

AD-A200 036

RESEARCH PAPER
CAA-RP-87-2

DTIC FILE COPY

4

**HISTORICAL CHARACTERISTICS
OF
COMBAT FOR WARGAMES
(BENCHMARKS)**

JULY 1988



PREPARED BY
ROBERT McQUIE

US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20814-2797

DTIC
ELECTE
SEP 22 1988
S E D

This document has been approved
for public release and using the
distribution is unlimited.

88 9 22 036

CA

RESEARCH PAPER
CAA-RP-87-2

HISTORICAL CHARACTERISTICS OF COMBAT FOR WARGAMES

(BENCHMARKS)

July 1988



Accession For	
DTIC CAA-81	☒
DTIC TAG	☐
Unannounced	☐
Unannounced	
By	
Approved	
Availability Codes	
Available and/or	
Unlimited	
A-1	

Prepared by

ROBERT McQUIE

US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20814-2797

This document has been approved
for public release and making its
distribution is unlimited.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE				Form Approved OMB No 0704-0188	
1a. REPORT SECURITY CLASSIFICATION Unclassified			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			3. DISTRIBUTION/AVAILABILITY OF REPORT Unlimited		
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) CAA-RP-87-2			5. MONITORING ORGANIZATION REPORT NUMBER (S)		
6a. NAME OF PERFORMING ORGANIZATION U.S. Army Concepts Analysis Agency		6b. OFFICE SYMBOL (if applicable) CSCA-MVM	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) 8120 Woodmont Avenue Bethesda, MD 20814-2797			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. Army Concepts Analysis Agency		8b. OFFICE SYMBOL (if applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code) 8120 Woodmont Avenue Bethesda, MD 20814-2797			10. SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
					WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) Historical Characteristics of Combat for Wargames					
12. PERSONAL AUTHOR(S) Robert McQuie					
13a. TYPE OF REPORT Final		13b. TIME COVERED FROM 1937 TO 1982	14. DATE OF REPORT (Year, Month, Day) 1988 July 1		15. PAGE COUNT 47
16. SUPPLEMENTARY NOTATION Prepared under an Army concepts Analysis Agency Research Fellowship					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP	Wargames		
15	01		Ground Combat		
			Combat Simulations		
			Battles		
			Movement Rates		
			Combined Arms Combat		
			Casualties		
			Chaotic Data		
			Historical Data		
			Credibility		
			Weapons Density		
			Model Validation		
19. ABSTRACT (Continue on reverse if necessary and identify by block number) For 260 battles between 1937 and 1982 historical data were assembled about the environment tactics, outcomes and number of weapons in each force. From this data, a series of ratios, percentages and rates were calculated for each battle describing its characteristics. For each characteristic, the range was determined within which it was usually found and the median value of the characteristic. These ranges and medians may serve as criteria of credibility for the results of wargames and combat simulations. A procedure is provided for comparing these criteria with the results.					
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS RPT ☐ DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION Unclassified		
22a. NAME OF RESPONSIBLE INDIVIDUAL Robert McQuie			22b. TELEPHONE (Include Area Code) (301) 295-5228		22c. OFFICE SYMBOL CSCA-MV

DD Form 1473, JUN 86

Previous editions are obsolete.

SECURITY CLASSIFICATION OF THIS PAGE

UNCLASSIFIED



HISTORICAL CHARACTERISTICS OF COMBAT FOR WARGAMES (BENCHMARKS)

SUMMARY
CAA-RP-87-2

THE REASON FOR PERFORMING THE STUDY is because of a need ^{exists} to compare wargames results with military history.

THE PRINCIPAL ACCOMPLISHMENTS of ^{this} the work reported is the derivation of tables of numerical characteristics that describe ground combat during the last 50 years.

THE KEY ASSUMPTION. Incompleteness of the data does not make it unusable.

THE PRINCIPAL LIMITATION is the unavailability of data about battles in Vietnam and incompleteness of available data on battles elsewhere;

THE STUDY OBJECTIVE is to provide a tool for judging whether the results of simulated combat are consistent with historical combat. *→ (to p. ii')*

THE BASIC APPROACH is to assemble available data on actual battles and calculate simple ratios and rates that describe each. This involved:

- a. From 260 modern battles, data were gathered about 45 characteristics.
- b. From these characteristics, 28 ratios and rates were calculated.
- c. Medians and ranges of these values were calculated and tabulated.
- d. Forms were designed to compare these values with wargame results.

THE STUDY was carried out by Robert McQuie under the CAA Research and Study Fellowship.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-MV, 8120 Woodmont Avenue, Bethesda, Maryland 20814-2797.

Tear-out copies of this synopsis are at back cover.

CONTENTS

CHAPTER		Page
1	A PERPLEXING REQUIREMENT OF WARGAME RESULTS	1
	How Credible are Wargame Results?	
	How Could That Question be Answered?	
2	DATA ABOUT THE RESULTS OF HISTORICAL COMBAT	4
	Sources of the Data About Historical Battles	
	Peculiarities of the Data About Historical Battles	
	Characteristics of Historical Battles in the Data	
	Reliability of Data About Historical Battles	
3	CRITERIA OF WARGAME CREDIBILITY	
	Features of the Data Affecting the Methodology Used	10
	An Implication of the Data for Wargame Validation	
	Methodology Used for Establishing the Criteria	
	Credibility Criteria That Were Established	
	Advantages and Disadvantages of Their Use	
4	APPLICATION OF THE CRITERIA TO A PARTICULAR WARGAME	19
	Purpose of the Evaluation	
	Method of Applying the Criteria	
	Results of the Evaluation	
5	FUTURE WORK	25
	Statistically Based Research	
	Tactically Meaningful Printouts	
	Data About Vietnam Battles	
APPENDIX		
A	Contributors	A-1
B	Study Directive	B-1
C	Bibliography	C-1
D	Historical Data Used	D-1
E	Statistical Characteristics	E-1
F	Blank Evaluation Forms	F-1
G	Distribution	G-1
GLOSSARY		Glossary-1
STUDY SUMMARY (tear-out copies)		

FIGURES

FIGURE		Page
1	Skewedness of Characteristics	11
2	Homogeneity of Characteristics	12
E-2	Distribution of Characteristics	E-3

TABLES

TABLE		
1	Medical Blood Test	3
2	Characteristics of the Data: Location of Battles	5
3	Characteristics of the Data: Size of Forces	6
4	Characteristics of the Data: Environment of Battles	6
5	Characteristics of the Data: Tactics and Postures	7
6	Characteristics of the Data: Outcomes of Battles	8
7	Variability of Characteristics	13
8	Plausibility Criteria	16
9	Centrality Criteria	17
10	Force Worksheet - Defender	20
11	Force Worksheet - Attacker	21
12	Scenario Worksheet	23
13	Wargames Requiring Tactical Information Displays	26
E-1	Amount of Data on Which Characteristics are Based	E-1

CHAPTER 1

A PERPLEXING REQUIREMENT OF WARGAME RESULTS

1-1. HOW CREDIBLE ARE WARGAME RESULTS?

a. The results of wargames and combat simulations are often surprising. The casualty rates, for example, may have been negligible, or the unit with the most weapons may have been defeated. Surprising results lead to questions by the users of wargame results. The questions are serious ones and often result in a requirement to make more simulation runs or to explain in detail the results of already run battles and campaigns.

b. When the results produce an unexpected type of battle or lead to a surprising conclusion, uncertainties also arise in the minds of the producers of wargame results. The question arises: has a key discovery been made or was there an error in the data about weapons and terrain or in the programming? There is no simple way to answer that question.

1-2. HOW COULD THAT QUESTION BE ANSWERED?

a. In this paper the term "wargame" will be used to refer to two types of combat models, interactive games with players and simulations without. The solution proposed to the preceding questions is that a model should reflect what has happened on real battlefields. When the forces in an historical battle are simulated, the model should produce results similar to the actual battle. This does not seem like an unreasonable demand. While comparing simulated combat with history may not absolutely ensure model credibility, it is claimed to be a first step toward that goal.

b. How to make this comparison and where to get the historical data has been discussed widely. It has been suggested that an historical battle, perhaps the Battle of the Bulge or of Okinawa, could be replayed on a particular simulation; if the outcomes of both battles were similar, they would support the tactical realism of that combat model. With this approach, however, there is a problem. If the wargame being tested is stochastic, perhaps 20 or more replays would be needed to establish averages that are reliable in the statistical sense of each characteristic of battle. This would be an expensive and time consuming exercise. Even if such an exercise could be carried out it would not be conclusive, because replays of the real battle could not be available for comparison. What appears to be needed to establish credibility is to take the available historical data and make them useful, even if only as preliminary guides to analysis.

c. In light of the preceding, the obvious approach of comparing a game with history does not appear to be workable. Merely assembling the historical data that is available and letting it speak for itself is unlikely to produce much insight. The principal reason for this is that any battle could have turned out differently without too many changes of circumstances. Wellington's remark that Waterloo was "the closest run thing you ever saw" has applied to many other battles as well.

d. The thought underlying this paper is that the way to simplify making the data useful may be found in the field of medicine. Patients and battles share a key characteristic; both perform in surprising ways because of the influence of human nature. In medicine, diagnosis uses objective data to outline the problem, but leaves room for judgment to interpret the results.

e. An example may be seen in Figure 1, a form reporting the results of a standard medical blood test. A sample of blood has been taken, and a laboratory has used it to measure on each line of the form one of the 23 characteristics of the individual being tested. Readings on these measures are noted in the "Results" column, and the acceptable ranges for the readings are noted in the "Expected Range" column. The acceptable ranges are set from data about actual patients tested by the laboratory in question. A physician compares the two columns and then decides in what areas there may be problems for further investigation. In the example, although several readings are outside the expected ranges, in his judgment, only two, chlorides and triglycerides, are sufficiently extreme to warrant his attention. He has marked these two with a check mark. The tests guide him in reaching a conclusion; they do not calculate the conclusion for him.

f. A similar approach will be pursued in devising a method of diagnosing the symptoms of wargames. A set of standard characteristics or criteria will be derived from historical battles. These criteria of tactical plausibility may be referred to as "benchmarks."

1-3. **SUMMARY.** In summary, then, the need for a method of assessing the credibility of wargame results has been recognized for a long time. Doing this appears possible using an approach analogous to the use of medical tests to diagnose patients by a physician. For wargames, it involves establishing standard characteristics from historical combat, comparing them with the results of wargames and then investigating the characteristics that appear to differ from history. The next chapter will describe the data on which these characteristics were based. Chapter 3 will describe the characteristics and how they were derived. Chapter 4 will show how they applied in evaluating a particular wargame.

Table 1. Medical Blood Test

CHURCH MEDICAL CENTER

PATIENT'S NAME JOHN JONES D.O.B. 1 JUL 52 M ☒ F ☐

ACCOUNT NO. 62744 DATE 20 MARCH 87

PHONE NO. 294-5678 DOCTOR WILLIAM SMITH M.D.

CHEM 4 ☐ CHEM 13 ☐ CHEM 23 ☒

CHEMISTRY TEST	RESULTS	UNITS	EXPECTED RANGE
ALBUMIN	<u>4.0</u>	g/dl	<u>4.0 - 5.0</u>
ALK. PHOS.	<u>53</u>	u/l	<u>20 - 92</u>
BILIRUBIN T.	<u>0.6</u>	mg/dl	<u>0.12 - 1.25</u>
CALCIUM	<u>8.0</u>	mg/dl	<u>7.7 - 9.5</u>
CARBON DIOXIDE	<u>29.9</u>	mEq/l	<u>23 - 32</u>
✓ CHLORIDE	<u>80</u>	mEq/l	<u>98 - 106</u>
CHOLESTEROL	<u>179</u>	mg/dl	<u>132 - 299</u>
CREATININE	<u>1.2</u>	mg/dl	<u>0.7 - 1.4</u>
GGT	<u>23</u>	u/l	<u>7 - 56</u>
GLUCOSE	<u>116</u>	mg/dl	<u>61 - 114</u>
LDH	<u>112</u>	u/l	<u>81 - 190</u>
PHOSPHORUS	<u>3.4</u>	mg/dl	<u>2.3 - 4.2</u>
POTASSIUM	<u>4.06</u>	mEq/l	<u>3.5 - 5.5</u>
PROTEIN T.	<u>6.6</u>	g/dl	<u>6.3 - 7.9</u>
SGGT (AST)	<u>23</u>	u/l	<u>7 - 32</u>
SGPT (ALT)	<u>33</u>	u/l	<u>3 - 31</u>
SODIUM	<u>141.4</u>	mmol/l	<u>135 - 150</u>
✓ TRIGLYCERIDES	<u>202</u>	mg/dl	<u>36 - 165</u>
UREA NITROGEN (BUN)	<u>13</u>	mg/dl	<u>7 - 27</u>

CHAPTER 2

DATA ABOUT THE RESULTS OF HISTORICAL COMBAT

2-1. SOURCES OF DATA ABOUT HISTORICAL BATTLES

a. The data in this report was obtained from the only source of quantitative data about modern historical combat ever assembled that attempts to describe in detail both sides of the battlefield. This is the collection of data about 601 battles generated for various studies over the past 25 years by Colonel Trevor N. DuPuy and the the military historians at Data Memory Systems, Incorporated of Fairfax, Virginia. These data have been assembled under a contract to the US Army Concepts Analysis Agency and now constitute the Army's data base of historical battles.

b. Of these battles, 260 took place since 1937 and are candidates for use in establishing historical criteria of credibility. The term "battle" is used in this report to describe, as explained in the Glossary, both entire battles and engagements or phases of larger battles. Archives, interviews and books were used by the military historians who assembled it. Appendix C, the bibliography, lists the published reports that are the sources of this information, and Appendix D, Historical Data Used, lists the data about each battle.

c. About each battle, select elements of information were extracted from these reports covering the following characteristics of combat: terrain, tactics, weapons and outcomes, the latter covering attrition and movement. The variables in these categories are defined where necessary in the glossary and enumerated in the column headings of Appendix D.

d. Appendix D contains the complete records of the data on which the calculations in this report were based. To understand these criteria, it is helpful to understand certain peculiarities of this data. These will be described below. The items of data selected for analysis in this report were those that could have been obtained from a war correspondent at the scene of the conflict. This involved excluding characteristics of a battle that were later judgments of military historians rather than "observations." Accordingly, variables such as "success," "morale" and "training" were intentionally excluded. The intent, imperfectly realized perhaps, is to confine the data to the general type of evidence that might be obtained from a laboratory or a geological survey. It should be noted that the reports, listed in Appendix C, that contain this data have much more information about each battle than was used in this analysis.

e. Key elements of data on these battles and engagements were assembled in a table with 260 rows, one for each battle, and 45 columns, one for each characteristic or data element. From this table, a representative value of each characteristic was calculated. For categorical characteristics, such as weather, the mode or most frequently occurring value was used. For quantifiable characteristics such as width of front, the value at the median or 50th percentile of the ranked data was used. These modes and medians describe a battle consisting of:

A division attacking a division,
 in a frontal attack against a fortified defense,
 with 17,700 men attacking 8,500,
 on an 8-kilometer front,
 in mild, dry weather,
 on rolling terrain,
 with mixed cover,
 without surprise,
 with the attack producing a penetration,
 and the defense resulting in a withdrawal.

