The American high command underestimated — typical of their high-technology way of thinking — the mobility of non-high technology divisions so much that grotesque command errors became unavoidable. In this way, the Americans relieved the 10th (US) Corps from the bridgehead of Inchon/Seoul on 30 September 1950 in the middle of the pursuit to the Yalu and embarked it on ships. The corps was carried around all of Korea. It was to be landed on the coast near Wonsan deep in the rear of the enemy, so early that it would block rapidly retreating enemy formations. However, as the landing forces appeared on 19 October before Wonsan, the soldiers of a South Korean division waved happily at them. They had already taken the city eight days before, pursuing the retreating enemy on foot.

The error was soon followed by farce. As the landing force approached the already occupied harbor, a number of boats in the van ran on mines. Now, the harbor had to first be cleared of mines. Thus, the powerful armada had to wait on the high seas while in Wonsan singers of hit songs in front line theaters made fun of the amphibious force. On 26 October, finally began quite peacefully the landing which was to have attacked the enemy in his rear. Wonsan had already been for two weeks in friendly hands (46).

After describing the first battles against the Chinese, the American official work passed judgment on the Chinese tactics: "Highly skilled enemy light infantry troops had carried out the Chinese attacks, generally unaided by any weapons larger than mortars. Their attacks had demonstrated that the Chinese were ... particularly adept at night fighting ... They planned their attacks to get in the rear of the UN forces, cut them off from their escape and supply roads and then send in frontal and flanking attacks to precipitate the battle. They also employed ... a V-formation into which they allowed enemy forces to move; the sides of the V then closed around the enemy while another force moved below the mouth of the V to engage any forces attempting to relieve the trapped unit." (47)

A few weeks after the first battles against the Americans, the 66th (Red Chinese) Army issued a pamphlet entitled, "Primary Conclusions of Battle Experiences at Unsan." The battles which the American official history spoke of were not investigated from the Chinese viewpoint with justified pride and, above all, with a noteworthy lack of self-complacency: "The infantry-men are weak ... When transportation comes to a standstill, the infantry loses the will to fight ... As a main objective, one of our units must fight its way rapidly around the enemy and cut off their rear ... Route of attack must avoid highways and flat terrain in order to keep tanks and artillery from hindering the attack operations ... Night warfare in mountainous terrain must have a definite plan ... Small leading patrol groups attack and then sound the bugle. A large number will at that time follow in column." The pamphlet summed up their lessons learned: "We deployed our main force to encircule and annihilate the enemy at Hichon, Onjong, and Chosan ... We engaged the enemy (first in the form of interdiction, then in that of attack) without sufficient preparation; yet the result was satisfactory." (48)

(U.S.)

The lessons which we can draw from the difficulties of the Americans in Korea -- and, of course, not only there -- are easy to recognize. In the open terrain of North Africa or the Ukraine, the lightly armed infantry of the North Koreans and Chinese would have become an easy prey for the high-technology American divisions. In the hilly terrain of Korean, on the other hand, they quite often made easy work of the Americans. Neither one of the two division types is, considered in the abstract, better or worse. Both divisions were highly mobile. Still, the mobility of each division was oriented to a specified type of terrain. In Korea, the Americans were dead set on a type of mobility which was not adapated to Korean terrain and was not worth its cost.

None of these are new insights. The very first use of tanks -- 1916 in the swampy shell-pocked terrain of the Somme -- was a failure owing to unfavorable terrain. It was revealed again in the Finnish Winter War that highly sophisticated, presumably highly mobile, divisions are considerably less mobile in certain areas than light infantry. It was found in the Second World War in Italy that "the mobility of a division was in inverse ratio to the number of vehicles it took into battle." (49) Shortly after the end of the Korean War, the same realization again surfaced in the evaluation of the American divisions: "A noticeable failing was their reluctance to leave the roads and take to the hills, even when the enemy was known to be at hand. In consequence, they were often ambushed, outflanked and denied the observation and command of the battlefield which occupation of high ground provides. Their inclination to cling to the roads was accentuated by the comparatively lavish scale of transport." (50) In addition, our command regulations refer to the obvious fact that mechanized units are tied in certain areas to highways and roads and are accordingly immobile (51).

The claim that mobility is no absolute value but is terrain-dependent is therefore no innovation. It is all the more astonishing that not only in discussion carried on in markets and alleys but also in discussions of specialists, mechanized divisions are still characterized, come what may, as highly mobile, and nonmechnized divisions are denied any mobility. This permeates not the least the discussion of the new structure of our army and is expressed in the breakdown of our last infantry units.

