enough for the armored infantry. This is the situation which, as has been shown, must be officially sanctioned by our Army. Of course, there are still fine young men to be found in every recruit class of armored infantrymen. There are even also high school graduates who have been sent to be armored infantry because they had no occupational training, and for this reason, were not attractive to the rear services. However, has not "rear combat compartment," the designation for the place of the infantrymen of the MARDER MICV, long since become in the field forces a term describing hardly usable soldiers? When the reserve noncommissioned officer candidates are withdrawn for their special courses, there rarely remains more than the dregs. The negative personnel selection of our armed forces, the dumb ones in the dual meaning of the word. This does not exclude the possibility that even here good soldiers are to be found. But sharp minds, clear heads and hard-driving citizens are rare. The number of soldiers with weak character is high.

It is precisely this negative selection which nevertheless embodies the purpose of the armed forces. The entire huge command and supply apparatus of modern armed forces, from the Defense Ministry through the Territorial Army down to the company sergeant, has only one purpose: to properly train the tank, armored personnel carrier, the infantryman and the gun, to use them in deterrence and to appropriately send them to combat. The purpose of our Army is manifested in the tank, infantry-man and in the gun and not in headquarters, command and supply troops or in the Ministry even as important as they all are. The apparatus far to the rear, the shaft of the spear, to which we call our best conscripts loses meaning and reason for existence when the point of the spear remains blunt. In our armies with their high reliance on technology, the giant noncombat units use up the cream of the crop and often only skim milk remains for the point of the spear.

The problem becomes even more intense in wartime. Already within the divisions the combat and combat support forces who directly engage the enemy, hold only a fraction of the personnel (27). Beyond the divisions, the logistic troops of a single corps are almost stronger than a war strength division. They have more soldiers than the entire Bundeswehr can make available for dismounted infantry combat. In addition to the supply troops, however, the corps still have extensive units for command and control, telecommunications and engineering whose main task likewise in no way consists of combat activity. And, finally, behind the corps, there are still an uncountable number of units of the Territorial Army. Thus, after mobilization, the units of the Army specified for the Front for combat include hardly 10% and possibly even no more than 5% or 6% of the soldiers (28). And it is precisely on this small group, however, that the enemy weapon effect is concentrated.

The consequences for the combat forces are adequate to these facts.

The period of operation of a battalion commander of the armored infantry amounted to 30 days in the Second World War, that of a company commander to three weeks and that of a platoon leader to all of seven days (29).

The losses of a single infantry company amounted in the first three years of the campaign in Russia to 1500 dead and wounded. This means, in the case of a company inventory of about 100 men in the line farthest forward, a life expectancy of an average of two and one-half months for the individual infantryman (30).

On 19 September 1950, D Company of the Fifth Marine Corps Brigade attacked Hill 66 at the accesses of Seoul. In spite of the most heavy Air Force support, out of 206 soldiers only 33 got as far as the foot of the hill. 26 of them took and held the peak. Within a few hours, the company had 178 bloody losses. This included 36 soldiers as well as the company commander who were fatalities. 116 were wounded and an additional 26 were wounded but remained with the main force (31).

One month later, the American Commander-in-Chief of the Far East, General MacArthur, visited the capital city of North Korea which had just been taken. On his arrival at the airport, he surprisingly ordered the Commander of the Honor Company (F Company Cavalry Regiment 5) to have those soldiers step forward who three months previously had come to Korea with the almost 200-men-strong company. Five men, i.e., 2.5%, stepped forward and three of these were recovered wounded. The company had lost 99% of their soldiers in three months (32).

The infantry companies of the Fifth Brigade of the Marine Corps lost during the first 50 days of their operations in Korea five out of six company commanders as well as 16 out of 18 platoon commanders, accordingly 22 out of 24 officers. This corresponds to an officer loss of 92% (33).

