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COMPARATIVE ANALYSIS OF ARMORED CONFLICT EXPERIENCE

A Draft Final Report

submitted by the

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I. METHODOLOGY

Selection of Armor Actions for Study

The criteria for actions to be studied were those set by Systems Analysis, Department of Defense (SA/DOD), to meet its research needs. They were as follows:

1. The actions were to be primarily tank-against-tank. The client expressed strong interest, however, in the effect of supporting arms upon such armor battles.

2. If possible, large numbers of tanks should be involved, preferably an armored division or more on each side.

3. Terrain must be relatively open; no actions in jungle or excessively mountainous terrain should be considered.

About halfway through the study, in further discussions with representatives of SA/DOD, the following additional desirable criterion was set forth:

4. If possible, at least one action treated should be a battle in which one side was defending prepared positions against a determined major attack.*

*SA/DOD also expressed interest in wearout and mechanical breakdown during or at the end of periods of breakout and pursuit. The study participants agreed, however, that since such investigation required a very different kind of research process from the detailed investigation of individual armor actions already approaching completion, it was not feasible in the time available to attempt it. Such data could best be obtained, it was agreed, by following one or more armored divisions day by day through a long period including periods of both combat and noncombat.

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As a basis for selecting the actions to be studied, an overall list was first prepared of a large number of varied armor actions in World War II.* The list was drawn up by the senior study participants in a planning conference for the study. It included five Northwest Europe actions during 1944-1945, three Mediterranean Theater actions, three involving British tanks in the North African Western Desert, six Eastern Front actions, and three other operations--the German invasion of France and Belgian Flanders in 1940, the India-Pakistan tank engagements of 1965, and the Israeli invasion of the Sinai Peninsula in 1956.

It was decided that the actions to be treated in the study would be chosen from this overall list on the basis of availability of records to provide the detailed strength and loss data needed for meaningful quantitative analysis. The results of record searching at the Federal Records Center, Alexandria, and at the US Army Armor Center at Fort Knox, together with consultations with historians of the Office, Chief of Military History, and the Document Reference Library of the Research Analysis Corporation, resulted in the following decisions.

1. Eastern Front. The tank battles on the Eastern Front would have been ideal for purposes of the study because of the large numbers involved and the open terrain. Unfortunately, it

*Korea was excluded because of the small numbers of tanks involved in individual actions.

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was conclusively determined that there are no German records available in this country that deal with events at the battalion level, and no detailed strength and loss figures even at division level.* Soviet records, of course, are not available. Late in the study, a study participant did prepare a paper on the Eastern Front battle of Targul Frumos, Rumania, on the basis of B.H. Liddell-Hart's interview with General Hasso von Manteuffel, who commanded the German forces in the battle. Although the account was one-sided, and probably not fully objective, it appeared to be sufficiently accurate and specific to be included.

2. Northwest Europe.

a. Operation GOODWOOD, August 1944, was chosen because of its close conformity to the criteria for the study, despite the fact that paucity of records would make thorough quantitative analysis impossible. The operation involved large numbers of tanks (more than 900 British tanks), in a determined attempt to break through a well-prepared defense in depth. There are no British primary sources (after action reports, etc.) in this country, and no German records bearing on the action in this country. British studies of the action that are available are focused in such a way that they do not provide the data needed for this study. Adequate

*Such records apparently were in this country, but were returned to West Germany without having been microfilmed.

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records to complete this substudy are available in England and in West Germany.

b. The action near Arracourt, September 1944, was selected because of relatively good official records and availability of participants for interviews.

c. The US defensive actions in the "Battle of the Bulge" at St. Vith and Bastogne were chosen as examples of armor against armor in defense. More documentary data was available for St. Vith than for Bastogne, but the drama of both actions aroused so much interest at the time that a good deal of material based on survivors' accounts has been published and was utilized.

d. Good material was found of the Saar Campaign of November-December 1944, and this action, not on the original list, was added.

e. No data could be found on the German attack in Alsace, January 1945, and it was removed from this list. It was decided that it was not feasible to treat the breakout-and-pursuit period (Avranches-Falaise) of August 1944, as too many confused, individual engagements were involved to make analysis possible. As noted above, it was decided that study of breakout and pursuit, and the presumably attendant problems of mechanical reliability and endurance, could be better treated in a different kind of study.