These representative values from the historical data describe briefly what war has been like at the combined arms level for the last half century.

2-2. PECULIARITIES OF THE DATA ABOUT HISTORICAL BATTLES

a. Three aspects of the historical data on which the above description of battle was based distinguish it from the type of data normally used in war games. The first aspect is its incompleteness; only 80 percent of the 11,000 data cells in the table of battles could be filled. Only 17 of the 260 battles have all of the elements of data specified by the table. The missing entries represent items of data that in many cases can never be recovered. When, for example, the United States captured Okinawa in 1945, many Japanese command bunkers were cleared out with flame throwers, destroying all historical sources, both written and oral. For this reason, if no other, combat data cannot be analyzed like the data from proving grounds used in engineering and physics.

b. A second aspect of this data is illustrated in Table 2. Different wars and theaters are covered in varying levels of completeness. Some locations are sparsely covered because there were not many battles, such as Lebanon. Others are sparsely covered because no data has been accumulated, such as the war in Iraq. There is only one battle from Vietnam.

Table 2. Characteristics of the Data:
Location of Battles

Location	No. of battles
West Europe (1940)	5
East Asia (1938-45)	6
East Europe (1939-42)	4
North Africa (1943)	8
Italy (1943-44)	64
East Europe (1943-45)	28
West Europe (1944)	25
West Pacific (1944-45)	32
Korea (1950)	11
Israel (1948)	9
Israel (1956)	4
Israel (1967)	22
Israel (1973)	33
Other locations	9

c. A third aspect is illustrated in Table 3; most battles were small or were fragments of longer or more extensive battles. While echelons above corps are represented, they were organizations that had been in combat for some time and were below authorized strength. Only about one battle in eight, for example, involved a unit with more than 100,000 troops. The historical data used in this report is primarily about divisions.

Table 3. Characteristics of the Data: Size of Forces

Echelon	Percent of battles	
	Attackers	Defenders
Army group	5%	3%
Army	7	10
Corps	14	9
Division	65	50
Brigade	8	27
Battalion	1	1

2-3. CHARACTERISTICS OF HISTORICAL BATTLES IN THE DATA

a. The battles in the data may be characterized in terms of their environments, the tactics attempted, and the observable results of combat. Table 4 characterizes the data in terms of environment. As may be seen, there is little combat in swamps, forests, or cities.

Table 4. Characteristics of the Data: Environment of Battles

Aspect of the environment	Percent of battles
TERRAIN	
Rugged	29%
Rolling	46
Flat	25
COVER	
Woods	1%
Mixed	65
Bare	20
Urban	1
Swamp	2
Desert	11

b. Table 5 characterizes the battles in terms of the tactics initially intended to be employed, that is, the maneuver by the attacker and the posture of the defender. The typical battle involves a frontal attack against a fortified defense. About one attack in eight employed any mobile form of maneuver, such as an envelopment or a mobile defense. Surprise, moreover, was present in less than 15 percent of the instances. As may be seen, the engagements represent routine battlefield tactics. Clausewitz noted that in his day, fancy tactics and battlefield brilliance seldom occurred in practice. In our day, the condition appears to still exist.

Table 5. Characteristics of the Data: Tactics and Postures

Tactics and postures of forces	Percent of battles
ATTACKER MANEUVER	
River crossing	10%
Frontal attack	73
Breakthrough	2
Envelopment	7
Double envelopment	6
Pursuit	2
DEFENDER INITIAL POSTURE	
Hasty defense	24%
Prepared defense	30
Fortified defense	39
Mobile defense	1
Delay	5
Withdrawal	1

c. Table 6 characterizes the data in terms of different outcomes or observable results. As may be seen, about 75 percent of the engagements were successful for the attacker, but with very few overwhelming victories or defeats. In most cases, victory resulted in a penetration by the attacker accompanied by a withdrawal by the defender to renew the battle nearby a few days later. In general, what is described by this table is the routine of war rather than its high points.

Table 6. Characteristics of the Data: Outcomes of Battles

Outcome at end of battle	Percent of battles
ATTACKER	
Breakthrough	17%
Penetration	55
Repulsed	25
Other	3
DEFENDER	
Annihilation	5%
Withdrawal + heavy casualties	13
Withdrawal or delay	42
Stalemate	35
Pursuit of attacker	4
Truce or surrender	1

2-4. RELIABILITY OF THE DATA ABOUT HISTORICAL BATTLES

The military historians who gathered the data have offered their subjective judgments of its comparative reliability. In their opinion, the information about the Western European and Italian campaigns of World War II are the most accurate, since they were able to work from both United States war records and the German ones that became available after the surrender of Germany. The Korean data probably is the least reliable, since no North Korean records and little oral evidence was available. The Middle East war data lies somewhere in between, with data on the 1956 and 1973 wars being better than that on the 1948 and 1967 wars.

An independent audit of the source records on select battles by McDonald and another team of military historians (see Bibliography) produced many changes and a few additional data elements. It also produced discussion among the historians that resemble in tone arguments about the fall of the Roman Empire.

2-5. SUMMARY

In summary, a large table of military history was constructed with data about 260 battles during the last 50 years. Two-thirds of the battles took place in World War II, one third since 1945. The records on almost all

battles are incomplete, and one-fifth of the historical data called for by the table could not be supplied. From the data that were available, nevertheless, sets of rates and ratios were calculated that describe each battle. These values form the raw material from which to construct criteria of wargame credibility that will be described in the next chapter.

CHAPTER 3

CRITERIA OF WARGAME CREDIBILITY

3-1. **FEATURES OF THE DATA AFFECTING THE METHODOLOGY USED.** Having looked in Chapter 1 at the problem of evaluating wargame credibility and in Chapter 2 at the data on which to base an evaluation, let us turn to the criteria on which such a judgment might be based. The preceding chapter addressed historical data; the "observable" characteristics of each battle. This chapter will address the rates and ratios calculated from that data. Three points will be covered: features of combat that influence how the criteria were arrived at, the methodology for calculating them, and the values that resulted. Three statistical features of values calculated from historical data influence how these creditability criteria are arrived at: their variability, their skewedness, and their homogeneity.

a. The first feature of the rates and ratios is skewedness, which is illustrated by Figure 1. It shows, for one characteristic, the number of artillery pieces per kilometer of front, how the value varies from battle to battle. The frequency distribution is extremely skewed. The average or median for all characteristics of battle have a low value, but in every characteristic there is a long tail of values that stretch towards the right to extremely high values.

b. There is even an engagement on Okinawa, not plotted in Figure 1, where the United States brought to bear 440 guns per kilometer of front. Exactly the same type of distribution of values was observed for every other rate and ratio that were examined. Appendix E contains a series of graphs that show the frequency distributions of these characteristics.

c. Table E-1 of the appendix shows in numerical terms that all of the distributions are in a sense nonstandard. They do not resemble a normal distribution or even a symmetric one. This feature has an implication for how a benchmark should be established: calculating it in terms of an arithmetic average would be misleading. A few very high values in the data could lead to an average that was shifted to the right on the chart to the point where it represents a situation that had taken place only a very few times. In other words, the average would be overestimated. An average from Figure 1, for example, would state that the representative artillery density characteristic was approximately 30 guns per kilometer, a value higher than 80 percent of the actual battles from which it was derived.

d. A way to deal with this situation is to set the benchmark in terms of the median, a value of the characteristic exceeded by 50 percent of the battles. For the artillery density characteristic, it was 16 guns per kilometer. A second way to deal with this feature of the data is to use ranges rather than confidence intervals as a basis for the criteria of credibility. Values of a characteristic might be employed that contain 90 percent of the battles, or for a tighter criteria, 50 percent of them.

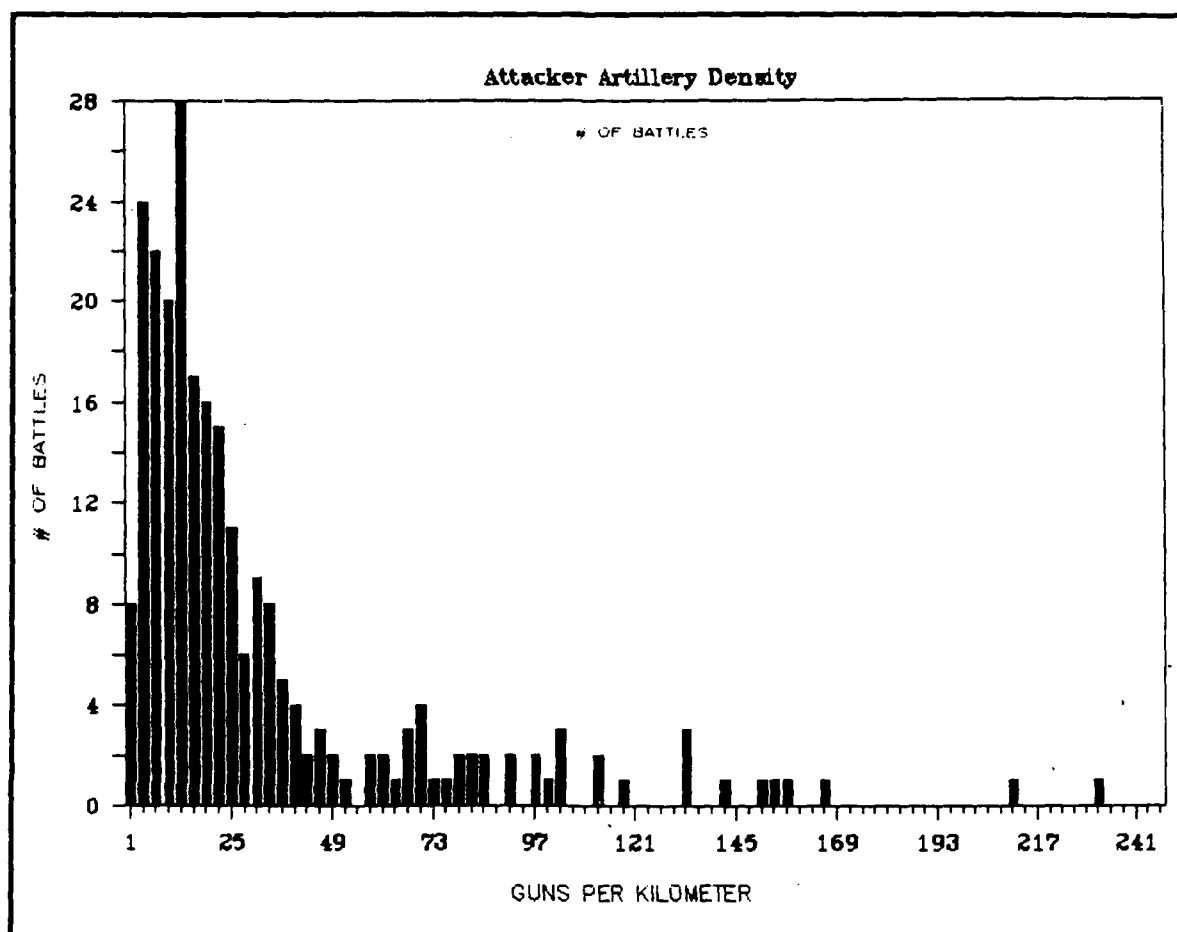


Figure 1. Skewedness of Characteristics

e. A second feature of the data, homogeneity, is illustrated by Figure 2. It plots the artillery per kilometer of front by campaign. The graph simplifies the actual analysis which was carried out in terms of 16 theaters or campaigns. The data arrayed in this fashion has two features relevant for our purposes. Firstly, the ranges are very wide for theaters. Secondly, the medians, while not identical, are very low for all of them. The medians are shown by the small diamond next to each stack of X's, each of which represents one battle. Thirdly, the variations for each theater are so wide that it is impossible to determine with any certainty whether the median might not change if the sample of battles were expanded. There is no apparent year, theater or campaign where it can be concluded with any certainty that a different pattern of artillery density began to be observable. This feature, too, has implications for selection of a methodology. It means that there is no statistically consistent procedure for selecting subsets of data on which to base the calculations. In other words, removing outliers or grouping it by theater is unlikely to improve the quality of the criteria.