A study of the Supreme Command of the Wehrmacht on the combat capability of the Wehrmacht in June 1943 stated on 6 June 1942: "Although the Army in the east received from 22 June 1941 to 1 May 1942 one million men as replacement from the Homeland (not counting the recovered wounded returned directly from the field hospitals to the field forces), the Army in the east probably had on 1 May 1942, 625,000 shortfalls. These essentially concerned the combat troops. The formations of Army Group South still had about 50% of their original infantry combat capability. In Army Group Center and North, this figure amounted to about 35% of their original infantry combat capability ... During the summer, it will only be possible to replace current losses. Replacement of the losses incurred during the winter will not be possible." (34)

In the past, the still quite minimal weapons effect was directed toward the entire Army of the enemy. Today, the weapons effect has risen immensely but it is directed against ever-smaller parts of the enemy armies. Correspondingly, the losses of the Front forces have been increasing. The losses themselves and the

awareness that large units of the Army are extensively withdrawn from danger cannot remain without an effect on the morale of many soldiers. Many of those who participated in war can still remember the depressing feeling incurred by every return to the front. Fully loaded, the military leave trains passed over the boundaries of Germany and, as more and more room became available while underway, they finally arrived half-empty at the railroad heads in the east. It was still far to the Front but only few of those soldiers arriving there -- and always the same ones -- continued further forward.

The fact should probably weigh even more heavily from the psychological standpoint that the combat forces with high losses lacked the time to thoroughly indoctrinate their personnel replacement and awaken in them confidence in the commanders who indeed changed too quickly. The quantitative disproportion between the combat forces and the rear services becomes thereby easily also a disproportion with respect to quality and capability. The tip of the spear, the combat forces, is not only much too small. Its material also contains too many poor constituents. With high losses, it is no longer able to cope with the immense burden of modern combat (35).

The combat forces and, above all, the infantry must accordingly be assisted. Since Frederick the Great provided the infantry with escort artillery, its help always consisted of the same means, the assignment of further heavy weapons. This was undoubtedly quite proper for a long time. Ten infantrymen have less firepower than ten comrades in arms of which four are in a tank and six are in a self-propelled howitzer. The discussion usually is finished with this statement. It appears to be irrefutable. The erosion of the infantry has here one of its spiritual roots.

In reality, this argument brushes only the surface of the problem. When 10 infantrymen step into a tank and a gun, all conditions are modified behind them. The Army becomes quite a bit more expensive so that army command will check whether they have to break up units. In addition, the supply requirements of the unit rose sharply. A workshop is needed. Spare parts, ammunition and fuel must be stored in depots, managed and brought to the Front. Finally, the entire supply chain must be led, secured and transported over bodies of water. Where do the soldiers come from whom we require for these tasks and who were certainly not at all addressed in the first computation?

The size of the Army is limited in peacetime by law whereas in wartime a great many other factors become valid. The additional personnel required for the rear services can accordingly only come from the active peacetime units as well as from the formations to be mobilized at the start of the war. From which branches of the service come those soldiers who are required for the rear services in the case of an increase in heavy weapons? The service support troops can clearly not be drained of their strength since these are to be reinforced. They also do not come from the tank or artillery formations since, owing to their increases, a reinforcement of the rear services has become necessary. Accordingly, the personnel will and must be taken from the infantry units. This can be clearly demonstrated by the fading-away of the infantry which has been continuing over many decades. The Bundeswehr in its short history has already industriously participated in this fading process by the breaking up of the third armored infantry battalions of our armored infantry brigades.

In order to continue the illustrative example already used once: The customary argumentation is wrong when it states: "Ten infantrymen have less firepower than ten other soldiers in a tank or a gun, as the case may be." The argument must be expanded and formulated as a question: "Are 20 or 25 infantrymen more appropriate than 10 soldiers in a tank or gun, respectively, and 10 or 15 other soldiers with the rear services?"

The answer clearly is a function above all of the terrain of the operating area. In North Africa and in the Ukraine, the high-technology field force would be more powerful. The tank, supported by the self-propelled howitzer, will sweep the infantry like loose chaff. The infantrymen are stronger in the Finnish forests and additionally are more cost-effective. Perhaps they are also stronger and more cost-effective in the extensive wooden areas of the Heath and generally in the forests, builtup areas and industrial parts of Central Europe. From the example, it becomes clear that any increase in heavy weapons arrives at a culmination point owing to the associated erosion of the infantry. If this point is exceeded, the intended positive effect is converted into a negative one. The increase in heavy weapons no longer helps the infantry but harms it. The few remaining infantrymen are then too weak to fight wherever they must do it alone or with little support by heavy weapons. If the culmination point is exceeded, the death sentence is pronounced for the infantryman — by those who wish to help him. The weak infantry then has its strength quickly bled away in continuous operations.