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3. Mediterranean. A well-documented small-unit action at Chouigui Pass in Tunisia, November 1942, was selected. Data on the other Mediterranean actions that had been considered was not adequate, due to nonavailability of German records.

4. Western Desert. British defense of Alam Halfa against Rommel in summary 1942 was chosen. It was felt that since it was a determined tank defense in prepared positions against a vigorous assault it was especially well suited for the study.

5. Other operations. Through the cooperation and help of the Defense Intelligence Agency, reasonably good data was available for the India-Pakistan actions, and a classified paper was prepared. The France-Flanders campaign, which was treated largely on the basis of published secondary materials, was found to provide considerable material for analysis, with adequate cumulative figures available for the whole campaign, and enough data available for specific operations, down to the small-unit level in one case, to provide accounts of the campaign at four different levels.

The ten actions finally selected, regrouped on a geographic rather than theater-of-operations basis were as follows:

A. Northwest Europe, World War II

1. France-Flanders, 1940
2. GOODWOOD, 18-21 July 1944
3. Arracourt, 19-22 September 1944
4. The Saar Campaign, 8 November-7 December 1944
5. St. Vith, 17-23 December 1944
6. Bastogne, 18-20 December 1944

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- B. North Africa, World War II
 - 1. Alam Halfa, 31 August-3 September 1942
 - 2. Chouigui Pass, November 1942
- C. Eastern Front
 - 1. Targul Frumos, Rumania, May 1944
- D. Post-World War II
 - 1. India-Pakistan, August-September 1965

Assembling the Material

The data from US records on the tank actions selected was collected by those senior study participants who had been given responsibility for preparing papers on the actions (Andrews, Crosby, Nihart) with the help of research assistants. The research assistants, with the help of the Federal Records Center staff, searched the records available at the Center for the units involved, for the time periods of the actions. After action reports, division histories, unit diaries, journals, and periodic reports (G-2, G-3, G-4) were the basic sources for strength and loss figures. The contemporary accounts of the actions were also useful, as were comments on the effectiveness of US and enemy tanks.

German records in this country are discussed in Appendix C, attached. The German records were searched by a German-fluent senior staff member of HERO, assisted by a German-fluent research assistant.

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A trip to the Fort Knox Armor Center by one of the senior participants resulted in the selection and loan to HERO by the Armor Center of 21 unpublished monographs, several published works that had been difficult to obtain in this area, and 14 after action reports, other unit reports, and miscellaneous papers. This material was all examined, and much of it was found useful for the study.

The staff of the Historical Services Division and of the Histories Division of the Office, Chief of Military History, made available a number of unpublished monographs that were especially helpful in filling in the German side of several actions. Especially valuable was the advice of these experienced historians and researchers as to which materials were available elsewhere, and which simply were nonexistent or not available in this country.

The staff of the Document Reference Library of the Research Analysis Corporation made available, and in several cases borrowed for the study participants, various materials, especially classified studies on the use of armor. These, while generally adding nothing to the data for specific operations, were valuable for general background, including as they did such material as overall statistics on tank losses by causative agent, theoretical work on tank roles, and efforts to derive desirable strength ratios of opposing tanks. Other similar material was borrowed for the study

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participants by SA/DOD. Much of this material is listed and briefly discussed in Appendix B (contained in classified annex).

About a dozen personal interviews with action participants were also conducted by one of the study participants (Colonel Crosby). Although these could not, of course, yield numerical data on strengths and losses, they brought out several otherwise unrecorded and very significant factors in the battles (as, for instance, the use of white phosphorus at Arracourt). Action participants were able to suggest sources of data in some cases, and at least one action participant had personal records in his possession that did give some detailed numerical data.

Published secondary sources were also used, the most useful being the Office, Chief of Military History, volumes in the series "US Army in World War II."