THE FIFTH PART OF THE COST: SPECIALIZED FIREPOWER

When we define firepower, we generally inquire as to caliber, rate of fire, maximum range and, in a number of weapons, the velocity and the flatness of the trajectory -- and thereby we have already unconsciously initiated the preference for certain weapons. The significant of terrain as an overriding factor is, just as in the case of mobility, immediately clear when extreme terrains are considered. Certainly, when mechanized units are committed perhaps even at night, in builtup areas or forests, there is an error if the commander of the high command has not provided troops better suited for this type of terrain. This comment does not, however, change the fact which is to be illustrated here: That firepower just like mobility is a terrain-dependent value. An armored brigade deploys at daylight and in open terrain a firepower much different from the firepower deployed at night in

wooded highlands. Long range, flat trajectory weapons cannot utilize their range in cities, forests, industrial landscapes and, often enough, even in the highlands. Many weapons, such as certain antitank guided missiles, cannot be used at all. In the case of high-angle weapons, the capabilities for target reconnaissance and thereby weapons employment are likewise greatly limited.

We accordingly observe in the case of firewpoer a similar converse development as in the case of mobility. In covered and broken terrain, mechanized forces can only utilize a fraction of their firepower and mobility potential. The still-usable fraction can be insufficient even to achieve superiority over foot soldiers. The more open the terrain becomes, the more the foot soldier falls back and the better can mechanized forces utilize their potential until, in completely open terrain, the foot soldier is hopelessly inferior.

The conventional statement that mechanized forces are highly mobile and dispose of high firepower may accordingly be countered with the calm question as to what sort of terrain is concerned. As a general observation, as commonly used, the statement is false.

Closely related to the belief in the absolute firepower of mechanized units is the incapacity to analyze without illusions the terrain which lies before us every day. A sentence typical for this attitude is to be found in a very important document of Army to the effect that "80% of our combat ranges lie on the area up to 2000m". The sentence is supposed to characterize the combat ranges typical for the Federal Republic. It is characteristically in need of supplementary data. The makeup of the range up to 2000 m has great significance for tactics and technology. Only this makeup can show us how much of our range potential can be utilized by our modern weapons.

Just 30% of the Federal Republic is covered by forest and a good 10% is occupied by builtup areas and industrial zones. A reason why the enemy should avoid these areas, even when they are more or less undefended, is difficult to see. In addition, our regulations correctly indicated that the obstacle value of forests is frequently overestimated. Thus they require that forests on the flanks of the enemy's main thrust must not be abandoned to the enemy (52). This is naturally true for builtup areas to the same extent, particularly since here the major transportation routes come together. We will accordingly be obliged, contrary to customary practice, to involve covered areas in a discussion concerning the ranges to be expected.

The combat ranges are short in forests and builtup areas -- accordingly 40% of the terrain. These spaces further constrict the combat ranges for those weapons located in open terrain but having a covered area before them. This allows the estimate that very short firing ranges are to be anticipated in about 50% of the German terrain. Night, fog and fires on the battlefield will additionally shorten the remaining larger combat ranges. The statement that 80% of our combat ranges are of the range up to 2000 m comes from an authoritative source but is in its terse brevity greatly in need of supplement.

An investigation of the Military Geographical Office of the Bundeswehr arrives at even more pessimistic findings. According to them, the following "line of sight distances" are to be anticipated (in extract form, rounded values):

Above 2500 m	6% of all line of sight distances
Above 2000 m	10% of all line of sight distances
Above 1500 m	17% of all line of sight distances
Above 500 m	45% of all line of sight distances
Under 500 m	55% of all line of sight distances

Evaluating these figures, it is to be noted that the Military Geographical Office had already excluded many areas of extremely short line of sight distances (Schwarzwalk, Harz, Ruhr Region) from the investigation. Above all, however, the Military Geographical Office computed only vision impediments owing to ground cover (builtup areas, industrial installations and forests). Obstruction to vision owing to ground forms (mountains, hills, etc) remained out of the question although the ground forms undoubtedly will generally shorten the possibile line of sight distances. The actual lines of sight are accordingly even considerably shorter than the values provided in the table. War-conditioned factors as well as night and weather will reduce them still more. Unless the enemy for no reason and to his detriment leaves all builtup areas and forests unattacked, the combat ranges in wartime will be much lower than we could dream. In no case is the impression valid that must be gained from the terse statement that "80% of all combat ranges are located in the area up to 2000."

This leads directly on to the question as to the cost effectiveness of our flat trajectory weapons. The German regulations from the period before the Second World War foresaw ranges up to 500 m for tank combat. The tank gun performed no better than this. Even in a heavily covered terrain which possibly allowed average combat ranges of 250 m, still 50% of the range potential was accordingly used. Spaces with such combat ranges were found almost everywhere outside of compact wooded areas however.