Whoever wishes to help the combat forces and above all the infantry must accordingly first check which requirements are raised by the terrain of the probable operating area. He must free himself from the simple repetition of the ancient and long-time correct principle: "Still one more heavy weapon." He must settle whether the terrain requires a strengthening of the infantry combat capability and whether it allows employment of additional heavy weapons.

THE THIRD PART OF THE COST: INCREASED DEPENDENCY ON RESUPPLY

We are asking for the price which we have to pay for the technology of our Army. The third part of the cost -- the greatly increased dependency on resupply — is not anything basically new. From the very beginning, every rather large unit has been dependent on resupply. Since the armies require more than rations and hay for the horses, even the smallest unit can no longer supply itself from the countryside. However, it appears as if the dependency on resupply has drastically increased in parallel to the reliance on technology.

The headquarters and supply installations are extended today in modern armies evermore concentrated behind the thin line of the combat forces and the artillery formations. This is where most soldiers are to be found. They all have an activity which is vital for the combat forces. Their units also have hardly a soldier available for combat security. The area is full of soldiers but stripped clear of fighters. An installation of the imposing size of a corps headquarters, whose size impresses every lay person, can hardly defend itself against small bands or tiny groups of determined paratroopers. Special security forces are provided for this problem. The area resembles a giant achilles heel clearly presented to the enemy. One company of paratroopers in the corps support area is the nightmare of every G4 officer.

The soldiers who are assigned to these areas know that the lives of the Front troops depend on their work, that accordingly their participation in combat must be avoided in the interests of the troops at the Front. In addition, they lack education as fighters and also, with the best of intentions, training and combat experience. It can hardly be doubted how these units would behave when the enemy breaks through to them or troops land on them from the air. The last war shows outstanding individual performances but allows no great hopes for the totality. There is no reason which would allow us to assume that the rear services of the Bundeswehr would fight any better than those of the Wehrmacht. (36)

The question is raised ever so more urgently as to who is to actually secure the spaces with their unreplaceable units and expensive installations. Naturally, the territorial defense will set up security units. Problem solved? No. For this will mean that the Front forces will lose even more personnel and even more fighters. The situation has come full circle. Giant headquarters and rear services are needed to support the combat forces. They are irreplaceable, in addition exceedingly large, expensive and vulnerable. For this reason, units which otherwise could be able to fight in forward areas must secure the rear services. In this way, the Front field forces are weakened by their support elements (36a).

The resupply dependency of modern high-technology units presents considerable problems in wartime. Refugee movements can at least temporarily block numerous resupply channels. All rear services and installations are exposed to attacks from the air. Enemies which have infiltrated, broken through, airlanded or fight from concealment can seek to disturb them (36b). These difficulties will be multiplied in nuclear combat.

One part of the cost which is paid by our high-technology units for the advantages of technology consists in an increased dependency on resupply which is immediately surfaced with each disturbance. The combat of a brigade can be affected to the highest degree already by the dropout of the maintenance company, a disturbance of the division computer which controls spare parts supply or the delayed arrival of a fuel convoy. The interplay of the diverse headquarters and troop units is quite like a fine-spun net in which no mesh may fail. Serious consequences are otherwise unavoidable.

The history of warfare fortunately still supplies no example as to how supply problems can be solved in nuclear warfare. Nevertheless, the Korean War shows how an army which had little reliance on technology was able to cope with a threat to its resupply which would not be basically different from that possible in a future war.

In the spring of 1951, the Red Chinese and the North Koreans carried out their defense just south of the 38th parallel with 60 divisions operating forward and 10 reserve divisions against the troops of the United Nations slowly gaining ground to the north. Only a few poorly constructed roads led from China over the Yalu to the Front. The two single asphalt highways generally followed the coast. They therefore laid within the range of guns on the American ships.