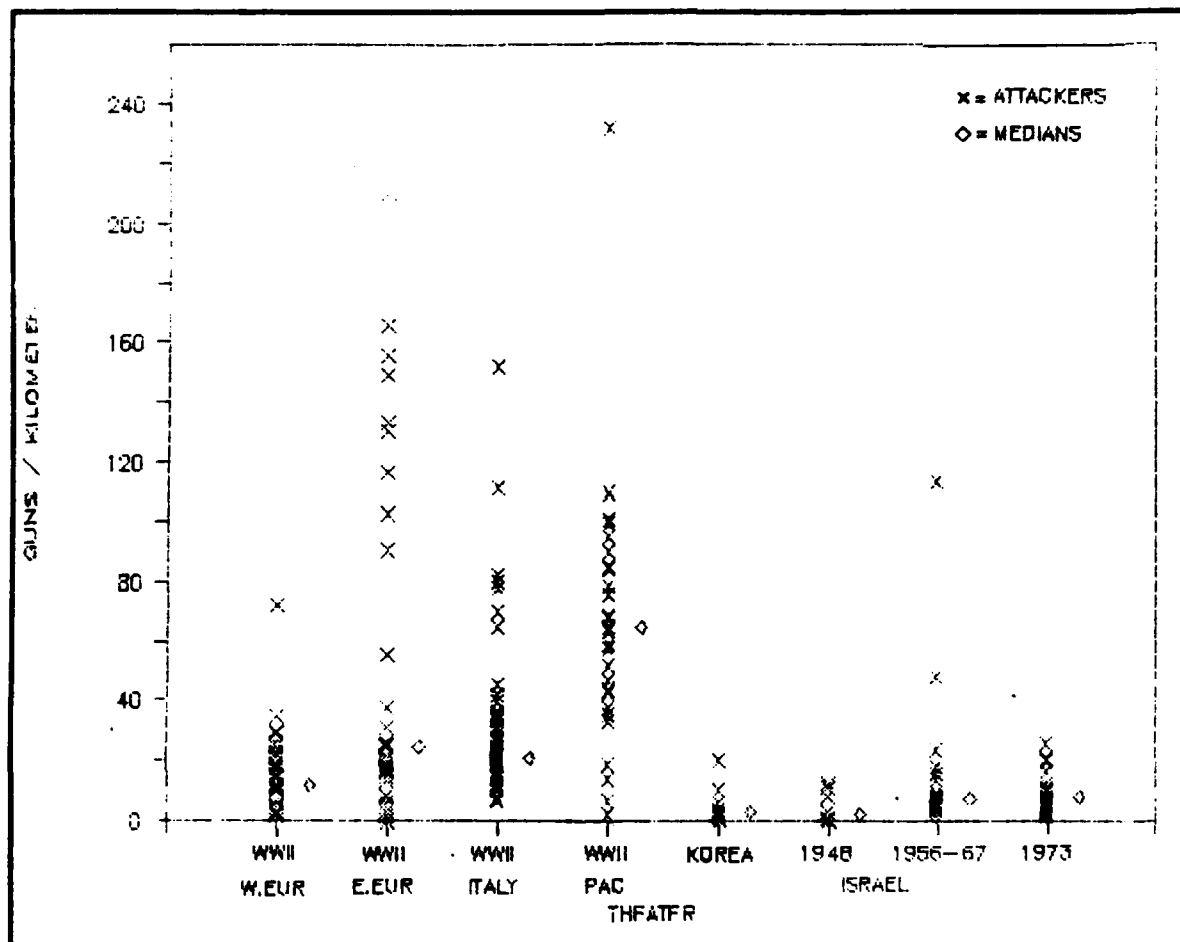


Figure 2. Homogeneity of Characteristics

f. Moreover, there appears to be no particular time during the last 50 years where a change in the pattern is observable. Considering the numerous changes in the nature of weapons and tactics that have been observed, this is surprising. The possibility of heterogeneity of data was tested by use of the Kruskal Wallis distribution free analysis of variance combined with Dunn's distribution free multiple comparison procedure based on rank sums. The results were the same: a hypothesis of no change over time or between theaters could not be rejected for this characteristic. The same hypothesis was tested for other characteristics of the data and could not be rejected for any of them. While this does not guarantee that no such differences actually developed, it does indicate that a logical criteria for rejecting some data and accepting others is not immediately apparent.

g. The third feature of the data, variability, is illustrated by Table 7. It shows, for select characteristics, the battle with the highest and with the lowest value for that characteristic. For example, advance rate during combat is shown at the bottom of the figure. The fastest rate of opposed advance against a determined defense occurred in 1967 during the Sinai

campaign, where the Israelis moved forward at the rate of approximately 45 kilometers per day. The slowest rate occurred during one of the engagements on Okinawa in 1945 when the United States moved forward at the rate of 100 meters per day. The range within which the characteristics of a battle may be found is exceedingly wide.

Table 7. Variability of Characteristics

Characteristic	Type of characteristic	Year	Attacker & Defender	Value of characteristic	Ratio of High to Low Values
Force ratio men (atkr:dfdr)	High: Low	1967 1945	Egypt:Israel Japan:USA	17:1 .3:1	57:1
Force ratio artillery (atkr:dfdr)	High: Low:	1945 1948	USA:Japan Israel:Syria	50:1 .11:1	450:1
Mortar density dfdr (wpns/km)	High: Low	1943 1973	Britain:Germany Egypt:Israel	132 0.19	730:1
Artillery density atkr (wpns/km)	High: Low	1944 1948	USA:Japan Israel:Jordan	444 0.2	2200:1
Casualty rate atkr (% per day)	High: Low	1945 1944	USA:Japan Britain:Germany	96% 0.13%	740:1
Tank loss rate atkr (% per day)	High: Low	1967 1944	Israel:Syria USA:Germany	92% .63%	150:1
Advance rate (km per day)	High: Low	1967 1945	Israel:Egypt USA:Japan	45 0.1	450:1

h. The ratios for all of the initial conditions and outcomes of combat are equally high, and it appears to be a feature of war that key characteristics can vary quite widely. Perhaps this should not be surprising; combat is a risky business. Even though it is usually routine, it can at times be horribly nonstandard. The data reflects this situation; almost anything can happen, and it has. This wide variability of characteristics appears to be an aspect of war that wargames, to be creditable, should be capable of duplicating. This wide variability also has an implication for the manner in which criteria of credibility are selected: The standards must recognize a very wide range of acceptable outcomes.

3-2. AN IMPLICATION OF THE DATA FOR WARGAME VALIDATION

Collectively, these three features of the data have an implication for validating wargames: almost any result of a wargame or simulation can be considered as credible, in the sense that something like it has probably taken place in real combat and might be expected to repeat itself in the future. Almost every possible combination of weapons, tactics, and outcomes may be found at one time or another in the past. Consequently, the demand,

often made, that a wargame must be able to reproduce history appears to be a specious one. Merely reproducing a particular battle or campaign that has occurred in the past is not enough to ensure that a wargame is credible. To say something believable about war in the future, more is needed than reproducing an historical battle. Even if the wargame cannot match a particular battle, it may still be quite representative of battles in general. Conversely, if it did match a particular battle, it may not be useful if the battle was exceptional and did not represent the typical instance of combat.

3-3. METHODOLOGY USED FOR ESTABLISHING THE CRITERIA

a. The preceding observations about the measurements resulting from combat provide guidelines for how computations of the benchmarks could be carried out. As a result, the following were adopted:

(1) Use the data for all of the 260 battles, since there is no valid basis for rejecting any battle, war, or theater.

(2) Use "robust" measures of battle characteristics that are insensitive to very large or very small outliers and to the extreme skewedness of the data.

(3) Employ measures of battle characteristics that recognize the wide variation in numerical characteristics found among battles.

b. As a consequence, the actual computations involved a procedure consisting of the following steps:

(1) Organize the data in a table with 260 rows, one for each battle, and 41 columns, one for each objective characteristic of the battle in the historical data.

(2) Calculate for each battle, where missing data does not prevent it, the ratios and percentages that describe its principal characteristics.

(3) Ignore ratios and percentages where a characteristic could not be computed because of missing data elements needed to compute it.

(4) For characteristics that could be calculated, rank their values.

(5) Determine the range of characteristics between the 5 to 95 percentiles of a characteristic as a criterion of "plausibility."

(6) Determine the interquartile range of characteristics between the 25 to 75 percentiles of a characteristic as a criterion of "centrality."

(7) Determine the median value of each characteristic.

c. This procedure produced two tables, each displaying one set of numbers describing its beginning and the second describing its end. These two sets are referred to as the "initial conditions" and the "outcomes" of the engagement. Because of missing elements of data, some of these ratios and rates are based on more instances than others. Casualty rates, for example,

can be calculated for 97 percent of the battles, while the force ratio for mortars is known for only 45 percent of them. Table E-1 shows the number of battles on which each criterion of creditability was established.

3-4. CREDIBILITY CRITERIA THAT WERE ESTABLISHED

a. Table 8 shows the first set of criteria derived from the historical data. They represent a set of criteria of "plausibility." Any simulation with a scenario that was compatible with these ranges cannot be considered unrealistic. As an example, if the attacker's casualties are between 1/5 of 1 percent per day and 6 percent per day, it represents plausible results. Moreover, if the wargame has simulated a large number of battles, 50 percent of them should be less than the median casualties of 9/10ths of one percent per day of combat.

b. Table 9 shows the second set of benchmarks. They represent a set of criteria of "centrality". Such a set is needed because a wargame represents not just a single battle, but is rather a surrogate for a great number of battles likely to take place during the war or campaign being examined. If the wargame results are too high or too low, even though plausible, they will give a false idea of the requirements for weapons and supply during the overall campaign. The simulated battle has to be near the middle of the expected battles that might take place. That is, it has to be central. As an example, unless the attacker's casualties are between $\frac{1}{2}$ percent and 2 percent per day, the extrapolation of the results of one simulated battle to all of the battles in an entire campaign could be misleading.

3-5. ADVANTAGES AND DISADVANTAGES OF THEIR USE

a. The condition of the data brings with its use some advantages and some disadvantages of using the criteria of credibility. First, the advantages: the data from which they are derived is all of and the only available quantification of tactical, combined arms combat. Tables 8 and 9 are the first time that it has been assembled in a form useful to the practicing wargamer. They enable wargame results to be tested in a straightforward fashion but do not ensure in any absolute sense that results of a wargame are "right." The tables have the potential of focusing a spotlight on unrealistic scenarios and optimistic weapons performance that might unintentionally distort the development of the military conclusions.

Table 8. Plausibility Criteria

Characteristic		Criteria		
		Lower	Median	Upper
INITIAL CONDITIONS				
Force ratio (atkr:dfdr)	-Men	.57:1	1.9:1	6.3:1
	-Mortars	.21:1	1.6:1	13:1
	-Guns	.24:1	1.7:1	15:1
Troop density (men/meter)	-Atkr	.45	2.5	9.3
	-Dfdr	.30	1.3	5.7
Weapon system density ("systems"/km)	-Atkr	24	82	600
	-Dfdr	3.7	71	610
Rifle squad density (squads/km)	-Atkr	1.1	30	120
	-Dfdr	1.3	6.7	80
Mortar density (weapons/km)	-Atkr	.76	13	110
	-Dfdr	.63	7.2	38
Antitank weapon density (weapons/km)	-Atkr	1.5	9.8	82
	-Dfdr	.59	4.2	75
Tank density (tanks/km)	-Atkr	2.9	18	80
	-Dfdr	1.3	6.9	45
Artillery density (weapons/km)	-Atkr	1.7	16	110
	-Dfdr	1.5	8.9	50
Air defense density (weapons/km)	-Atkr	2.2	7.1	35
	-Dfdr	1.1	5.0	36
Close air support density (sorties/km/day)	-Atkr	.31	5.5	43
	-Dfdr	.2	2.6	29
OUTCOMES				
Casualty rate (%/day)	-Atkr	0.2%	0.93%	5.5%
	-Dfdr	0.3	2.8	22
Casualty ratio	-(Atkr-Dfdr)	.08:1	.68:1	7.0:1
Tank loss rate (%/day)	-Atkr	0%	4.3%	44%
	-Dfdr	.5	12	53
Advance rate	-(km/day)	0	1.7	21
Combat intensity	-(hours/day)	3	10	19

Table 9. Centrality Criteria

Characteristic		Criteria		
		Lower	Median	Upper
INITIAL CONDITIONS				
Force ratio (atkr:dfdr)	-Men	1.1:1	1.9:1	3.0:1
	-Mortars	.67:1	1.6:1	4.6:1
	-Guns	.87:1	1.7:1	3.7:1
Troop density (men/meter)	-Atkr	1.3	2.5	4.6
	-Dfdr	.72	1.3	1.9
Weapon system density ("systems"/km)	-Atkr	54	82	130
	-Dfdr	30	71	150
Rifle squad density (squads/km)	-Atkr	7.6	30	71
	-Dfdr	1.9	6.7	21
Mortar density (weapons/km)	-Atkr	5.0	13	36
	-Dfdr	3.2	7.2	13
Antitank weapon density (weapons/km)	-Atkr	4.6	9.8	19
	-Dfdr	2.2	4.2	13
Tank density (tanks/km)	-Atkr	9.7	18	31
	-Dfdr	3.5	6.9	14
Artillery density (weapons/km)	-Atkr	7.6	16	31
	-Dfdr	4.8	8.9	16
Air defense density (weapons/km)	-Atkr	4.5	7.1	14
	-Dfdr	2.9	5.0	12
Close air support density (sorties/km/day)	-Atkr	1.6	5.5	14
	-Dfdr	1.0	2.6	7.5
OUTCOMES				
Casualty rate (%/day)	-Atkr	.57%	.93%	2%
	-Dfdr	1.2	2.8	5.7
Casualty ratio	(atkr-dfdr)	.26:1	.68:1	1.8:1
Tank loss rate (%/day)	-Atkr	1.7%	4.3%	14%
	-Dfdr	4.9	12	27
Advance rate	(km/day)	.40	1.7	5
Combat intensity	(hours/day)	7.3	10	13

b. Use of Tables 8 and 9 also has disadvantages. The data on which they are based are far from perfect, and their utility will have to be tested by use. It has missing items for most battles, and for some campaigns it is of better quality than for others. It does not present a neat, closely defined picture of combat that can be applied to wargame results in a fashion that guarantees the reliability of the conclusions reached. These data are not like the weapons test data used in many wargames, which has been gathered under controlled conditions and can be evaluated within the framework of well understood statistical concepts. The main disadvantage of these benchmarks is that they cannot be applied mechanically.

c. Even if the data were perfect, moreover, there is another consideration in using it: the next war has never been like the last one. Every new war differs from its predecessor in some surprising and usually unpleasant way. Examples are the effects of the machine gun in 1914 and the tank in 1939. On the other hand, many of the features remain the same from war to war. Infantry density in 1914 did not differ much from that of the Russo-Japanese war of 1904. Moreover, the organization and tactics of a German infantry division in 1939 were about the same as in 1918. In applying any criterion of creditability, nevertheless, the uncertainty remains. The problem of using Tables 8 and 9 is that we do not know whether they describe the aspects of war that will remain the same or those that will change.