The situation is otherwise today. Naturally, we may build our guns not only for the average combat ranges. Naturally, we must require that a number of our weapons can also be used in areas with very long line of sight distances. However, the performance limit of modern tank guns is today already more than 1500 m. In the following tank generation, the performance limit will be once again considerably increased. In addition, our MICV are equipped with an anti-tank guided missile which has a minimum firing range of 2000 m. The guided missiles of the tank destroyer can reach much further. If these weapons are used in a terrain which only allows average combat ranges of 250 m, a very great part of the dearly purchased potential clearly is going to waste. A number of weapons with minimum ranges cannot even be used at all. The weapons which can still

be used are actually too good for combat under these conditions. If the relationship between available potential, accordingly possible ranges, and utilizable potential, accordingly line of sight distances becomes too unfavorable, questions are to be raised to the leadership. Either it has made an error when it employed a technically saturated unit in these areas or it acted erroneously when it established no units which are better adapted to this terrain (53).

THE SIXTH PART OF THE COST: DIFFICULTY WITH MAINTENANCE AND REPLACEMENT OF MAJOR ITEMS OF EQUIPMENT

There are still two further factors which will again cramp the mobility of our technically saturated divisions more than we would want. The maintenance situation of the Army is not comforting even in peacetime. This is true even though time is available for careful training of crews as well as for care and maintenance of vehicles, although all maintenance units can work undisturbed, although the spare parts supply in fact should function smoothly, although the kilometer performance of the vehicle per year is limited, the vehicles accordingly only rarely driven, although no vehicle is damaged by enemy effect and although a great many civil workshops are working for the Bundeswehr.

In wartime, all of these important mitigating factors will not be present. The mechanized formations will then encounter cold reality. With a very much lower maintenance performance, the maintenance requirement will most certainly be a great deal higher. Already during the war in France in 1940, "notes made by the battalion engineer surfaced the fact that the number of the major maintenance operations carried out in the five to six week period (removal of shot damage and engine repairs, overhauls of tracks and suspensions, etc) was two and one-half to three times as great as the total number of tanks in operation. This means that, in this time, each tank had to pass through the workshop two and one-half to three times." (54) On 1 May 1943, 31% of all tanks in operation on the German East Front were in maintenance in the vicinity of the Front (55).

The requirement for spare parts will increase with the steep rise in the requirement for maintenance. Our spare parts supply is hardly satisfactory in peacetime. This problem will be intensified in wartime owing to a further phenomenon typical for technically saturated armies. Our units find it extremely difficult to take into battle those spare parts allocated to them for the event of war. It would be a dangerous illusion to assume that our highly mobile formations could be redeployed without great effort over wide distances. Naturally, it is possible for us to go great distances with our outstanding wheeled and tracked vehicles. However, when we arrive at the new deployment area, we find that our spare part units have only arrived with a part of their treasures. Much and possibly even most of these spare parts are still at the old location -- hopefully. Accordingly, we must unload our spare parts trucks and send them back. Hopefully, they arrive and hopefully they also return. And hopefully, the second trip is sufficient. It appears as if high reliance on technology and mobility begin at this point to operate against themselves. Supplies of spare parts are required which presume an unfeasibly high effort for their transport, without which, however, maintenance is not possible. It again appears that reliance on technology achieves a dimension at least in subareas which can no longer be managed. Unless we invest still greater resources in the

rear services — resources which must again be taken from the combat forces.

One last factor intensifies the problem. "From the time standpoint, a tank division when engaging daily in combat can be committed for about three to four weeks. In both cases, counting in the customary replacement, only one-fourth to one-fifth of the initial strength is engaged with the enemy. The remainder is to be found in workshops or destroyed on the terrain ... It was a rule of thumb of the last war that for every 100 tanks per operational day, three tanks had to be made available as a resupply quota." (56) The major items of equipment accordingly had to be renewed once within the space of one month. This would mean for the Bundeswehr that, in the first month after outbreak of hostilities, far more than 3000 new tanks would be needed. Where would they come from? Who would pay for them? Who would quickly train the troops for them? The idea to replace broken-down major items of equipment on such a scale is completely illusionary.

In the past war, infantry divisions relieved at least for certain periods mechanized troops. The armored force accordingly had the opportunity of renewing its strength and maintaining its equipment (57). This capability is missing today. We have only mechanized formations today. The battles should and must be carried out by mechanized troops in a manner even more mobile than in the past war. Attrition will accordingly be higher. From this can be seen how great will be the need of spare parts and new major items of equipment.