The railroad network was likewise quite wide-meshed especially in the northern part of the country. The railroads criss-crossed the valleys and rivers on countless bridges in the hilly terrain. In addition, the railroads also usually ran along the coast which was dominated by guns from American ships.

Highway traffic was only rarely protected by sparse forest areas. Even spaces where depots or rest centers for transport columns were protected from air observation were rare. The American Navy blocked access from the sea. Making matters even more difficult was the fact that the Americans had long since destroyed the minimal industrial potential of North Korea. The area along the Front could no longer produce for the field forces. The entire resupply had to be brought from the Soviet Union or China right across North Korea to the Front.

The rear area of the Chinese and North Koreans was abandoned almost without protection to the American Air Force as far as the Yalu. The weak anti-aircraft could not protect the wide and about 400 km deep area as far as the Chinese border (37). The Red Air Force was limited to occasional attempts at least to cover passages over the Yalu. It had even with that only a partial success.

Accordingly, ideal conditions were given for the attempt to interdict the resupply of the Communist field forces. The Americans made an early decision to utilize the favorable opportunity. As early as December 1950, even during the hasty retreat from the Yalu, they oriented the main effort of their Air Force operations against the transportation links of the enemy (38). A special headquarters selected after careful investigation 172 targets and ordered the Far East Tactical Air Force as well as the Naval Air Arm to destroy these targets ("Interdiction Campaign No. 4"). In countless attacks, even remotely controlled six-ton bombs were employed against the bridges. In May 1951, the Americans stepped up the interdiction program with operation "Strangle." The name indicated the intention. Within 90 days, a concentrated Air Force operation was to so completely cut off the resupply of the enemy Front forces that they would become either an easy booty or would have to retreat far to the north to their strongholds on the Yalu (39).

The American Air Force, following the conclusion of Interdiction Campaign No 4, attacked for a period of 10 additional months primarily the communications lines and the resupply traffic of the enemy. The Air Force in the Far East alone flew the fantastic number of 87,552 sorties. A great many other sorties were flown by the Naval Air Arm which operated off the coast of North Korea with a number of carrier groups (40).

Naturally, great successes were achieved. Naturally, much damage was caused. The offensive strength of the enemy dropped. The Chinesehad to employ great resources for reconstruction of roads, bridges and railroads. They employed the most unconventional solutions. Although the Americans operated night combat aircraft, the Chinese allowed their columns to drive at night with all lights on. However, the resupply routes had sentries every 500 m who warned the columns

of the approach of aircraft. The constructions were especially extensive. Thus, the Chinese set up replacement bridges for destroyed ones, allowed trains to pass over at night and then dismantled the replacement bridges before the American air reconnaissance began in the morning. Further, the Chinese constructed alongside the railroad bridge which passed over the 1100 m wide Yalu at Sinuiju eight substitute bridges placed side-by-side. Soon, there developed a competition between destruction and rebuilding of bridges. The Chinese succeeded in always keeping passable at least one bridge.

For many months, the Chinese and Americans struggled with the resupply. The Americans often thought they had won the battle. However, the Chinese slowly gained the upper hand. At the beginning of January 1952, the American Commander in Chief, General Ridgeway, reported to Washington that the operation "Strangle" "has not prevented the enemy from bringing forward that resupply which he requires for a static defense. . . . and that the enemy, despite all attacks against the resupply and the transportation routes, had been able to assemble supplies which he needed for a great offensive." (41) A short time later, "Strangle" was broken off and replaced by another program. The new project had just as bombastic a name ("Saturate") as well as similar although not quite so far-ranging goals. Its result was likewise unsatisfactory. The reasons for the lack of success on the part of the Americans are, in retrospect, not difficult to recognize. The Chinese divisions needed in defense only about 40 tons of resupply per day. This is far less than is needed today by a single German tank battalion. They could supply an entire division with 20 of their two-ton trucks. The few intact supply routes and the short nights were sufficient for this minimal resupply traffic. In case of an emergency, the Chinese could even resort to columns of bearers. They avoided in this way a danger which, in consideration of the unfavorable Korean terrain, the superiority of the American Air Force and their giant supply requirements, might have vitally threatened a modern army.