3-6 SUMMARY. Two sets of criteria of credibility have been proposed, a "plausibility" set and a "centrality" set. In the next chapter, a procedure will be described for using the benchmarks to evaluate a specific simulated battle.

CHAPTER 4

APPLICATION OF THE CRITERIA TO A PARTICULAR WARGAME

4-1. PURPOSE OF THE EVALUATION

a. In this chapter, the criteria from the tables developed in the last chapter will be used to evaluate battles from a particular wargame. The simulation employed will be COSAGE, the Combat Sample Generator, a division-level model of combined arms combat that represents the design characteristics of individual weapons in a battle on terrain accurate to the 100-meter interval using the tactics and organizations appropriate to the nationalities involved.

b. The intent here will be to determine the "credibility" of the results of the game simulating combat in a hypothetical battlefield called Omaha. The results evaluated are actual ones generated by COSAGE as it was being calibrated for a particular study. In other words, we will use the criteria to think about whether any of the inputs or results were so extreme that a second look should be given before making the final simulation run of the scenario.

4-2. METHOD OF APPLYING THE CRITERIA

a. The determination is carried out by comparing rates from the wargame with ranges from the historical data. Two forms have been devised for carrying out this comparison. Blank copies of these forms are in Appendix F and may be reproduced by users. The first form is used to assess the credibility of simulated combat by one force, either Red or Blue. The form has been filled out with wargame results for the US defending division and is shown in Table 10. The benchmarks from Table 8 are transcribed to the leftmost three columns, and the results of the game runs to the rightmost of them. As can be seen, the US division had about two tanks and seven pieces of artillery per kilometer of front. The results, fighting 14 hours per day, were for the US division a casualty rate of about 18 percent per day and a movement in retrograde of about 15 kilometers per day.

b. Some of the wargame results for the US division were, as might be expected, above or below the median, but all of them were within the upper and lower plausibility benchmarks for defending forces. Consequently, we can have some assurance that the simulated performance of this force was not utterly farfetched.

c. The next step is to repeat the comparison for the Red unit. This is illustrated in Table 11, which is the same form filled out for the other unit in the Omaha scenario. As can be seen, the Red attacking corps had about 13 tanks and 24 pieces of artillery per kilometer of front. For the corps, the results were a casualty rate of about 8 percent per day.

Table 10. Force Worksheet - Defender

C R E D I B I L I T Y O F S I M U L A T E D C O M B A T							
Run Date: <u>6 OCT 78</u>		Scenario: <u>OMAHA</u>		[] Attacker			
Model: <u>COSAGE</u>		Unit: <u>BLUE DIV</u>		[X] Defender			
Type of Test: [] Centrality [X] Plausibility							
TYPE OF CRITERIA FROM MILITARY HISTORY			VALUES OF THE CRITERIA			RESULTS OF SIMULATED COMBAT	
Characteristic	Measure	Lower	Median	Upper	Value	Status	
I N I T I A L C O N D I T I O N S							
RELATIVE ADVANTAGE	Troop	ratio(atk:def)	.57:1	1.9:1	6.3:1	3.3	OK
	Mortar	ratio(atk:def)	.21:1	1.6:1	13:1	8.2	OK
	Gun & Missile	ratio(atk:def)	.24:1	1.7:1	15:1	3.2	OK
TARGET DENSITY	Troop	men/meter	.30	1.3	5.7	N.A.	-
	Weapon System	"systems"/km	3.7	71	610	N.A.	-
WEAPON DENSITY	Rifle Squad	squads/km	.13	6.7	80	N.A.	-
	Mortar	mortars/km	.63	7.2	38	2.8	OK
	Antitank	AT weapons/km	.59	4.2	75	1.8	OK
	Tank	tanks/km	1.3	6.9	45	1.9	LOW
	Artillery	guns & msis/km	1.5	8.9	50	6.6	OK
	Air Defense	weapons/km	1.1	5.0	36	1.5	OK
	Close Air	sorties/km/day	.2	2.6	29	.55	OK
O U T C O M E S							
TROOP ATTRITION	% / day	.3	2.8	22	18	HIGH	
CASUALTY RATIO	atkr:dfdr	.08:1	.68:1	7.0:1	1.5	OK	
TANK LOSSES	% / day	.5	12	53	1.8	OK	
OPPOSED MOVEMENT	km / day	0	1.7	21	-15	LOW	
COMBAT INTENSITY	hrs / day	3	10	19	14	OK	

Table 11. Force Worksheet - Attacker

C R E D I B I L I T Y O F S I M U L A T E D C O M B A T							
Run Date: <u>6 OCT 78</u>		Scenario: <u>OMAHA</u>		[X] Attacker			
Model: <u>COSAGE</u>		Unit: <u>RED ARMY</u>		[] Defender			
Type of Test: [] Centrality ☒ [X] Plausibility							
TYPE OF CRITERIA FROM MILITARY HISTORY			VALUES OF THE CRITERIA			RESULTS OF SIMULATED COMBAT	
Characteristic	Measure		Lower	Median	Upper	Value	Status
I N I T I A L C O N D I T I O N S							
RELATIVE ADVANTAGE	Troop	ratio(atk:def)	.57:1	1.9:1	6.3:1	<u>3.3</u>	<u>OK</u>
	Mortar	ratio(atk:def)	.21:1	1.6:1	13:1	<u>8.2</u>	<u>OK</u>
	Gun & Missile	ratio(atk:def)	.24:1	1.7:1	15:1	<u>3.2</u>	<u>OK</u>
TARGET DENSITY	Troop	men/meter	.45	2.5	9.3	<u>N.A.</u>	<u>-</u>
	Weapon System	"systems"/km	24	82	600	<u>N.A.</u>	<u>-</u>
WEAPON DENSITY	Rifle Squad	squads/km	1.1	30	120	<u>N.A.</u>	<u>-</u>
	Mortar	mortars/km	.76	13	110	<u>23</u>	<u>OK</u>
	Antitank	AT weapons/km	1.5	9.8	82	<u>56</u>	<u>OK</u>
	Tank	tanks/km	2.9	18	80	<u>13</u>	<u>OK</u>
	Artillery	guns & msis/km	1.7	15	110	<u>24</u>	<u>OK</u>
	Air Defense	weapons/km	2.0	7.1	35	<u>21</u>	<u>OK</u>
	Close Air	sorties/km/day	.31	5.5	43	<u>.2</u>	<u>LOW</u>
O U T C O M E S							
TROOP ATTRITION	% / day	.2	.93	5.5	<u>7.9</u>	<u>HIGH</u>	
CASUALTY RATIO	atkr:dfdr	.08:1	.68:1	7.0:1	<u>1.5</u>	<u>OK</u>	
TANK LOSSES	% / day	0	4.3	44	<u>18</u>	<u>OK</u>	
OPPOSED MOVEMENT	km / day	0	1.7	21	<u>15</u>	<u>OK</u>	
COMBAT INTENSITY	hrs / day	3	10	19	<u>14</u>	<u>OK</u>	

4-3. RESULTS OF THE EVALUATION

a. Some of the wargame results for the Red corps were above or below the median benchmark, but all of them, with two exceptions, were within the upper and lower criteria of plausibility for attacking forces. The first exception is that the corps' casualty rate is on the high side of available evidence. This does not say that it has not happened in the past--only that it has not happened very often. The second is that the Red corps used far fewer air sorties than has been normal. Perhaps something is wrong with the scenario or the inputs to the game. Since the US weapons density is within range and the Red target density is within range, it could be that some of the Blue weapons have been simulated at too high a level of effectiveness. It could also be that some of the data have been entered incorrectly or that the maneuver of Red forces is more aggressive than has usually taken place with actual forces. It could be that nothing at all is wrong, and that the particular scenario, TOEs, and tactics are such that one should expect non-traditional results.

b. Some of the benchmarks are marked "N/A," to indicate that they are not applicable. This is because this particular wargame represents combat selectively; nonessential details about rifle squads were intentionally left out of the model to provide more room in computer memory about weapons, which are its prime concern. This sort of tradeoff has to be made all the time in building combat models, and any procedure for assessing their creditability should have the capability of being applied without addressing a complete enumeration of every weapon in a simulated battle.

c. In summary, the results of this particular set of wargame results do not appear to be less than credible in terms of the benchmarks. Consequently, the model that generated them should be examined carefully in terms of tactics and data entry.

d. Assuming the final runs of a wargame have been made, another question arises: can the results be relied on to estimate the characteristics of a series of future battles? Being "credible" leaves room, as noted in Chapter 3, for a very wide range of battlefield characteristics. Most of the time, a wargame run is used for much more than the analysis of a particular force in a particular setting. It is, in a sense, a surrogate for all the battles that could occur in the campaign or contingency plan being examined. The results should, as a consequence, be representative or "central." To evaluate this aspect the above evaluation has to be repeated using the centrality benchmarks in Table 9. This involves filling out two more of the forms, one for each force.

e. Since getting an insight into wargame results often leads to a comparison of different forces in the same terrain or the same opponents with different tactics, a third and fourth copy of the form might be prepared as well to reflect the additional forces or scenario. Since the comparison becomes a bit more intricate, a second form has been devised, a scenario worksheet. It is nothing more than a transcription of the rightmost columns of the force worksheets, and an example is shown in Table 12. This particular example, it should be noted, summarizes the results of evaluating Omaha in terms of centrality rather than plausibility. The four force worksheets behind Table 12 are not shown here.

Table 12. Scenario Worksheet

COMPARISON OF SIMULATED BATTLES									
Run Date: <u>6 OCT 78</u>			Type of Test: ☒ Centrality ☐ Plausibility						
Model: <u>COSAGE</u>			Scenario: <u>OMAHA</u>						
TYPE OF CRITERIA FROM MILITARY HISTORY			BATTLE <u>1</u>		BATTLE <u>2</u>		BATTLE <u> </u>		
Characteristic	Measure		<u>RED</u>	<u>BLUE</u>	<u>RED</u>	<u>GREEN</u>			
			CORPS	DIV	CORPS	DIV			
			Atkr	Dfdr	Atkr	Dfdr	Atkr	Dfdr	
INITIAL CONDITIONS									
RELATIVE ADVANCE	Men	ratio(atk:def)	<u>HIGH</u>						
	Mortars	ratio(atk:def)	<u>HIGH</u>						
	Guns & MsIs	ratio(atk:def)							
TARGET DENSITY	Troop	men/meter							
	Weapon System	"systems"/km							
WEAPON DENSITY	Rifle Squad	squads/km							
	Mortar	mortars/km							
	Antitank	AT weapons/km	<u>HIGH</u>	<u>HIGH</u>	<u>HIGH</u>	<u>HIGH</u>			
	Tank	tanks/km		<u>LOW</u>		<u>LOW</u>			
	Artillery	guns & msIs/km							
	Air Defense	weapons/km	<u>HIGH</u>	<u>LOW</u>	<u>HIGH</u>	<u>LOW</u>			
	Air Support	sorties/km/day	<u>LOW</u>	<u>LOW</u>	<u>LOW</u>	<u>HIGH</u>			
OUTCOMES									
TROOP ATTRITION	% / day		<u>HIGH</u>	<u>HIGH</u>	<u>HIGH</u>	<u>HIGH</u>			
CASUALTY RATIO	atkr:dfdr								
TANK LOSSES	% / day		<u>HIGH</u>	<u>LOW</u>					
OPPOSED MOVEMENT	km / day		<u>HIGH</u>		<u>HIGH</u>				
COMBAT DURATION	hrs / day		<u>HIGH</u>		<u>HIGH</u>				

f. Table 12 shows the results of runs of a Red corps against a US division and of the same corps in the same location against an allied Blue division. In terms of being representative of combat in general, the following aspects of simulating this particular battle appear surprisingly high for both sides:

force ratio of troops
antitank weapon density
casualty rate
rate of opposed movement
hours of combat per day

The density of air defense weapons, moreover, appears high for an attacker and low for a defender, at least in comparison with the past.

g. While none of these out of bounds conditions are absolute verdicts either for or against the wargame results about Omaha, they do indicate the need for a careful review the way it is working.

4-4. CONCLUSION

The criteria of credibility cannot be applied in a mechanical fashion. For an analyst to conclude that a simulated battle is either "implausible" or "noncentral," consideration should be given to other factors that influence combat but that are not measured by the numerical criteria in Tables 8 and 9. While the procedure just described is the first step in the assessment of wargame credibility, a second step is equally important: thinking about the results.

CHAPTER 5

FUTURE WORK

5-1. STATISTICAL BASED RESEARCH

a. A few impressions have forced themselves on the author's attention in carrying out this research. They have to do with needed work in order to validate the tactical realism of wargames.

b. Further analysis of this data might produce "better" estimates of the ranges and medians of the characteristics, or even open the possibility of estimating useful formulas for particular assets of combat. Such research would depend, however, on new developments in the statistical theory related to (1) multivariate and nonparametric detection of outliers and to (2) exploratory data analysis. Usable tools of analysis in these areas may not now exist. This is because of the rather nonstandard distribution of the values of combat characteristics. The utility of historical data to wargaming as a consequence would appear to lie in simple tabulations making rather crude data useful rather than in analyzing it with statistical procedures copied from the physical sciences.

5-2. TACTICALLY MEANINGFUL PRINTOUTS

It is discouraging to validate wargames with advanced statistics when the printout of a typical wargame consists of huge piles of obscure detail. The first step is to make the obvious clear. With wargame printouts, the situation now is similar to the owner of a business who wants to know whether or not to build a new factory. The comptroller thereupon carts in a stack of printouts of the spare parts inventory of every plant. The owner looks surprised, and the comptroller returns with another load of listings, this time of every accounts receivable entry on the books of the company and the sick leave records of all its employees. The owner, thereupon, gives up and goes to an outside accounting firm to get a one page financial statement that tells him where he stands. Wargaming is in much the same situation, the computers don't printout "the bottom line." A report similar to Table 11 should be programmed to produce standardized output of every simulation. Otherwise, management really has nothing to review. Table 13 suggests Army wargames and simulations in need of such summaries of overall tactical operations.