The question whether a considerable war reserve of major items of equipment is reasonable is primarily determined by the assumed duration of the war and therewith also by the solution of strategic problems up to a conceivable "strategy after decoupling." In view of these extensive correlations, no discussion will be carried on here as to where a war reserve would be reasonable consisting of a modest supply of tanks and MICV. On the other hand, it cannot be disputed that a sufficient supply of spare and exchange parts, a sufficient transport capacity for these parts as well as ultimately a maintenance capacity adapted to our vehicle inventory is absolutely necessary. Whoever is acquainted with our Army will find it difficult to believe that we have solved these tasks even for the very much more modest peacetime conditions. They are, in part, unsolved for wartime. A solution would require additional resources whose availability would hardly exceed the capability of our people but would certainly exceed its willingness to pay. Accordingly, it can be assumed that our mechanized units will start consuming their substance on the day of initial deployment. Because any total breakdown is irreplaceable -- personnel that have not become casualties will then be "utilized" presumably on foot in special infantry companies just as in the last war. Further, substance will be quickly consumed because maintenance and spare parts supply are not ensured. The question is unavoidably raised as to the status of our units after a short period of warfare. It would be fatal to shut our eyes from the consequences resulting. The present degree of technology of our Army exceeds the will to pay of our people. The technology of our Army will, for this reason, deterioriate starting in the first hours of a war. The consuming of substance, the degradation of all mechanized units, begins with the initial deployment. Perhaps, it would for this reason

be wiser even though it would naturally not be modern to mechanize only those major units to the present extent for which this is mandatory, i.e., those units which are earmarked for combat in predominantly open spaces. Conditions should then be produced here which allow technology to be maintained beyond the first hours and, at best, the first days of a war.

THE SEVENTH PART OF THE COST: ARMIES BECOMING EVER SMALLER

People are ordinarily quite happy with their Army in the Federal Republic. Training, armament, equipment, discipline and leadership are reputed as good. We do not need to shun comparisons of allied nations. Content, even pride, are accordingly not unjustified.

Still, a few thoughtful comments are justified. They involve the question whether we are doing enough for defense, i.e., at least in comparison to our allies. The question is also justified since our country would become the first battlefield given the failure of deterrence. This would be somewhat like the countries of Europe fighting all on German soil in the 30 Years War. Deterrence and defense accordingly are in the vital interest of our country and its inhabitants.

There are a number of scales for evaluating the defense efforts of a country. One of the most appropriate ones is certainly an evaluation on the basis of the percentage of gross national product expended for defense. Here, however, the Federal Republic, hardly considered poor, falls modestly in the middle of the NATO countries on a quite unassuming position.

One other scale quite clearly is accommodating to the Federal Republic. It is oriented to the percentage of the population which a country keeps on active peacetime duty or plans to mobilize in times of tension. The Bundeswehr hardly maintains extremely capital-intensive military resources whereby giant sums are needed to employ a few soldiers, e.g., no strategic nuclear weapons, no long-range bombers and not even a large fleet. The scale "percentage of the population under arms" accordingly gives preference to the Federal Republic with respect to her allies, particularly with respect to the Americans, English, and French. This is also true with respect to countries like Greece or Norway which have to maintain a large fleet owing to their geographical situation. In addition, since we who live directly on the Iron Curtain are concerned above all for our own skins, we will certainly not let ourselves be shamed by any of our allies.

The reality is otherwise. The Federal Republic maintains in peacetime 0.80% of her population under arms. This is the same percentage as in Sweden or in the Netherlands. Belgium has about 0.88%, France a good 0.96% and the USA as well as Norway have 1.0% still further above us (58). In the high percentage of the USA, their worldwide engagement is

assuredly also mirrored. Still, a considerable part of the American armed forces defends the USA on our soil and directly helps us in the bargain. Hopefully, the Americans will continue to have an appreciation for the fact that we do less for the defense of Germany than they do.

It would in no way be better following mobilization. For then the Federal Republic sinks even to one of the lowest places. We will then have 1.87% of the population under arms -- and this already includes "troop units" -- which only hold the personnel replacements. We lie with this percentage behind Holland and Austria (1.96%). This is certainly no encouraging aspect. Belgium, Denmark and Norway will mobilize between 2.33% and 6% of their population. Neutral countries, who in two world wars were able to deter any neighbors from attack, apparently know best what role is played by strong armed forces in deterrence. Sweden will mobilize 8.65% and Switzerland will even mobilize 9.32% of their population. If the Federal Republic in time of tension wished to carry out deterrence with armed forces of the same relative size as Switzerland, she would have to make available far more than five million soldiers. In reality, the sum is not much more than one million. Why do we not use our potential better? Even when it is a matter of our own skin?