A good deal of research was also required to obtain in detail the characteristics of the tanks that took part in the actions studied. A most valuable source for German World War II tanks was a mimeographed British work, with photographs, "Illustrated Record of German Army Equipment, 1939-1945," Vol. III (M.I.10, The War Office, 1947) lent to HERO by RAC. B.H. Liddell-Hart's book, The Tanks, contains less detailed charts of characteristics for World War II tanks of all nations except the Soviet Union. Armor: A History of Mechanized Forces by R.M. Ogorkiewicz (New York: Praeger, 1960) provided some useful information on Soviet tanks,

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but no detailed data. Handout data sheets published by US Army Ordnance on US and foreign tanks were also used. Contemporary US intelligence reports on German tanks, found at the Federal Records Center gave tank characteristics as observed in combat and derived from captured tanks. In general, the sources agreed closely. A challenging research problem was the determination of which model of the eight models of the German Pz.Kpfw. IV, for example, was involved in a given action in which the sources report only "Mark IVs." Data on development and dates of introduction of the various models, given in "Illustrated Record of German Army Equipment" and Liddell-Hart, together with slim clues in contemporary accounts of the actions, and other sources, were helpful in satisfactorily resolving this problem.

Interpretation and Use of Data

Each of the ten actions treated has been presented in a paper that includes the following parts:*

1. A narrative account of the action.
2. An analysis of the action, with emphasis on the factors determining success of the winning side.

*Not all these items have yet been supplied for all actions, but all will be in the final report.

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3. A map of the battle area.

4. Numerical data on tank strengths and losses, presented in tabular format.

5. Data on tank characteristics for all types of tanks involved in the action, presented in tabular format.

6. A bibliography of sources.

The numerical data of items 4 and 5, above, have been presented in tabular formats adapted from samples provided by SA/DOD. One format shows tank strength and loss figures for a given action, and the other shows characteristics of the tanks engaged in the action. Following the suggestion of SA/DOD, the actions have been divided into phases in cases in which they fell naturally into such phases, and in which there was data in adequate detail to make such phasing reasonably accurate. (None of the phased charts is yet ready for submission, but they are being prepared for the final report. Preparing tables for each phase of an action raises some difficult problems, such as determining the frontage of an engagement phase.) It was also decided to present the characteristics of all tanks involved in a given engagement in one spreadsheet chart with the account of that engagement.

In most cases there were gaps in the data that could not be filled except arbitrarily. For example, it was known in one action that both heavy and medium tanks were engaged, but it was not possible to tell how many of the tank casualties were heavy and

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how many were medium. In no case except that of GOODWOOD did lack of data make it impossible to gain a clear picture of relative strengths and losses and to derive effectiveness quotients by use of the formula provided by SA/DOD. In the case of GOODWOOD, it was decided to submit the action without the unavailable German figures because of its special interest for the study.

In interpretation of data, a consistent attempt has been made to focus on two key points, central to the study and to the client's interest: (1) the advantage gained in each action from numerical superiority; (2) the advantage gained from qualitative superiority in specific tank characteristics. In a number of cases it was found that superior tactics, leadership, training, or good fortune was more significant in the outcome of the battle than either numerical superiority or overall qualitative superiority. In these cases, the question asked was, "What factors of numerical superiority, or what specific tank characteristics made it possible to successfully implement the superior tactics, or take advantage of the superior leadership, training, or luck?"

II. SUMMARIES OF TANK ACTIONS INVESTIGATED

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France-Flanders, May-June 1940

The Germans invaded the low countries and France in May 1940 and quickly won a stunning victory, despite substantial numerical inferiority (3,609 French and British tanks to 2,574 German tanks). The German tanks were also generally inferior in armor and firepower, although they were somewhat superior in mobility--and mobility in all its aspects was the key factor in this campaign.

The well-conceived German strategic plan called for a thrust down through the low countries which would draw the best French and British forces, whereupon the main German attack, 44 divisions strong and using most of the available German armor, would push through the Ardennes area and break through to the Channel, cutting off the Allied forces to the north. The plan worked smoothly. The French had thought the Ardennes impassable for armor, and had defended it so lightly that its roads were entirely adequate for the German tanks. The Meuse crossings were forced and the breakthrough accomplished with the support of strafing Stuka aircraft, whose devastating psychological effect substituted for the artillery which the German armored units had outrun.