5-3. DATA ABOUT VIETNAM BATTLES

It is difficult to recognize, as noted earlier, which factors change and which ones remain constant in war. The engineering and ballistics characteristics of the machinegun were known in 1914, and with excruciating precision. That didn't help very much in the trenches of Flanders. There was no operational data about the interactions in its use along with other weapons. For modern technology the interactions have been observed most recently during the battles in Vietnam. Surprisingly the only data base of Army casualties in Vietnam is being prepared now by the Navy. Quantitative data showing a balanced picture of Vietnam battles should be assembled and disseminated to the Army study community.

**Table 13. Wargames Requiring Tactical
Information Displays**

Game	Echelon repre- sented	Owned by
CARMONETTE	Battalion	TRAC - White Sands
CEM	Theater	Concepts Analysis Agency
FORCEM	Theater	Concepts Analysis Agency
JANUS	Brigade	Lawrence Livermore Lab
JTLS	Theater	Joint Chiefs of Staff
VECTOR 2	Corps	TRAC - Leavenworth

APPENDIX A
CONTRIBUTORS

1. AUTHOR

Robert McQuie

2. PRODUCT REVIEW BOARD

Dr. Robert Helmbold, Chairman
Dr. Daniel Willard, DUSA(OR)
Mr. Carl Bates
Mr. Steven McNulty

APPENDIX B
STUDY DIRECTIVE

1. **PURPOSE OF STUDY DIRECTIVE.** To direct the development of an historical knowledge base for assessing realism of combat simulations and wargames.

2. **STUDY TITLE.** Benchmarks.

3. **BACKGROUND**

a. No readily available quantitative measures exist that provide for comparison between the results of historical combat and the results of simulations and wargames.

b. This CAA Fellowship effort has been designed to alleviate this deficiency. It will produce tables of data based on actual battles and sets of formats to summarize key aspects of simulated combat.

4. **STUDY PROPONENT.** Director, U. S. Army Concepts Analysis Agency.

5. **STUDY AGENCY.** Agency Fellowship Program.

6. **TERMS OF REFERENCE**

a. **Objective.** To develop relationships of various parameters of combat that are useful in comparing the results of combat simulations with historical combat.

b. **Scope.** Brigade, division, and corps-level battles. The data required for these battles will be derived from the combat history data base at CAA (as sanitized based on the CHASE Study).

c. **Timeframe.** 1939-1982.

d. **Assumptions**

(1) Some relationships that are developed from the CAA combat history data base can show key characteristics of combat in the past that are always relevant.

(2) Wargame evaluations can be done with sets of ratios in much the same way as is analysis of financial statements.

(3) Subjective judgments are ultimately more important than objective benchmarks but cannot be developed until benchmarks are developed.

e. **Benefits.** The results from this fellowship can be useful to four groups, each of which is concerned with evaluating the results of CAA models: CAA management, project leaders, analysts, and HQDA action officers. These results can provide a warning of simulated combat results that are likely to become controversial; guide change in models; and alert data preparation personnel to critical areas.

f. Essential Elements of Analysis

- (1) How were the ratios used to establish the parameters (i.e., the benchmarks) defined?
- (2) What data will be used from the data base to establish the ratios?
- (3) Will the initial condition ratios be useful?
- (4) Will the following ratios about the results of actual combat be useful in conducting an analysis?
- (5) Is the methodology proposed for using the data one that can be applied by CAA personnel?

7. RESPONSIBILITIES

- a. RS. Provide access to a personal computer for use by the CAA fellowship during the study.
- b. CAA. Provide a data entry assistant for 1 month.

8. MILESTONES

- | | |
|----------------------------|-----------------|
| a. Initial ARB | 1 April 1987 |
| b. Battles files generated | 29 April 1987 |
| c. Battles files revised | 19 May 1987 |
| d. Benchmarks calculated | 1 July 1987 |
| e. Output formats designed | 24 July 1987 |
| f. IPR | 3 August 1987 |
| g. Final ARB | 15 October 1987 |
| h. PRB completed | 20 October 1987 |
| i. Report completed | 1 November 1987 |

APPENDIX C
BIBLIOGRAPHY

Bader, Brian et. al. Combat History Analysis Study Effort, Data Enhancement Study. Volume I: Introduction and Bibliography. Fairfax, VA: Data Memory Systems Inc., January 1986. AD-A175712

Volume II. (Revised advance rate figures (p 5). "Specific" revisions (p 27). "Consistency" revisions (p 82). No change list (p 149) contains some corrections.) AD-A175713

Volume III. (Revised strength and casualties data with some corrections. Basic data for reinforcements (p 4). Details of basis for assigning victory (p 122).) AD-A175714

Volume IV. (Basic data on hours of actual combat and duration (p 3) and on widths of front (p 81), including some revisions not noted as such.) AD-A175715

Volume V. (Explanations of posture changes. Some revisions (p 3). Data reliability estimates (p 25).) AD-A175716

Bader, Brian et al. Data Base Error Corrections. Fairfax, VA: Data Memory Systems Incorporated, January 1987. (Corrections of advance rates (p 19), duration and distances (pp 29, 50, 55), hours (p 26), and miscellaneous data (pp 28, 50, 56).) AD-176750

Combat Data Subscription Service, Volume I, No. 1. Winter, 1974. Dunn Loring, VA: Historical Evaluation and Research Organization. (Original source on World War II battles in Italy and Northwest Europe. Revised by Volume II, No. 1.)

Volume I, No. 2, Spring 1975. (Battle narratives for Volume I, No. 1. (Original source of data on 1967 and 1973 Arab Israeli Wars. Revised by Volume II, No. 1.)

Volume I, No. 3, Summer, 1975. (Original source of data on 1948 and 1956 Arab-Israeli Wars. Table on World War II tank battles (p 69).)

Volume II, No. 1, Winter, 1976. (Revision of data on 1967 War. Source of Benchmarks data on mortars, antitank weapons and air defense weapons.)

Volume II, No. 2, Spring, 1977. (Revision of data on 1973 War. Source of Benchmarks data on mortars, antitank weapons and air defense weapons.)

Dupuy, Trevor N. et. al. Average Casualty Rates for War Games Based on Historical Combat Data. Washington, DC: Historical Evaluation and Research Organization, February, 1967. (Source of Korean War data.) AD-890546,7&8

Dupuy, Trevor N. et al. **Comparative Analysis of Armored Conflict Experience.** 2 Vols. Washington, DC: Historical Evaluation and Research Organization, May 1967. (Narrative data and analysis of 20 tank battles in World War II. Source of data on France 1940). AD-873137 and 8

Dupuy, Trevor N. et al. **Analysis of Factors that Have Influenced Outcomes of Battle and Wars: A Data Base of Battles and Engagements, Vol. IV: Wars from 1904 to 1940.** Dunn Loring, VA: Historical Evaluation and Research Organization, June 1983 (Main source of data on battles before 1941). AD-B087720L

Volume V: World War II Campaigns in North Africa, Italy and Western Europe. AD-B087721L

Volume VI: World War II Campaigns in France 1940, the Eastern Front and Against Japan. The 1967, 1968 and 1973 Arab Israeli Wars. (Main source of data on World War II battles in Russia, the Pacific, and in the 1967 and 1973 Arab Israeli Wars.) AD-B087722L

McQuie, Robert et al. **Multivariate Analysis of Combat,** Washington, DC: Planning Research Corp., May 1968. (Alternate source of some data for Italy, Korea, and Okinawa engagements. First analysis of historical data on combat and of the Dupuy data base.) AD-673294

McDonald, Charles et al. **Independent Review/Reassessment of Anomalous Data.** Alexandria, VA: LSW Management Associates, Inc. June 1987. (Audit of data on 61 battles in the Dupuy data. Contains a few new data elements. Not used as a source in this paper.) AD-195726

Reister, Frank A. **Battle Casualties and Medical Statistics, US Army Experience in the Korean War.** Washington, DC: Department of the Army, The Surgeon General, no date [+/-1960]. (Strengths, durations, date, and casualties by echelon for 52 corps and division engagements, but for US units only. Supplementary data on higher and lower echelon units. Not used as a source of data for in this paper. Only the US side of the battle is described.)

APPENDIX D - HISTORICAL DATA USED

Identification					Environment				Tactics			
Name	Battle	Location	Date	Nations	Echelon	Terrain	Cover	Humidity	Temp	Attacker	Major	Suprs
				Atkr	Dfdr					Maneuver	Wdth	Dpth
Abu Ageila-Umkatef	Sinai	Oct-56	Is	Egy	Div Rgt	Flat	Bare	Dry	Hot	Frontal Atk	6	No
Abu Ageila-Umkatef	Sinai	Jun-67	Is	Egy	Div Div	Flat	Mixed	Dry	Hot	Envelopment	8	9
Acre	Sinai	May-48	Is	Egy	Rgt Rgt	Flat	Mixed	Dry	Temp	Frontal Atk	2	No
Adabiya	Sinai	Oct-73	Is	Egy	Div Corp	Rolling	Desert	Dry	Hot	Envelopment	13	7
Ageila-Rafah-Ayin	Sinai	Dec-48	Is	Egy	Div Div	Flat	Bare	Dry	Temp	Frontal Atk	2	No
Ahmadiyeh	Golan	Oct-73	Syr	Is	Div Rgt	Rugged	Bare	Dry	Hot	Frontal Atk	8	15
Alam Halifa	N.Africa	Aug-42	Ger+	Brit	Army Army	Flat	Bare	Dry	Hot	Envelopment	90	No
Alamein 2	N.Africa	Oct-42	Brit	Ger+	Army Army	Flat	Bare	Dry	Temp	Penetration	61	Atkr
Alamein-Bridgehead	N.Africa	Oct-42	Brit	Ger+	Army Army	Flat	Bare	Dry	Temp	Frontal Atk	61	No
Alamein-Lightfoot	N.Africa	Oct-42	Brit	Ger+	Army Army	Flat	Bare	Dry	Temp	Penetration	61	Atkr
Alamein-Supercharg	N.Africa	Nov-42	Brit	Ger+	Army Army	Flat	Bare	Dry	Temp	Penetration	61	No
Amphitheater	Italy S	Sep-43	Brit	Ger	Div Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	13	No
Anzio Breakout	Italy R	May-44	US	Ger	Div Div	Flat	Mixed	Light	Temp	Frontal Atk	6	Atkr
Anzio-Albano Road	Italy R	May-44	Brit	Ger	Div Div	Flat	Mixed	Light	Temp	Frontal Atk	6	No
Aprilia 1	Italy A	Jan-44	Brit	Ger	Div Div	Flat	Mixed	Heavy	Temp	Frontal Atk	7	Atkr
Aprilia 2	Italy A	Feb-44	Ger	Brit	Div Div	Flat	Mixed	Dry	Cold	Frontal Atk	2	No
Ardea	Italy R	May-44	Brit	Ger	Div Div	Rolling	Mixed	Dry	Temp	River Cross	9	No
Ardennes	W.Europe	May-40	Ger	Fr	Argp Army	Rolling	Mixed	Light	Temp	River Cross	96	No
Arracourt	W.Europe	Sep-44	Ger	US	Div Rgt	Rolling	Mixed	Light	Temp	Frontal Atk	10	No
Arras	W.Europe	May-40	Brit	Ger	Rgt Rgt	Rolling	Mixed	Dry	Temp	Envelopment	5	No
Baerendorf 1	W.Europe	Nov-44	US	Ger	Div Div	Rolling	Mixed	Dry	Cold	River Cross	4	No
Baerendorf 2	W.Europe	Nov-44	US	Ger	Div Div	Rolling	Mixed	Dry	Cold	Frontal Atk	11	No
Banias-Masada	Golan	Jun-67	Is	Syr	Rgt Rgt	Rugged	Mixed	Dry	Hot		5	No
Bastogne	W.Europe	Dec-44	Ger	US	Corp Rgt	Rolling	Mixed	Light	Cold	Frontal Atk	12	No
Battipaglia 1	Italy S	Sep-43	Ger	Brit	Div Div	Rolling	Mixed	Dry	Temp	Frontal Atk	5	No
Battipaglia 2	Italy S	Sep-43	Brit	Ger	Div Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	12	No
Bayonette Line	Korea	Jun-51	US	NKor	Div Army	Rugged		Light	Temp	Frontal Atk	32	No
Bekka Valley	Lebanon	Jun-82	Is	Syr	Corp Div	Rolling	Desert	Dry	Hot	Frontal Atk	26	No
Berezina River	E.Europe	Jun-44	USSR	Ger	Corp Div	Flat	Swamp	Dry	Temp	Dbl Envelop	10	No
Bir Gifgafa	Sinai	Jun-67	Egy	Is	Rgt Rgt	Flat	Desert	Dry	Hot	Frontal Atk	5	2
Bir Hama-Gifgafa	Sinai	Jun-67	Is	Egy	Div Div	Flat	Desert	Dry	Hot	Envelopment	10	6
Bir Lahfan	Sinai	Jun-67	Is	Egy	Div Div	Flat	Desert	Dry	Hot	Frontal Atk	10	5
Bir Rud Salim	Sinai	Nov-56	Is	Egy	Rgt Rgt	Flat	Bare	Dry	Hot	Frontal Atk		No
Birhassna-Thamada	Sinai	Jun-67	Is	Egy	Div Div	Flat	Desert	Dry	Hot	Frontal Atk	7	5
Boos	W.Europe	Jun-40	Fr	Ger	Co Co	Rolling	Mixed	Light	Temp	Frontal Atk	1	No
Bourgaltroff	W.Europe	Nov-44	US	Ger	Div Div	Rolling	Mixed	Light	Cold	Frontal Atk	11	No
Boutmiya	Golan	Jun-67	Is	Syr	Div Div	Rugged	Mixed	Dry	Hot		8	No
Bowling Alley 1	Italy A	Feb-44	Ger	US	Corp Div	Flat	Mixed	Dry	Temp	Frontal Atk	10	Atkr
Brody 1	E.Europe	Jul-44	USSR	Ger	Corp Rgt	Flat	Swamp	Dry	Temp	Frontal Atk	6	No
Brody 2	E.Europe	Jul-44	USSR	Ger	Corp Div	Flat	Swamp	Dry	Temp	Frontal Atk	7	No
Burbach-Durstel	W.Europe	Nov-44	US	Ger	Div Div	Rolling	Mixed	Light	Cold	Frontal Atk	11	No
Butte Line	Korea	Feb-51	US	NKor	Div Army			Dry	Temp	Frontal Atk	19	No
Caiazzo	Italy V	Oct-43	US	Ger	Div Div	Rolling	Mixed	Dry	Temp	River Cross	9	No
Calabritto	Italy V	Dec-43	Brit	Ger	Div Div	Rugged	Mixed	Light	Temp	Frontal Atk	2	No
Cambrai	W.Europe	May-40	Ger	Fr	Div Div	Rolling	Mixed	Light	Temp	Frontal Atk	2	No
Campoleone 1	Italy A	Jan-44	Brit	Ger	Div Div	Flat	Mixed	Dry	Cold	Frontal Atk	11	No
Campoleone 2	Italy A	Feb-44	Ger	Brit	Div Rgt	Flat	Mixed	Dry	Temp	Dbl Envelop	11	No
Campoleone Station	Italy R	May-44	US	Ger	Div Div	Rolling	Mixed	Dry	Temp	Frontal Atk	7	No
Canal 1	Italy V	Oct-43	Brit	Ger	Div Div	Flat	Mixed	Light	Temp	River Cross	9	No
Canal 2	Italy V	Oct-43	Brit	Ger	Div Rgt	Rolling	Mixed	Light	Temp	River Cross	9	No
Capua	Italy V	Oct-43	Brit	Ger	Div Div	Flat	Mixed	Dry	Temp	River Cross	2	No
Carroceto	Italy A	Feb-44	Ger	Brit	Div Div	Flat	Mixed	Dry	Cold	Frontal Atk	8	No
Castel Volturno	Italy V	Oct-43	Brit	Ger	Div Div	Flat	Mixed	Dry	Temp	River Cross	10	No
Castellonoro	Italy R	May-44	US	Ger	Div Div	Rugged	Bare	Dry	Temp	Frontal Atk	5	No
Chan River	Korea	Apr-51	US	NKor	Div Army			Light	Temp	Frontal Atk	24	No
Changkufeng 1	Manchuria	Jul-38	Jap	USSR	Rgt Rgt	Rugged	Bare	Dry	Temp	Envelopment	3	No
Changkufeng 2	Manchuria	Aug-38	USSR	Jap	Div Div	Rugged	Bare	Dry	Temp	Dbl Envelop	3	No
Changkufeng 3	Manchuria	Sep-38	USSR	Jap	Army Div	Rugged	Bare	Dry	Temp	Dbl Envelop	6	No
Chartres	W.Europe	Aug-44	US	Ger	Div Army	Rolling	Mixed	Dry	Temp	Envelopment	5	No
Chateau Salins	W.Europe	Nov-44	US	Ger	Corp Div	Rolling	Mixed	Heavy	Cold	Frontal Atk	17	No
Chinese Farm 1	Sinai	Oct-73	Is	Egy	Div Corp	Rolling	Desert	Dry	Hot	Envelopment	14	15
Chinese Farm 2	Sinai	Oct-73	Is	Egy	Div Corp	Rolling	Desert	Dry	Hot	Frontal Atk	11	19
Chinese Farm-W.	Sinai	Oct-73	Is	Egy	Div Div	Rolling	Desert	Dry	Hot	Frontal Atk	11	11
Chouigui Pass	N.Africa	Nov-42	Ger	US	Bn Co	Rolling	Bare	Dry	Temp	Frontal Atk	1	Dfdr
Ciechanow 1	E.Europe	Jan-45	USSR	Ger	Div Div	Rolling	Bare	Light	Cold	Frontal Atk	2	No
Ciechanow 2	E.Europe	Jan-44	USSR	Ger	Div Div	Rolling	Bare	Light	Cold	Frontal Atk	3	No
Cisterna	Italy R	May-44	US	Ger	Div Div	Flat	Mixed	Light	Temp	Frontal Atk	8	Atkr
Cobra	W.Europe	Jul-44	US	Ger	Corp Corp	Rolling	Mixed	Dry	Temp	Frontal Atk	11	No
Death to Invader	Sinai	Jul-48	Is	Egy	Rgt Rgt	Rolling	Bare	Dry	Hot	Frontal Atk		No
Dragon	Italy V	Oct-43	US	Ger	Div Div	Rolling	Mixed	Light	Temp	Frontal Atk	5	No
Durstel-Faerbervle	W.Europe	Nov-44	US	Ger	Corp Corp	Rolling	Mixed	Light	Cold	Frontal Atk	51	No