This can be stated differently. We have a good army. It is, however, small even when compared to allied partners. Following mobilization, it will be even relatively smaller than the armies of our neighbors. This is scant credit to us. It is hardly a pleasant fact and granted little space in our publications. But how large should the Army be? Perhaps we already have enough troops?

NATO has sought for a long time to establish 30 divisions including 12 German ones for the defense of Central Europe. This intention may have had as a basis, the widespread conviction that a defense can still be carried out successfully with a force ratio of 1:3 (59). The Second World War appeared to substantiate this argument. A three-to-fourfold superior attacker was defeated both in the East as well as in the West in many defense battles. However, this superiority was only present in narrowly circumscribed areas and not on the total Eastern or Western Front. There is one example: In late fall of 1943, there was a much more favorable balance of forces on the Eastern Front. The Russians were operating 378 divisions, the Germans 200, the Romanians 10 and the Hungarians 6 major formations. Even when only the German major formations were counted, there still did not result force-ratio of 1:2. In addition, the German divisions had considerably more personnel assigned. Accordingly, there were 5.5 million Russian soldiers opposing 4.2 million soldiers of the Axis powers. This results in a ratio of 1.0:1.3 (60). Even if we assume a considerable error in these figures, we will never reach anything like a force ratio of 1:3. The erroneous belief that a balance of forces of 1:3 is sufficient also in large spaces made it appear certain that there would be a success in German defense in the fall of 1943. However, as Colonel-General Jodl reported the above mentioned figures, the German East Front had long begun to collapse. In spite of the bravery of the soldiers and in spite of the arts of leadership, only at Berlin was it possible to finally stabilize the Front. In the southern part of the Eastern Front, the Russians cut off Crimea, crossed

south of Cherkassij on a 400 km breadth of the Dnieper and established the prerequisites for a great battle of encirclement. Farther in the north, the Russians took Kiev, negotiated a 200 km breadth of the Dnieper to the north of the city and fought a 100 km wide gap between Army Groups, South and Center. This gap was soon used for encircling an entire German tank army. Army Group Center was thrown back to the Sosh and it was able only with difficulty to prevent both of its wings from being outflanked. Only Army Group North continued to hold. However, the Russians were able to destroy its left flank in a few weeks and throw back the remnants to Narwa. In other words, in spite of a balance of forces better than 1:2, the defender loses one key position after the other.

The great German offensives also contradict the popular thesis that it is possible to be inferior by threefold and still hope for succes in defense. The German Wehrmacht indeed fought in the campaign in France with a superior air force (probably about 3000 against 2000 aircraft) and better armored tactics. Still, the number of divisions was almost the same. In addition, the allies were able to support their defense by large fortifications which helped them to economize forces. Allied tanks were clearly superior in numbers and quantity. About 3000 tanks equipped with guns fought against 1200 German ones, which number was augmented by 1500 additional German tanks equipped only with machine guns or 2 cm guns and therefore being unserviceable for armored combat (61). The Russians had a towering superiority at the start of the Eastern campaign (62), and Rommel finally fought all of his successes against an enmy which was considerably superior not only in numbers but also in the quality of material (63).

Thus, the history of warfare supplies numerous examples of how even great operational successes can be achieved with equality of forces or with inferiority of the attacker. Of course, it is true that leadership deficiencies often played a considerable role. However, it is still uncertain whether the units of NATO, a coalition which is not always united, or the essentially more strictly organized forces of the Warsaw Pact are led more successfully. Proportioning the military forces of an alliance according to the assumption that the enemy is being led less skillfully would additionally contradict all reasonable doctrines.

Clearly even the reference to nuclear weapons cannot justify the existing balance of forces -- about 1:3 or worse. The enemy likewise has nuclear weapons. Additionally, he can use them more ruthlessly than we in combat conducted on NATO territory. Above all, it is uncertain whether nuclear weapons favor the attacker or the defender (64).

The concept that it is possible to conduct a defense even with an inferiority of 1:3 and still expect success is true at best in narrowly circumscribed conditions which prevent the enemy from operating, i.e., for the combat of a battalion or a brigade and perhaps even a division (65). The attacker has a strategic initiative which must be conceded him

by NATO for a number of reasons. In addition, he is protected by the weakness of NATO from any preventive attack. The attacker with his general superiority of 1:3 can accordingly be satisfied in large areas with an equality of forces or even accept inferiority (66). At points where he seeks a decision, he can build up any desired superiority until the terrain is saturated. He can support a massive attack from depth by rapid changes of echelon. He will then break through sooner or later and collapse whole sections of Front -- as occurred repeatedly in 1943-45. A conventional defense cannot be carried out with any prospects for success with that balance of forces which prevails in Central Europe in peacetime, nor after mobilization and after complete deployment of both sides. A success would be a unique event in the history of warfare. Any military defensive success on the part of NATO will be limited in time and indeed quite so.