German Breakthrough and Exploitation North of the Somme, 10-24 May 1940

In this classic campaign the Germans concentrated 2,683 tanks, which qualitatively were somewhat inferior in gunpower and

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and armor although superior in speed and range, against 2,160 French and British tanks. German losses were 1,080, an estimated two-thirds of which were repairable, to Allied losses of 2,060 which in addition to combat losses, included total losses due to capture or destruction to avoid capture. Determining factors were the German exploitation of concentration at the decisive point; tactical, operational, and technical surprise; and mobility in all of its forms, physical, mental, organizational, doctrinal, command-control-communications, and the use of firepower and terrain. Conversely, the Allies, although possessing an overall greater number of tanks in France (3,609 Allied to 2,574 German), dispersed their tanks in France, in the area of the campaign, and organizationally. Allied tactics, doctrine, command-control-communications, and mental preparation was also deficient for this new form of warfare. This 2-to-1 disparity of tank losses, while in favor of Germany and significant, does not tell the complete story, as this campaign destroyed France as a military power and drove Britain from the continent.

Rommel's 7th Panzer Division,
10-24 May 1940

The participation of Rommel's 7th Panzer Division in the campaign north of the Somme River provides a closer look at armored combat and its result. Rommel collided with both a French armored division and a British tank brigade, paced the

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overall German attack (along with Guderian), and had a better tank loss ratio than the aggregate of all German panzer divisions. This study estimates Rommel's losses for this campaign at 72, while losses inflicted by him on the Allies were 161. Indices of effectiveness were thus 2.47 for Rommel and .4 for the Allied units encountered. The same determinants obtained in this portion of the campaign as for the campaign as a whole.

A Group Franc South of the Somme,
June 1940

This small-unit action had a well-led and integrated French combat team launching a mobile counterattack from a defensive base and inflicting disproportionate losses on a German unit that had three times as many tanks but lacked reconnaissance or support. The French Group Franc consisted of 5 Somua tanks heavily armored for the time and armed with a very powerful 47mm. gun, 5 Panhard armored cars armed with 25mm. guns, 2 47mm. antitank guns, 2 25mm. antitank guns, heavy machineguns, and a motorcycle reconnaissance company. The Germans had 14 Pz.Kpfw. IV tanks with 30mm. of armor and a short 75mm. gun. The German tanks were the most powerful they possessed at the time, yet the French 47mm. guns easily penetrated them, while the German 75mm. gun of that time was only rarely effective against the 40mm. armor of the Somua. The Germans, without support or prior reconnaissance, blundered into the well-prepared and coordinated French defense and in fighting their way

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out of contact and around the position lost 4 tanks to the 47mm. antitank guns and 3 tanks to the Somua tanks' 47mm. guns while knocking out one Somua--a score of 7 to 1 in favor of an integrated organization employing appropriate tactics. French effectiveness was thus 20, while German was only .05.

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GOODWOOD, 18-22 July 1944

Operation GOODWOOD was a part of the Allied effort to break out of the Normandy beachhead in the vicinity of Caen. It is remarkable both for the effectiveness of preliminary aerial bombardment and for the misuse of tanks. British losses were very heavy (459 tanks lost or 36% of all engaged). German losses for this operation have not been found in the microfilmed records in the United States. The battle began with an extensive aerial bombardment which limited the initial response of the Germans to the British advance. However, as the British pushed further into the German defensive lines several weaknesses in their operational planning became apparent, while German defensive tactics were excellent. German armor and antitank guns were well placed to hit the advancing British tanks, which were trying to force the breakthrough without the aid of infantry. The British armor advanced beyond the range of supporting artillery fire; and the narrow attack zone bounded by minefields limited the number of tanks that could be committed and caused a severe traffic jam. GOODWOOD drew German armor off the US front and destroyed some of it; no breakthrough was achieved, but a continuation was made to the success of the later US breakthrough. British tank superiority (at least 4-1) and effective air bombardment resulted in a limited British advance.

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Arracourt, 19-22 September 1944

This tank battle near Arracourt, France, was won by Combat Command A of the US 4th Armored Division through superior leadership and tactics, despite a German numerical superiority of 5:3 (in the medium tanks that actually fought the battle), and despite the overall qualitative superiority of the German Mark IV (Pz.Kpfw. IV) and Mark V (Pz.Kpfw. V) tanks to the US M4. Responding to a German counterattack by the 111th and 113th Panzer Brigades, the US forces achieved a US-German loss ratio of 4:1 (87 German tanks lost to 21 US tanks lost). US leadership effectively used the principles of mass and maneuver, concentrating ~~their~~ tanks and launching repeated spoiling attacks, while the Germans wasted their tanks in piecemeal commitments.