Identification					Environment				Tactics					
Battle	Nations	Echelon						Attacker	Major					
Name	Location	Date	Atkr	Dfdr	Atkr	Dfdr	Terrain	Cover	Humidity	Temp	Maneuver	Wdth	Opth	Suprs
East Prussia	E. Europe	Jan-45	USSR	Ger	ArGp	ArGp	Rolling	Mixed	Light	Cold	Obl Envelop	500		No
Eboli	Italy S	Sep-43	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	Frontal Atk	8		No
El Arish	Sinai	Jun-67	Is	Egy	Div	Div	Flat	Desert	Dry	Hot	Frontal Atk	7	3	No
El Auja-Ayin	Sinai	Dec-48	Is	Egy	Div	Div	Flat	Bare	Dry	Temp	Frontal Atk	2		No
El Guettar 3	N. Africa	Mar-43	Ger	US	Div	Div	Rolling	Bare	Dry	Temp	Frontal Atk	25		Atkr
Fiocchia	Italy A	Feb-44	Ger	US	Div	Div	Flat	Mixed	Light	Temp	Frontal Atk	8		No
Formia	Italy R	May-44	US	Ger	Div	Div	Rugged	Bare	Dry	Temp	Frontal Atk	4		No
Fosso Campoleone	Italy R	May-44	US	Ger	Corp	Div	Rolling	Mixed	Dry	Temp	Frontal Atk	11		No
Francolise	Italy V	Oct-43	Brit	Ger	Div	Rgt	Rolling	Mixed	Light	Temp	Frontal Atk	6		No
Gaza Strip	Sinai	Jun-67	Is	PLO	Div	Div	Flat	Mixed	Dry	Hot	Frontal Atk	9	6	No
Gaza-Khan Yunis	Sinai	Nov-56	Is	Egy	Rgt	Rgt	Flat	Urban	Dry	Hot	Frontal Atk	5		No
Golan Conrath	Golan	Oct-73	Syr	Is	Div	Div	Rugged	Bare	Dry	Hot	Frontal Atk	25	24	No
Goodwood	W. Europe	Jul-44	Brit	Ger	Army	Corp	Rolling	Mixed	Dry	Temp	Frontal Atk	21		Atkr
Grazzanise	Italy V	Oct-43	Brit	Ger	Div	Div	Flat	Mixed	Dry	Temp	River Cross	2		No
Guadalajara	Spain	Mar-37	Ital	SRpb	Army	Army	Flat	Bare	Heavy	Cold	Frontal Atk	11		Atkr
Han River	Korea	Mar-51	US	NKor	Div	Army			Dry	Temp	River Cross	8		No
Hills 153-115	Pacific	Jun-45	US	Jap	Div	Rgt	Rugged	Mixed	Dry	Temp	Frontal Atk	3		No
Hill-95 1	Pacific	Jun-45	US	Jap	Div	Rgt	Rugged	Mixed	Dry	Temp	Frontal Atk	3		No
Hill-95 2	Pacific	Jun-45	US	Jap	Div	Rgt	Rugged	Mixed	Dry	Temp	Frontal Atk	2		No
Hiram	Golan	Oct-48	Is	Syr	Div	Rgt	Rolling	Bare	Dry	Hot	Frontal Atk	3		No
Hushniyah	Golan	Oct-73	Is	Syr	Div	Div	Rugged	Bare	Dry	Hot	Frontal Atk	12	9	No
Il Gioglio Pass	Italy N	Sep-44	US	Ger	Div	Rgt	Rugged	Mixed	Light	Temp	Frontal Atk	4		No
Iron Triangle	Korea	Jun-51	NKor	US	Army	Div			Heavy	Temp	Frontal Atk	32		No
Ismailla	Sinai	Oct-73	Is	Egy	Div	Div	Rolling	Desert	Dry	Hot	Frontal Atk	20	11	No
Itri-Fondi	Italy R	May-44	US	Ger	Div	Div	Rugged	Mixed	Dry	Temp	Envelopment	6		No
Iwo Jima 1	Pacific	Feb-45	US	Jap	Corp	Div	Rolling	Bare	Dry	Temp	Frontal Atk	5		No
Iwo Jima 3	Pacific	Mar-45	US	Jap	Corp	Rgt	Rolling	Bare	Dry	Temp	Frontal Atk	2		No
Iwo Jima-Suribachi	Pacific	Feb-45	US	Jap	Rgt	Rgt	Rugged	Bare	Dry	Temp	Frontal Atk	1		No
Jebel Geneifa	Sinai	Oct-73	Is	Egy	Div	Corp	Rolling	Desert	Dry	Hot	Frontal Atk	18	11	No
Jebel Libni	Sinai	Jun-67	Is	Egy	Div	Div	Flat	Desert	Dry	Hot	Frontal Atk	10	7	No
Jenin	W. Bank	Jun-67	Is	Jor	Div	Rgt	Rugged	Mixed	Dry	Hot	Obl Envelop	2	5	Atkr
Jerusalem	W. Bank	Jun-67	Is	Jor	Corp	Rgt	Rugged	Mixed	Dry	Hot	Obl Envelop	11	13	Atkr
Jerusalem Cor'dor	W. Bank	Jul-48	Is	Jor	Div	Rgt	Rolling	Bare	Dry	Hot	Frontal Atk	5		No
Jerusalem Jebussi	W. Bank	Apr-48	Is	Jor	Rgt	Rgt	Rugged	Mixed	Dry	Temp	Frontal Atk	10		No
Jitra	Malaysia	Dec-41	Brit	Jap	Div	Div	Rolling	Wooded	Heavy	Hot	Frontal Atk	8		Atkr
Kakazu-Tombstone	Pacific	Apr-45	US	Jap	Div	Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	4		No
Kansas Line	Korea	Apr-51	NKor	US	Army	Div			Light	Temp	Pursuit	24		No
Kantara Firdan	Sinai	Oct-73	Is	Egy	Div	Corp	Rolling	Desert	Dry	Hot	Frontal Atk	27	17	No
Katbiya	W. Bank	Jun-67	Is	Jor	Rgt	Rgt	Rugged	Mixed	Dry	Hot	Frontal Atk	1	6	No
Kerama	Jordan	Mar-68	Is	Jor	Div	Div	Flat	Mixed	Dry	Temp	Frontal Atk	5		No
Kfar Shams-Antar	Golan	Oct-73	Is	Irq	Div	Div	Rugged	Bare	Dry	Hot	Envelopment	20	7	Atkr
Kochi Conrath	Pacific	May-45	Jap	US	Div	Rgt	Rugged	Mixed	Dry	Temp	Frontal Atk	2		No
Kochi Ridge 4	Pacific	May-45	US	Jap	Div	Div	Rugged	Mixed	Light	Temp	Frontal Atk	2		No
Kochi-Onaga 1	Pacific	Apr-45	US	Jap	Div	Rgt	Rugged	Mixed	Light	Temp	Obl Envelop	3		No
Kochi-Onaga 2	Pacific	Apr-45	US	Jap	Div	Rgt	Rugged	Mixed	Dry	Temp	Envelopment	3		No
Kochi-Onaga 3	Pacific	Apr-45	US	Jap	Div	Rgt	Rugged	Mixed	Light	Temp	Obl Envelop	3		No
Korsun-Shevchovskiy	E. Europe	Jan-44	USSR	Ger	ArGp	Army	Flat	Mixed	Heavy	Cold	Obl Envelop	180		No
Kuneitra	Golan	Jun-67	Is	Syr	Div	Div	Rugged	Mixed	Dry	Hot			7	No
Kuneitra 2	Golan	Oct-73	Syr	Is	Div	Rgt	Rugged	Bare	Dry	Hot	Frontal Atk	15	12	Atkr
Kunson	Korea	Sep-50	US	NKor	Div	Army			Dry	Temp	Pursuit	73		No
Kursk Conrath	E. Europe	Aug-43	USSR	Ger	ArGp	Army	Rolling	Mixed	Dry	Temp	Frontal Atk	250		No
Kursk-Belgorod	E. Europe	Sep-43	USSR	Ger	Army	Div	Rolling	Mixed	Dry	Temp	Frontal Atk	16		No
Kursk-Oboyan 1	E. Europe	Jul-43	Ger	USSR	Corp	Army	Rolling	Mixed	Dry	Temp	Frontal Atk	16		No
Kursk-Oboyan 2	E. Europe	Jul-43	Ger	USSR	Corp	Army	Rolling	Mixed	Dry	Temp	Frontal Atk	20		No
Kursk-Oboyan 3	E. Europe	Jul-43	Ger	USSR	Corp	Army	Rolling	Mixed	Dry	Temp	Frontal Atk	25		No
Kursk-Prokhorovka	E. Europe	Jul-43	USSR	Ger	ArGp	Corp	Rolling	Mixed	Dry	Temp	Frontal Atk	25		No
Kursk-South	E. Europe	Jul-43	Ger	USSR	Army	ArGp	Rolling	Mixed	Light	Temp	Frontal Atk	30		No
Lanuvio	Italy R	May-44	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	Frontal Atk	3		No
Lariano	Italy R	Jun-44	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	Frontal Atk	5		No
Leninrad-"Spark"	E. Europe	Jan-43	USSR	Ger	Army	Army	Flat	Mixed	Light	Cold	Frontal Atk	13		No
Lviv-Bandomierz	E. Europe	Jul-44	USSR	Ger	ArGp	ArGp	Flat	Mixed	Dry	Temp	Envelopment	440		No
Maeda Escarpment	Pacific	Apr-45	US	Jap	Div	Div	Rolling	Mixed	Heavy	Temp	Frontal Atk	2		No
Melitopol	E. Europe	Jan-44	USSR	Ger	ArGp	Army	Rolling	Mixed	Dry	Temp	River Cross	111		No
Melun	W. Europe	Aug-44	US	Ger	Div	Div	Rolling	Mixed	Light	Temp	River Cross	5		No
Metz	W. Europe	Sep-44	US	Ger	Corp	Army	Rolling	Mixed	Light	Temp	Frontal Atk	25		No
Mishmarhayarden 1	Golan	Jun-48	Syr	Is	Rgt	Rgt	Flat	Mixed	Dry	Hot	Frontal Atk	5		No
Mishmarhayarden 2	Golan	Jul-48	Syr	Is	Rgt	Rgt	Flat	Mixed	Dry	Hot	Frontal Atk	6		No
Nitla Pass	Sinai	Jun-67	Egy	Is	Div	Div	Flat	Desert	Dry	Hot	Frontal Atk	1	10	No
Noletta River 1	Italy A	Feb-44	Ger	Brit	Div	Div	Flat	Mixed	Dry	Cold	River Cross	3		No
Noletta River 2	Italy A	Feb-44	Ger	Brit	Div	Div	Flat	Mixed	Dry	Cold	River Cross	4		Atkr
Noletta River 3	Italy R	May-44	Brit	Ger	Div	Div	Flat	Mixed	Light	Temp	River Cross	9		No