But even if we concede that defense may be successfully conducted with an overall balance of forces of 1:3, the question still remains how a positive decision can be produced following defeat of the aggression. Even a repelled attack still allows the aggressor the initiative and complete freedom of action. The prospect of compelling the aggressor to break off his aggression and to desist from his goals exists ever so little as before.

Moreover, even the modest goal of achieving a general balance of forces of 1:3 is not granted in NATO. There is no one to be seen far and wide who could make available additional forces to us. In this way, an unreal situation is produced. To hold defensively for the time politicians may require for last-minute negotiations and consultations will be no easy task for the conventional forces of NATO. Following a successful defense from an aggression, we will not be able to deny the enemy his success. The idea would be completely wrong that, after a successful defense, we could force the enemy to conform to the will of our own political leadership and force him to peace under conditions which are acceptable to both sides. Meanwhile, we fail to establish field forces in the required strength. We theoretically have indeed the most powerful military coalition in history. It contents itself, however, with forces inadequate by any scale. There are in Central Europe fewer divisions than were fielded by a third class country like Poland in the Second World War. Even Germany, which has the greatest interest in functioning deterrence and, if necessary, defense, is satisfied with forces whose relative size within the alliance is inconspicous.

It can hardly be acceptable to persist in such a paradoxical situation as if there were no satisfactory solution. The labor market would permit in almost all countries of NATO the establishment of additional divisions. Many a politician would probably be happy to see joblessness reduced. Many countries of our alliance have a large potential of trained reserves who could be called up in time of crisis. However, even the Federal Republic rejects beforehand the attempt to establish reserve divisions which, other than the Home Defense Commands, are clearly intended for operations forward on the Iron Curtain and which can be firmly counted on by the NATO commander.

What prevents the NATO partners from raising sufficient field forces? What prevents us from at least offering the allies troops on a scale which is appropriate for our strategic as well as our geographic situation? There are mainlytwo reasons:

For one, the immense cost of mechanized divisions,

For another, the conviction that only technically saturated divisions can reasonably be used on the modern battlefield.

A solution can again only be sought with more simple divisions. Numerous and important objections can be raised against this solution. However, they all cannot hide the fact that the present path has led us down a blind alley. If we cannot establish sufficient mechanized divisions, then we must certainly seek new paths. We must do something more than just sit with folded hands and continue along current lines — surfacing the regret that the politicians do not give us any more money. The prerequisite for a new path is only that the simpler divisions do not become cannon fodder but that their operation on the modern battlefield can be justified.

It has often occurred in history, most rently in the Finnish Winter War and in Korea, and probably also in Vietnam, that lightly armed, highly mobile forces have beaten heavily armed opponents in difficult terrain. Perhaps, the reliance on technology today again has achieved an exteme whereby, in covered and broken terrain, the disadvantages of high technology are beginning to outweight the advantages. Perhaps for divisions which have to fight in Central Europe in buiitup and forested terrain the future lies not in a further perfectioning of military technology. Perhaps simpler, more appropriate forms will have to be developed. This is because the broken and covered terrain of the Federal Republic requires also nonmechanizedforms of mobility and nonmechanized forms of firepower. These would be based on a high number of fighters, many weapons, numerous divisions, extensive independence from resupply, although without expensive advanced technology and mechanization.

THE EIGHTH PART OF THE COST: SCYLLA OR CHARYBDIS AS THE FUTURE OF THE ARMY

Let us recall that, when Ulysses returned from Troy to Attica, he had to pass through a strait. On one side dwelled the Scylla who swallowed up everyone who passed by. Opposite her waited Charybdis, a rocky abyss which three times daily suced in the ocean with all ships and living beings, destroyed them and spat them out again. No sailor could pass between them.

Modern armed forces are in the situation of Ulysses. The cost of their weapons rises from generation to generation by at least double and often more. In this way, the American M48 tank cost 0.6 million DM in 1958. The grandson, LEOPARD 2, cost 3.8 million DM 21 years later.