Part of the price which modern armies have to pay for the advantages of technology thus is a total dependency on a giant and complicated as well as an exceedingly vulnerable resupply system. This is a statement which does not yet imply judgment. It allows, however, to concede a chance to supply divisions whose resupply can be ensured even under unfavorable conditions. Still greatly impressed by the nuclear strategy of the times, F. O. Miksche stated 25 years ago: "Instead of promoting the advanced development of the tank weapon, a nuclear war could easily lead to the opposite and again concede an increased significance to the infantry. . . . It could happen that the development again will force us to simplification -- to the use of easily preparable, cheap and rugged material and to simpler but more reliable tactical forms. In deep trenches, watching sharpshooters or automatic weapon gunners and easily concealed weapons such as bazookas and grenade launchers could possible turn out as more usable than the modern and expensive equipment whose effectiveness in every case depends far too much on the smooth functioning of a complicated auxiliary service. It appears as if the performance which results from the 'mechanization' of armies has already exceeded its high point. Equipping them still further with engines could hardly promote their mobility but, owing to the still greater requirement for resupply and auxiliary personnel, rather slow it down. The picture is a reminder of those gigantic prehistoric monsters who had become so large that they could hardly move whereby they became easy prey to their smaller but much more mobile enemies. Because they had become so large, they were obliged to eat from early in the morning until late at night

in order to maintain themselves ... So complicated and unwieldy toys as the divisions of the Atlantic powers hardly correspond to the requirements of nuclear warfare and, moreover, they exceed the financial capabilities of European countries." (42)

THE FOURTH PART OF THE COST: SPECIALIZED MOBILITY

The American infantry divisions of the Korean War were extensively — even though not yet as much as the modern German divisions -- optimized for mechanized or motorized mobility and long-range firepower. However, the terrain of Korea placed narrow limits on their mobility.

Korea is mountainous. Hills and gorges confine even tracked vehicles frequently to the roads or the valley plains. The American divisions had used about two-fifths of their personnel as well as a large percentage of their material for increasing mobility. The division which was produced in this way, however, proved to be immobile in the Korean terrain. This indicated that mobility is not an absolute value but is a function of the terrain.

It was easy for the enemy to exploit the clear weakness of the American divisions. In this way, almost every battle revealed the same scenario. Equipped only with automatic weapons and a few light mortars, the enemy bypassed the widely scattered American combat troops or infiltrated at night between them. Headquarters or artillery units were often the first attacked and roused quite ungently from their sleep with hand grenades and bayonets. To the rear of the headquarters and heavy weapons, the Chinese had already emplaced a few machine guns on the fallback routes of the Americans. They shoot up anything traveling to the rear. Soon, wrecks and abandoned vehicles block the road. Vehicles which are still located forward with the field force do not reinforce them by granting them mobility but become, in this situation, a heavy ballast. Soon clogging the area before the roadblock are the vehicles of the artillery, the supply services, headquarters, engineers, communicators and the infantry. Laboriously, a few tanks make their way to the roadblock and shove vehicle upon vehicle from the road.

At daybreak, the Air Force is called on for help. However, the sharp-shooters and machine guns, wide scattered over the hills, are still more difficult to recognize from the air than from the ground. In addition, they offer just as do the mortars only a small and difficult-to-hit target. Thus, as a last resort, the infantry is brought back from the forward areas. However, by the time it arrives, the enemy has been further reinforced and the infantry of the modern divisions is weak anyhow. The hastily organized attack can perhaps open the retreat route for a short time but never be able to keep it open. Units of the surrounded force perhaps can break through. The mass is broken up and seeks to escape over the moutains. The materiel falls into the hands of the enemy.

Their simple but extremely successful tactics were used again and again by the North Koreans and Chinese against companies, battalions, regiments and even divisions (43). It is presumably no accident that the first battle which the Americans fought successfully after a great many discouraging defeats was won by a nonmotorized battalion. The battalion, reinforced by a few tanks, had voluntarily done without its own vehicles. Thus, they had voluntarily done away with all that dearly bought motorized mobility. Thereby, they had acquired that mobility which was required by the terrain (44).