Identification					Environment				Tactics			
Battle		Nations		Echelon	Terrain	Cover	Humidity	Temp	Attacker			
Name	Location	Date	Atkr Dfdr	Atkr Dfdr					Maneuver	Wdth	Dpth	Suprs
Monte Acero	Italy V	Oct-43	US Ger	Div Div	Rugged	Mixed	Dry	Temp	Frontal Atk	8		No
Monte Camino 1	Italy V	Nov-43	Brit Ger	Div Rgt	Rugged	Mixed	Light	Temp	Frontal Atk	5		No
Monte Camino 2	Italy V	Nov-43	Ger Brit	Rgt Rgt	Rugged	Mixed	Light	Temp	Frontal Atk	1		No
Monte Camino 3	Italy V	Dec-43	Brit Ger	Div Rgt	Rugged	Mixed	Light	Temp	Frontal Atk	2		No
Monte Grande	Italy V	Oct-43	Brit Ger	Rgt Rgt	Rolling	Mixed	Light	Temp	Frontal Atk	9		No
Monte Grande	Italy R	May-44	US Ger	Div Div	Rolling	Mixed	Dry	Temp	Frontal Atk	9		No
Monte Lungo	Italy V	Nov-43	US Ger	Div Rgt	Rugged	Mixed	Light	Temp	Frontal Atk	6		No
Monte Maggiore	Italy V	Dec-43	US Ger	Div Rgt	Flat	Mixed	Heavy	Temp	Frontal Atk	1		No
Monte Rotondo	Italy V	Nov-43	US Ger	Div Rgt	Rugged	Mixed	Light	Temp	Frontal Atk	5		No
Morhange	W.Europe	Nov-44	US Ger	Div Div	Rolling	Mixed	Light	Cold	Frontal Atk	8		No
Morhange-Faulquem	W.Europe	Nov-44	US Ger	Corp Corp	Rolling	Mixed	Light	Cold	Frontal Atk	49		No
Mortain	W.Europe	Aug-44	Ger US	Corp Div	Rolling	Mixed	Dry	Temp	Frontal Atk	9		Atkr
Moscow Cntratk	Russia	Dec-41	USSR Ger	ArGp ArGp	Rolling	Mixed	Snow	Cold	Obl Envelop	1060		No
Moscow Defense	Russia	Sep-41	Ger USSR	ArGp ArGp	Rolling	Mixed	Snow	Cold	Frontal Atk	700		No
Moselle-Metz	W.Europe	Sep-44	US Ger	Corp Army	Rolling	Mixed	Light	Temp	River Cross	25		No
Mount Herman 3	Golan	Oct-73	Is Syr	Rgt Rgt	Rugged	Mixed	Dry	Hot	Frontal Atk	2	8	No
Mount Hermon 1	Golan	Oct-73	Is Syr	Rgt Rgt	Rugged	Bare	Dry	Hot	Frontal Atk	1	2	No
Mount Hermon 2	Golan	Oct-73	Is Syr	Rgt Rgt	Rugged	Mixed	Dry	Hot	Frontal Atk	1	4	No
Mount Hermonit	Golan	Oct-73	Syr Is	Div Rgt	Rugged	Bare	Dry	Hot	Frontal Atk	8	21	No
Mutankiang	Manchuria	Aug-45	USSR Jap	Army Corp	Rugged	Mixed	Light	Temp	River Cross	12		Atkr
Naba	Golan	Oct-73	Jor Is	Div Rgt	Rugged	Bare	Dry	Hot	Frontal Atk	9	8	No
Nablus	W.Bank	Jun-67	Is Jor	Div Div	Rugged	Mixed	Dry	Hot	Frontal Atk	3	5	No
Nafekh	Golan	Oct-73	Syr Is	Div Rgt	Rugged	Bare	Dry	Hot	Frontal Atk	7	8	Atkr
Natli	Sinai	Jun-67	Is Egy	Div Div	Flat	Desert	Dry	Hot	Obl Envelop	12	9	Atkr
Nam River	Korea	Sep-50	US NKor	Div Army			Dry	Temp	Pursuit	52		No
Nitopol Bridgehead	E.Europe	Jan-44	USSR Ger	Div Div	Flat	Mixed	Heavy	Cold	River Cross	12		No
Nishibaru Ridge	Pacific	Apr-45	US Jap	Div Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	2		No
Nomonhan 1	Manchuria	May-39	Jap USSR	Rgt Rgt	Rolling	Bare	Dry	Temp	Envelopment	3		No
Nomonhan 2	Manchuria	Aug-39	USSR Jap	Army Army	Rolling	Bare	Dry	Temp	Obl Envelop	50		Atkr
Okinawa Beach 1	Pacific	Apr-45	US Jap	Div Rgt	Flat	Mixed	Dry	Temp	Frontal Atk	2		No
Okinawa Beach 2	Pacific	Apr-45	US Jap	Div Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	5		No
Okinawa Outposts	Pacific	Apr-45	US Jap	Div Rgt	Rugged	Mixed	Dry	Temp	Frontal Atk	2		No
Pierce Line	Korea	Apr-51	US NKor	Div Army			Light	Temp	Frontal Atk	24		No
Pogoreloye	Russia	Aug-42	USSR Ger	Army Army	Flat	Swamp	Snow	Temp	Envelopment	36		No
Port of Salerno	Italy S	Sep-43	Brit Ger	Div Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	6		No
Pozzilli	Italy V	Nov-43	US Ger	Div Div	Rugged	Mixed	Light	Temp	Frontal Atk	8		No
Pusan Breakout	Korea	Sep-50	US NKor	Div Corp			Dry	Temp	Pursuit	40		No
Pusan Perimeter	Korea	Sep-50	NKor US	Corp Div			Light	Temp	Frontal Atk	39		No
Quang Tri	Viet Nam	Mar-72	NVN SVN	Corp Div	Flat	Mixed	Dry	Temp	Frontal Atk	44		No
Rafah	Sinai	Jun-67	Is Egy	Div Div	Flat	Desert	Dry	Hot	Obl Envelop	24	9	Atkr
Rafah-El Arish	Sinai	Nov-56	Is Egy	Div Div	Flat	Bare	Dry	Hot	Frontal Atk	6		No
Rafid	Golan	Oct-73	Syr Is	Div Rgt	Rugged	Bare	Dry	Hot	Frontal Atk	14	13	Atkr
Raviyeh	Golan	Jun-67	Is Syr	Rgt Rgt	Rugged	Mixed	Dry	Hot	Frontal Atk	5	2	No
Ravno	Russia	Jun-41	Ger USSR	Army ArGp	Rolling	Mixed	Dry	Temp	River Cross	65		Atkr
Saint Lo	W.Europe	Jul-44	US Ger	Div Div	Rolling	Mixed	Dry	Temp	Frontal Atk	12		No
Saint Vith	W.Europe	Dec-44	Ger US	Corp Div	Rolling	Mixed	Light	Cold	Frontal Atk	12		No
San Martino	Italy R	May-44	US Ger	Div Div	Rugged	Bare	Dry	Temp	Frontal Atk	6		No
Sarre-Singling	W.Europe	Dec-44	US Ger	Corp Corp	Rolling	Mixed	Dry	Cold	Frontal Atk	32		No
Sarre-St. Avoird	W.Europe	Nov-44	US Ger	Corp Corp	Rolling	Mixed	Dry	Cold	Frontal Atk	64		No
Sarre-Union	W.Europe	Dec-44	US Ger	Div Div	Rolling	Mixed	Dry	Cold	Frontal Atk	5		No
Sauer River	W.Europe	Dec-44	Ger US	Div Rgt	Rugged	Mixed	Heavy	Cold	River Cross	15		Atkr
Schmidt	W.Europe	Nov-44	US Ger	Div Corp	Rolling	Mixed	Light	Temp	River Cross	10		No
Sedan	W.Europe	May-40	Ger Fr	Corp Army	Rolling	Mixed	Dry	Temp	River Cross	9		Atkr
Sedjanne-Bizerte	N.Africa	Apr-43	US Ger	Div Div	Rugged	Mixed	Dry	Temp	Frontal Atk	32		No
Seelow Heights	E.Europe	Apr-45	USSR Ger	Div Rgt	Rugged	Mixed	Dry	Temp	Frontal Atk	2		No
Seille-Wied	W.Europe	Nov-44	US Ger	Corp Corp	Rolling	Mixed	Heavy	Cold	River Cross	48		No
Seine River	W.Europe	Aug-44	US Ger	Corp Div	Rolling	Mixed	Light	Temp	River Cross	45		No
Sele-Calore	Italy S	Sep-43	US Ger	Div Div	Rolling	Mixed	Dry	Temp	Frontal Atk	11		No
Sevastopol	E.Europe	May-44	USSR Ger	ArGp Army	Rolling	Urban	Dry	Temp	Obl Envelop	25		No
Sezze	Italy R	May-44	US Ger	Div Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	14		No
Shallufa 1	Sinai	Oct-73	Is Egy	Div Corp	Rolling	Desert	Dry	Hot	Frontal Atk	32	11	No
Shallufa 2	Sinai	Oct-73	Is Egy	Div Corp	Rolling	Desert	Dry	Hot	Envelopment	32	8	No
Shuri Advance	Pacific	Apr-45	US Jap	Div Rgt	Rolling	Mixed	Dry	Temp	Frontal Atk	4		No
Shuri Cntratk	Pacific	May-45	Jap US	Div Div	Rolling	Mixed	Light	Temp	Frontal Atk	4		Atkr
Shuri East 1	Pacific	May-45	US Jap	Div Div	Rolling	Mixed	Dry	Temp	Frontal Atk	2		No
Shuri East 2	Pacific	May-45	US Jap	Div Div	Rolling	Mixed	Dry	Temp	Frontal Atk	3		No
Shuri East 3	Pacific	May-45	US Jap	Div Div	Rolling	Mixed	Light	Temp	Envelopment	3		No
Shuri West 1	Pacific	May-45	US Jap	Div Rgt	Rugged	Mixed	Heavy	Temp	Envelopment	4		Atkr
Shuri West 2	Pacific	May-45	US Jap	Div Div	Rugged	Mixed	Heavy	Temp	Frontal Atk	4		No
Shuri West 3	Pacific	May-45	US Jap	Div Div	Rugged	Mixed	Heavy	Temp	Frontal Atk	4		No
Singling-Bining	W.Europe	Dec-44	US Ger	Div Div	Rolling	Mixed	Light	Cold	Frontal Atk	4		No