Let it be granted that the new weapons perform more, one of the reasons for the price increases. However, this unfortunately allows us no way to express satisfaction with proportionally less numbers of weapons. For one thing, owing to its system of society, the Warsaw Pact has the capability of not only introducing new weapons one for one but even to increase their numbers still more. In addition, every defense must be able to cover the assigned area with firepower. This sets a minimum for weapons available in terrain broken up into small compartments as well as for times of poor visibility.

This development causes the most difficult problems for all defense budgets. If one does not pay close attention, it is possible to be maneuvered into a situation in which one can only choose whether he wants to end up on Scylla or on Charybdis. In every case, disaster is inevitable. One can choose Scylla, i.e., only the most modern weapons will be procured. Money soon is no longer then sufficient for armed forces of previous scopes. Battalions, perhaps even larger units, have to be broken up. A typical example is provided by the Bundeswehr which, years ago, quietly scratched the fourth combat battalion of their armored infantry brigades. Whoever wishes to avoid this Scylla can choose to be wrecked on Charybdis. He can retain the Army's size and, for this, do without the most modern weaponry. Soon, units of the Army will only have second or third rate armament. Naturally, our Army also has gone part of this way. A typical example is the gun-equipped tank destroyer with which one of the richest industrial countries of the world still, and for many years to come, equips many companies. This requires courage. As much courage as would be required to go hunting tanks with a tank destroyer whose gun can hardly penetrate a tank.

Let us concede that, for a limited time, it is possible to postpone the choice between Scylla and Charybdis. One need "only" to do without appropriate wartime stocks of ammunition and spare parts or, more euphemistically expressed, "to stretch" the procurement. Without a wartime supply of spare parts and ammunition, tanks, armored personnel carriers and SP guns are naturally much cheaper. This allows us, for a period of time, to boast of having large numbers. But, there is little substance behind this facade. Whoever wishes to solve the financial problems of modern armed forces and who wishes to avoid the choice between Scylla or Charybdis will have to use more ingenuity than tricks of this type. Although, these are tricks to which many NATO countries have resorted and, as rumours have it, still continue to resort to a great extent. Hopefully, not our Army, too (67).

General economy also offers no way out. Mechanized units must fire, travel and communicate. Otherwise, they cannot be trained. And without training, the units are worthless. In addition, no savings are allowed in technology. At least not at those places where advanced technology can be fully utilized. In combat against an expensive first-class weapons system, there is nothing so expensive as a second-class cheap one because it only has third or fourth class chances of success.

Advanced technology is then indispensable when it can be employed in the combat of high technology armies. Whoever wishes not to be wrecked either on Scylla or on Charybdis must accordingly avoid economies in advanced technology wherever it can be used.

The only conceivable way out is oriented to the fact that mobility and firepower are functions of the terrain so that the cost effectiveness of a weapons system is greatly determined by the terrain structure. The more weapons systems or field forces are technically optimized, the more the areas are narrowed in which they can be used cost-effectively. "Ecological niches" thus become available for simpler, less costly troops underneath the highly sophisticated weapons and troops. These niches in no way need to be small. Their size can be assessed by the fact that about 40% of the Federal Republic is covered by builtup areas and forests and accordingly is poorly suited for mechanized troops. Further spaces are dominated by builtup areas and forests and are hardly better suited for mechanized warfare.

Our Army must economize. Not a little, but much. So much it can avoid the choice between Scylla and Charybdis. The best possibility for economy should consist in terminating the misemployment of dearly bought technical potential where this potential can hardly be utilized.

SUMMARY

1. The Battle of the Spurs of Kortrijk (68)

When in the year 1302 the peasants and cities of Flanders revolted, the French took to the field under command of their king's brother-in-law to put down the revolt. Their army was at the peak of the technology of its time. Long-range fire -- 3000 crossbowmen and bowmen -- were jointed with the mobility and striking power of armored units -- 7500 knights and riders. The heavily armed army had faith in its technical superiority and hoped to effortlessly demolish the armed levy of citizens and peasants.

The Flemish fielded 13,000 men, almost all on foot, and with the exception of a few bowmen and crossbowmen armed only with a long halbard. Long-range firepower was lacking as well as armored striking power. As they besieged the citadel of Kortrijk, the French Army arrived for the relief. The Flemish selected a position which allowed them only a choice between victory and annihilation. With the wide Lys at their backs, they leaned on a cloister with their left flank and with the right flank on the city walls of Kortrijk. Their army was organized into a phalanx and stood behind the Groeningen, a brook whose banks were swampy in places. In addition, the Flemish had inundated the banks and reinforced the area with pitfalls. They all fought on foot. Even the army commander, Count Guido of Flanders, was dismounted and joined the phalanx. Thus, the army awaited the attack of the French forces, certainly hoping that it would be enough just to extend the pikes in order to deter the enemy from attack. Only the citizens of Ypers had been detached from the main body in order to repel a possible sortie of the citadel's garrison. A small reserve stood ready behind the phalanx (Figure 3).