The conditions were similar when attacking. Their giant vehicle park and their total dependency on resupply forced the Americans to early liberate the roads which usually passed through valleys. The infantry was, however, too weak and too accustomed to the support of heavy weapons and often was also physically unable to bypass a broad roadblock or valley obstacle (45). It became clear that vehicles for an infantry formation are no "select equipmentation" which can be used or whose use can be waived. The combat of the American infantry in Korea again showed that vehicles deeply influence the physical condition and tactics of the infantry -- a trend which was reinforced by the necessity to liberate as soon as possible roads for heavy weapons and resupply.

Thus, reputedly highly mobile divisions labored forward in the valleys and had to break up one rear guard position after another in frontal attack. Quite different was the case of the South Korean divisions. They marched on foot and often even barefoot. They were mobile and, from an infantry standpoint, even strong enough to waive the frontal attack and outflank the enemy across the hills. If success is compared, there results an interesting and, of course, hardly surprising pattern. After breaking out from the bridgehead of Pusan, the Americans and Koreans pursued the enemy over a distance of almost 800 km to the Yalu. In this operation, the primitively equipped South Korean divisions always were located forward. Echeloned far behind following the "highly mobile" American formations. For example, all South Korean divisions had long crossed the 38th parallel when all American divisions were still locked up in the valleys to the south of the parallel (Figure 2).

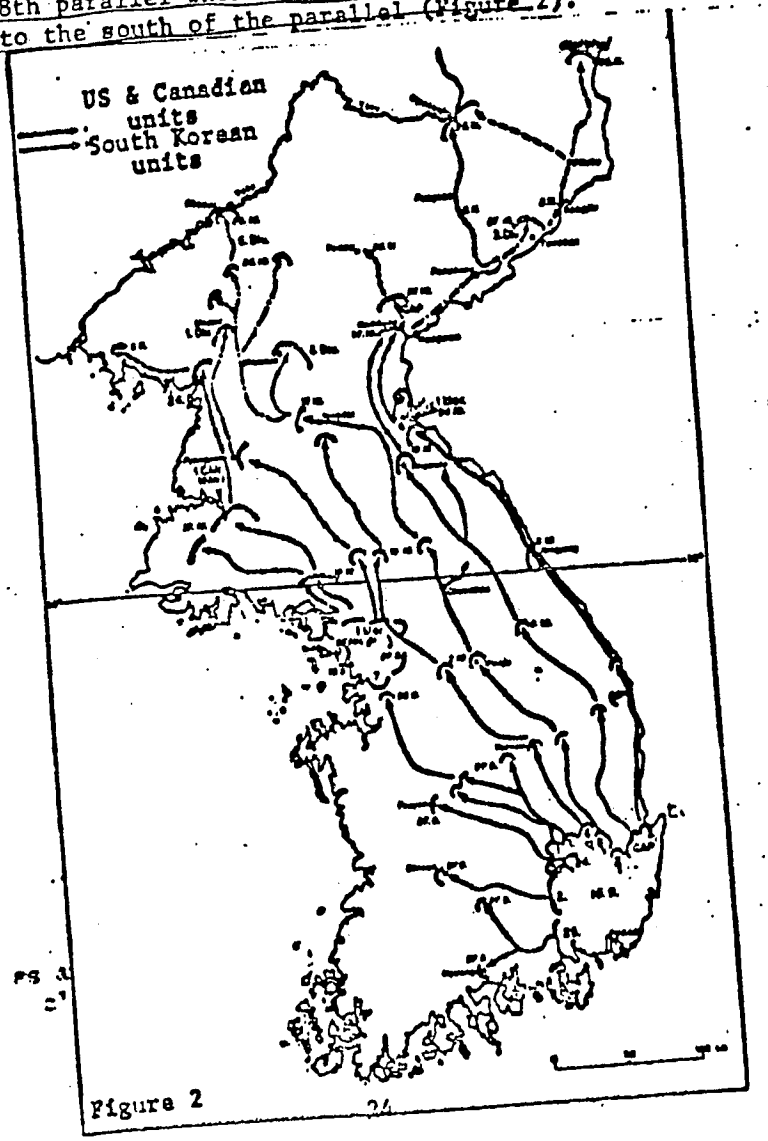

Figure 2