The superior mobility of the US M4 on dry, firm ground, and its power-traverse, quickly turning turret, more than compensated for the greater penetration capability of the German tank armament --75mm. guns, 43, 48, and 70 calibers long. Low visibility due to fog prevented US air support that would otherwise have been available, but the fog also allowed the Americans to close to a distance at which their less powerful L/40 guns became effective. Well-coordinated use of the highly effective tank destroyers and of artillery support contributed to the success. US use of white phosphorus as a first round allowed quick adjustment of fire, forced

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several German crews to abandon their tanks, and allowed the US tanks to draw close without being seen.

The Saar Campaign, 8 November-7 December 1944

Bad weather was the most influential factor in the Saar Campaign, November-December 1944. Continual rain made the ground nearly impassable and poor visibility prevented air support. The aim of the US Third Army offensive was to clear the southern part of the Saar Valley and eventually to establish a bridgehead over the Rhine. In this operation, the US 4th Armored Division (271 tanks) was opposed by 9 German divisions, 2 brigades, and some miscellaneous units (145 tanks). The German Mark IVs, Mark Vs, and Mark VIs were superior to the US M4s in flotation, gunpower, and armor protection. Despite their smaller force, the Germans fought a successful delaying action. They suited their tactics to take full advantage of the geographic and climatic conditions, while --because of these circumstances--the United States was engaged in an offensive for which tanks with marginal flotation were not well suited. Including 10 tanks that were recovered and returned to service, the US losses were 56 tanks to the German loss of 61. Thus although the Germans were outnumbered in tank strength almost 2:1, tank losses were almost equal for the two sides. Ten US M5s and 45 miscellaneous German tanks that were present were not suitable for action against opposing armor and antitank weapons, and if they

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are eliminated from consideration the German losses are actually less, by a ratio of 1-4, than those of the US force.

St. Vith, 17-23 December 1944

The mission of CCB of the 7th Armored Division at St. Vith was to hold at all costs in order to disrupt the German Ardennes offensive. Through use of excellent defensive tactics it did hold for six days against greatly superior German forces, delaying the Germans long enough to make certain the failure of the German offensive. Inadequate German planning allowed the German offensive spearheads to be held up by traffic jam, so that they reached St. Vith after the 7th Armored. The Germans committed their tanks piecemeal for three days, wasting the advantage of their numbers. CCB used a mobile defense, defending dominant terrain with dug-in infantry and tank destroyers, while holding its tanks as a mobile counterattacking force. Repeated US spoiling attacks kept the Germans off balance and made them believe they faced a much larger force than they did. The mobility of the M4 tank permitted the successful implementation of these tactics. [Loss ratios to be included when charts are completed.]

Bastogne, 17-20 December 1944

In the area east of Bastogne, in southeastern Belgium, on the edge of the Ardennes Forest, elements of two American armored divisions, the 9th and the 10th, clashed with elements of three

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German divisions, the 2d Panzer, 26th Volksgrenadier, and 130th Panzer Lehr in a series of uncoordinated actions. The German XLVII Panzer Corps, to which the German divisions belonged, was driving westward around Bastogne toward the Meuse River, as part of their great Ardennes counteroffensive. The Americans were assigned the task of holding them back from the roads leading into the city. CCR of the 9th Armored Division and CCB of the 10th were posted at various points in task forces comprising approximately a battalion apiece, variously supported by artillery, armored infantry, and other elements. Most of the action took place in fog, smoke, or darkness, with the Germans attacking with small numbers of tanks, and generally at fairly close range since poor visibility prevented their taking advantage of their longer range guns. The greatly outnumbered Americans suffered losses in a ratio of 5 to 3, but they achieved their objective of delaying the German advance. Tanks, tank destroyers, artillery, and infantry worked together in teams to drive off repeated attacks or, to exact a high price for their own destruction. The Germans, surprised to find their way blocked, lacked the information and the leadership to coordinate their attacks and to remove quickly the obstacles which they certainly had the strength to overcome. They did ultimately get through, but not until their schedule had been disrupted and their attack thrown off balance.