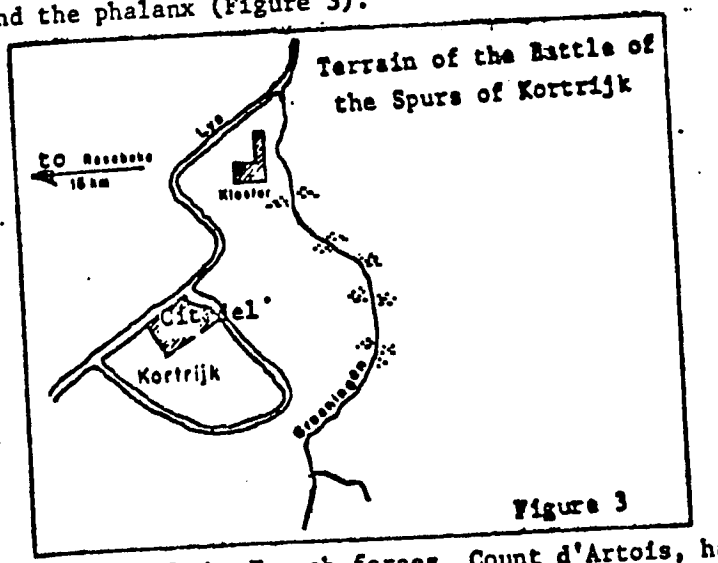

Figure 3

The commander of the French forces, Count d'Artois, had been tested in many battles. For this reason, he hesitated for a number of days to attack a position which he could not approach in the flank, and which to attack frontally, his army, optimized for mobility and long-range fire-power, was ill-suited. However, he had to rescue the citadel's garrison. For this reason, he finally made the decision for the assault.

The superior fire of the French forces began the attack. Genoese crossbowmen and Spanish javelin throwers came forward to open up a crossing over the Groeningen for the armored units. Their fire fell on the tight ranks of the phalanx and forced the Flemish to fall back from the banks and allow crossing points for the French forces. The knights immediately trotted up in the center. They succeeded in negotiating the Groeningen to win open terrain. The phalanx of the infantry collapsed at one point before the smashing shock of the armored forces. Intervention of the reserves restored the defense.

In the meanwhile, however, something unheard of had happened. As the main body of the heavily armed knights set about to negotiate the difficult brook crossing, impeded by stream, marshy land and pitfalls, the Flemish suddenly sounded the attack. The infantry approached. They caught the highly mobile armored units in unfavorable terrain and fell hacking and stabbing on the knights whose mobility and striking power were of no avail and who were only impeded by their armor. The Flemish had sworn to fell anyone who granted pardon to a Frenchman before the battle was decided. For this reason, it was of no avail even for Count d'Artois to ask mercy from his conquerors. He was beaten down and fell together with the flower of the French knighthood. In this way, he paid with his own life for his decision to use armored units in broken terrain against an infantry prepared for defense. The battle took its name from the counteless spurs which were removed from the killed knights.

2. The Battle of Rosebeke (69)

The battle was fought once again exactly 80 years later. The peasants and cities of Flanders had again risen against French authority. Again, the French took to the field to put down the rebels. Again, the Flemish had only an infantry army to oppose the French knights and again they laid seige to a citadel, Oudenaarde, as the French forces approached. However, King Charles of France did not let himself be enticed to lead his armored army into unfavorable terrain. He did not want to fight under the walls of a citadel but desired to select the battlefield himself. For this reason, he made his thrust far beyond Oudenaarde into the interior of Flanders. The Flemish had to give up the seige and accept battle with their infantry army on a field which this time was determined by their armored opponent.

Both armies met in November of the year 1382. The battle was fought only 15 kilometers from Kortrijk and recapitulated in almost every respect the battle fought 80 years before. Only the terrain had changed. The battlefield was open and flat.

The Flemish courageously took their enemy under attack with their forces bunched together in a thick phalanx of pikes and halbards. In the open terrain, they had at least to overcome the French foot soldiers before the knights could ride up. Still, the attempt was a failure. The French foot fell back but did not shatter. They withstood the attack

until the armored forces hit the Flemish hard in both flanks. Since they did not gain victory, the Flemish had to die. Retreat or even disbanded flight is not possible for infantry in open terrain. Among the killed was also Phillip van Artevelde, the commander of the Flemish forces. He also paid with his life for the decision to use troops in a terrain which was not suited for their type of mobility and weaponry.