Identification						Environment				Tactics					
Battle		Nations		Echelon		Terrain		Cover	Humidity	Temp	Attacker		Major		
Name	Location	Date	Atkr	Dfdr	Atkr	Dfdr					Maneuver	Wdth	Dpth	Suprs	
Skyline Ridge	Pacific	Apr-45	US	Jap	Div	Rgt	Rugged	Mixed	Dry	Temp	Frontal	Atk	3	No	
Spigno	Italy R	May-44	US	Ger	Div	Div	Rugged	Bare	Dry	Temp	Frontal	Atk	6	No	
Suez Attack-W.	Sinai	Oct-73	Egy	Is	Corp	Corp	Rolling	Desert	Dry	Hot	Frontal	Atk	50	54	No
Suez Attack-S.	Sinai	Oct-73	Egy	Is	Corp	Corp	Rolling	Desert	Dry	Hot	Frontal	Atk	50	39	No
Suez Buildup-W.	Sinai	Oct-73	Egy	Is	Corp	Div	Rolling	Desert	Dry	Hot	Frontal	Atk	110	43	No
Suez Buildup-S.	Sinai	Oct-73	Egy	Is	Corp	Div	Rolling	Desert	Dry	Hot	Frontal	Atk	54	30	No
Suez Canal-W.	Sinai	Oct-73	Egy	Is	Corp	Div	Rolling	Desert	Dry	Hot	Frontal	Atk	110	20	Attr
Suez Canal-S.	Sinai	Oct-73	Egy	Is	Corp	Rgt	Rolling	Desert	Dry	Hot	Frontal	Atk	38	15	Attr
Suez (City)	Sinai	Oct-73	Is	Egy	Div	Corp	Rolling	Desert	Dry	Hot	Frontal	Atk	6	10	No
Suomussalmi	Finland	Dec-39	Finn	USSR	Div	Corp	Rolling	Wooded	Snow	Cold	Dbl Envelop		32		Attr
S. Maria Infante	Italy R	May-44	US	Ger	Div	Div	Rugged	Bare	Dry	Temp	Frontal	Atk	8		No
S. Maria Oliveto	Italy V	Nov-43	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	5		No
Tarawa-Betto	Pacific	Nov-43	US	Jap	Div	Rgt	Rolling	Mixed	Dry	Temp	Frontal	Atk	1		No
Targul Frumos	E. Europe	May-44	USSR	Ger	Army	Div	Flat	Bare	Light	Temp	Frontal	Atk	19		No
Tarto-Tiber	Italy R	May-44	Brit	Ger	Corp	Div	Flat	Mixed	Dry	Temp	Frontal	Atk	7		No
Tel el Hara	Golan	Oct-73	Is	Syr	Div	Div	Rugged	Bare	Dry	Hot	Frontal	Atk	12	8	Dfdr
Tel Fahar-Banias	Golan	Jun-67	Is	Syr	Rgt	Rgt	Rugged	Mixed	Dry	Hot	Frontal	Atk	7	2	No
Tel Faris	Golan	Oct-73	Is	Syr	Div	Div	Rugged	Bare	Dry	Hot	Frontal	Atk	14	12	No
Tel Shaar	Golan	Oct-73	Is	Syr	Div	Div	Rugged	Bare	Dry	Hot	Frontal	Atk	3	10	No
Tel Shams	Golan	Oct-73	Is	Syr	Div	Div	Rugged	Bare	Dry	Hot	Frontal	Atk	5	11	No
Terracina	Italy R	May-44	US	Ger	Div	Div	Rugged	Mixed	Dry	Temp	Envelopment		15		No
Tiflit-Zababiya	W. Bank	Jun-67	Is	Jor	Rgt	Rgt	Rugged	Mixed	Dry	Hot	Frontal	Atk	1	2	No
Tobacco Factory	Italy S	Sep-43	Ger	Brit	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	10		No
Tobacco Factory 1	Italy A	Jan-44	Ger	Brit	Div	Div	Rolling	Mixed	Dry	Cold	Frontal	Atk	7		No
Tobacco Factory 2	Italy A	Feb-44	US	Ger	Div	Div	Flat	Mixed	Light	Temp	Frontal	Atk	2		No
Tomb Hill-Ouki	Pacific	Apr-45	US	Jap	Div	Rgt	Rugged	Mixed	Heavy	Temp	Frontal	Atk	3		No
Triflisco	Italy V	Oct-43	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	River	Cross	9		No
Valmontone	Italy R	Jun-44	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	6		No
Velletri	Italy R	May-44	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	14		Dfdr
Via Anziate	Italy R	Jun-44	US	Ger	Div	Div	Rolling	Bare	Dry	Temp	Frontal	Atk	4		No
Vietri 1	Italy S	Sep-43	Ger	Brit	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	15		No
Vietri 2	Italy S	Sep-43	Ger	Brit	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	15		No
Villa Crocetta	Italy R	May-44	US	Ger	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	5		No
Vistula Crossing 1	E. Europe	Jul-44	USSR	Ger	Corp	Div	Flat	Mixed	Dry	Temp	River	Cross	10		No
Vistula Crossing 2	E. Europe	Aug-44	USSR	Ger	Corp	Corp	Flat	Mixed	Dry	Temp	Frontal	Atk	12		No
Vistula-Oder	E. Europe	Jan-45	USSR	Ger	ArGp	ArGp	Flat	Mixed	Dry	Cold	Dbl Envelop		480		No
Westwall	W. Europe	Oct-44	US	Ger	Corp	Corp	Rolling	Mixed	Light	Temp	River	Cross	13		No
Yaeju Dake	Pacific	Jun-45	US	Jap	Div	Rgt	Rugged	Mixed	Dry	Temp	Frontal	Atk	2		No
Yassy-Kishinev	E. Europe	Aug-44	USSR	Ger	ArGp	ArGp	Flat	Mixed	Dry	Temp	Dbl Envelop		590		No
Yehuda el Al	Golan	Oct-73	Syr	Is	Div	Div	Rugged	Bare	Dry	Hot	Frontal	Atk	13	14	Attr
Yuza Dake Advance	Pacific	Jun-45	US	Jap	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	3		No
Yuza Dake Attack	Pacific	Jun-45	US	Jap	Div	Div	Rolling	Mixed	Dry	Temp	Frontal	Atk	3		No
Yuza Dake Capture	Pacific	Jun-45	US	Jap	Div	Rgt	Rolling	Mixed	Dry	Temp	Frontal	Atk	3		No
Zaoura-Kala	Golan	Jun-67	Is	Syr	Rgt	Rgt	Rugged	Mixed	Dry	Hot	Frontal	Atk	1	3	No

										Results											
Defender										Casualties										Resolution	
Name	Posture	Wdth	Dpth	Days	Hrs	Atkr	Dfdr	Atkr	Dfdr	Atkr	Dfdr	Atkr	Dfdr	Atkr	Dfdr	Atkr	Dfdr	Atkr	Dfdr	Attacker	Defender
																				Men	Sqds
Abu Ageila-Umkateff	Fortified	6		3		318	3,000	16	15												4,700
Abu Ageila-Umkateff	Fortified	8	8	1	9	300	900	19	40					20	Breakthru	Withdrawal	*				19,280
Acre	Prepared	2		2		10	10	0	0												2,500
Adabiya	Fortified	13	10	1		75	400	6	29					40	Penetration	Withdrawal					10,900
Ageila-Rafah-Ayin	Prepared	2		10		400	600														4,000
Ahmadiyah	Fortified	8	4	2	23	700	250	96	30					1	Repulse	Stalemate					22,750
Alam Halfa	Fortified	90		3	35	2,940	1,750	50	67					12	Repulse	Stalemate					124,000
Alamein 2	Fortified	61		13		13,000	16,000	500	591					26	Breakthru	Withdrawal	*				220,476
Alamein-Bridgehead	Fortified	61		7		3,000	4,500	38	180					7	Penetration	Stalemate					214,336
Alamein-Lightfoot	Fortified	61		3		6,140	3,695	302	127					6	Penetration	Stalemate					220,476
Alamein-Supercharg	Fortified	61		3		4,420	7,800	160	284					15	Breakthru	Withdrawal	*				211,000
Amphitheater	Hasty	13		3		1,154	100	0						4	Penetration	Stalemate					12,917
Anzio Breakout	Fortified	6		3	41	710	1,355	93	51					14	Penetration	Withdrawal					22,374
Anzio-Albano Road	Fortified	6		2		194	107							0	Repulse	Stalemate					17,343
Aprilia 1	Hasty	7		2		1,158	130	7	4					5	Penetration	Withdrawal					19,350
Aprilia 2	Prepared	2		1	13	270	311							1	Penetration	Withdrawal					27,518
Ardea	Fortified	9		3		245	374							6	Penetration	Withdrawal					15,557
Ardenne		96		12				980	2060						Breakthru	Withdrawal					
Arracourt	Hasty	10		4	21	779	119	87	25					-3	Repulse	Penetration					7,500
Arras	Hasty	5		2			410	61	22						Repulse	Pursuit					11,821
Baerendorf 1	Hasty	4		2		58	224	4	4					1	Penetration	Withdrawal					7,935
Baerendorf 2	Prepared	11		1	7	56	233	4						5	Penetration	Stalemate					15,871
Banias-Masaada	Prepared		4	1		50	500	35	15					7							11,400
Bastogne	Hasty	12		3		3,000	1,151	50	103					15	Penetration	Withdrawal					36,678
Battipaglia 1	Hasty	5		4		1,112	1,639							2	Repulse	Stalemate					14,730
Battipaglia 2	Delay	12		2		300	110							2	Penetration	Withdrawal					14,730
Bayonette Line	Prepared	32		2		240	3,160		0					2	Penetration						13,700
Bekka Valley	Prepared	26		3	42	1,082	4,150	30	400					36	Penetration	Withdrawal					34,500
Berezina River	Hasty	10		5		670	4,795	35	15					160	Breakthru	Withdrawal	*				16,100
Bir Gifgafa	Hasty	5	2	1	3	450	60	20	3					0	Withdrawal	Pursuit					3,500
Bir Hama-Gifgafa	Delay	10	6	1	3	75	550	5	30					25	Penetration	Withdrawal					10,200
Bir Lahfan	Hasty	10	5	1	14	90	1,350	11	30					15	Breakthru	Withdrawal	*				10,450
Bir Rud Salim	Fortified			2		13	300	2	12												2,668
Birhassna-Thamada	Prepared	7	5	1	9	60	550	10	30					28	Breakthru	Withdrawal	*				8,700
Boos	Prepared	1		1				7	1					0	Bypass	Stalemate					189
Bourgaltroff	Prepared	11		2	1	185	141		8					2	Penetration	Withdrawal					10,348
Boutmiya	Prepared		8	1		50	500	35	30					21							17,550
Bowling Alley 1	Fortified	10		4	49	2,238	1,018	56	38					3	Penetration	Stalemate					41,974
Brody 1	Prepared	6		1	17	980	720	14	0					8	Penetration	Withdrawal	*				39,000
Brody 2	Prepared	7		1	18	1,750	490	34	41					7	Penetration	Withdrawal	*				38,500
Burbach-Durstel	Prepared	11		3		110	216	10						4	Penetration	Withdrawal					16,232
Butte Line	Hasty	19		5		300	15,810		0					3	Penetration	Withdrawal					29,000
Caiazzo	Delay	9		2	24	140	52							3	Penetration	Withdrawal					18,210
Calabritto	Fortified	2		2	24	250	20							1	Penetration	Stalemate					17,765
Cambrai		2		5				72	161					48	Penetration	Withdrawal					17,000
Campoleone 1	Prepared	11		3	30	742	221							7	Penetration	Stalemate					17,766
Campoleone 2	Prepared	11		2	30	1,318	1,450							4	Penetration	Withdrawal					26,029
Campoleone Station	Fortified	7		3		517	580							3	Repulse	Stalemate					19,047
Canal 1	Prepared	9		2		125	45							1	Penetration	Withdrawal					14,600
Canal 2	Prepared	9		3		220	138							3	Penetration	Withdrawal					17,500
Capua	Prepared	2		1		420	94							0	Repulse	Stalemate					16,857
Carroceto	Prepared	8		2	20	341	369							3	Penetration	Stalemate					26,490
Castel Volturno	Prepared	10		2		500	40							2	Penetration	Withdrawal					21,265
Castellonorato	Fortified	5		2	21	537	442							4	Penetration	Withdrawal					16,458
Chan River	Hasty	24		3		150	1,560		0					19	Penetration	Withdrawal					26,000
Changkufeng 1	Fortified	3		1	6	178	350	0	17					1	Penetration	Withdrawal	*				1,410
Changkufeng 2	Fortified	3		2	13	400	41	15	0					0	Repulse	Withdrawal					4,000
Changkufeng 3	Fortified	6		5		4,000	1,100	50	0					1	Repulse	Stalemate					20,000
Chartres	Hasty	5		1		113	579							6	Penetration	Stalemate					15,646
Chateau Salins	Fortified	17		2		720	446	8	3					4	Penetration	Withdrawal					43,587
Chinese Farm 1	Hasty	14	21	2	19	100	500	56	62					7	Penetration	Stalemate					22,790
Chinese Farm 2	Hasty	11	25	2	18	950	2,400	40	222					10	Penetration	Withdrawal					28,900
Chinese Farm-W.	Hasty	11	12	1	13	300	800	15	64					5	Penetration	Withdrawal					19,600
Chouigui Pass	Hasty	2		1	1	27	21	9	7					0	Repulse	Pursuit					465
Ciechanov 1	Fortified	2		1		685	145	31	4					4	Penetration	Stalemate					10,800
Ciechanov 2	Fortified	3		1		850	230	39	12					4	Penetration	Withdrawal					12,115
Cisterna	Fortified	8		3	40	1,524	1,617	15						14	Penetration	Withdrawal					19,971
Cobra	Fortified	11		3		1,510	5,000							11	Breakthru	Withdrawal					126,000
Death to Invader	Prepared			5		250	300	0	8												2,500
Dragon	Delay	5		3		65	103							6	Penetration	Withdrawal					17,034
Durstel-Faerbervle	Prepared	51		2		482	811	20						2	Penetration	Stalemate					90,078

Results															Rifle:	
Resolution															Sgds:	
Name	Defender	Posture	Wtd	Oph	Days	Hrs	Atkr	Dfdr	Atkr	Dfdr	ment	Attacker	Defender	Men	Sgds	
East Prussia	Fortified	500			19		112,000	126,000	1060	480	126	Breakthru	Withdrawal	1,220,000		
Eboli	Delay	8			2		386	120			2	Penetration	Withdrawal	15,576	243	
El Arish	Prepared	7	6		1	11	135	225	13	40	8	Breakthru	Withdrawal	6,350		
El Auja-Ayin	Prepared	2			3		350	600					Delay	6,000		
El Guettar 3	Hasty	25			1	5	450	203	42	31	0	Repulse	Withdrawal	10,300		
Fiocchia	Fortified	8			3		265	403			0	Repulse		15,367		
Formia	Delay	4			3		405	721			9	Penetration	Withdrawal	23,190	243	
Fosso Campoleone	Fortified	11			3		1,304	1,379	80		3	Repulse	Stalemate	29,711		
Francolise	Prepared	6			3		75	44			5	Penetration	Stalemate	14,000		
Gaza Strip	Prepared	9	8		3	29	55	626	8	90	16	Breakthru	Surrender	12,150	20	
Gaza-Khan Yunis	Prepared	5			1	20	121	1,987	2	0	30			4,000		
Golan Cntratk	Prepared	25	11		1	11	550	160	67	10	0	Repulse	Stalemate	35,750	60	
Goodwood	Fortified	21			3	30	4,011	5,000	493	200	10	Penetration	Stalemate	76,213		
Grazzanise	Prepared	2			3		370	80			4	Penetration	Withdrawal	14,557		
Guadalajara	Prepared	11			5		6,460	6,660	15	21	2	Repulse	Pursuit	52,000		
Han River	Prepared	8			3		250	6,120		0	13	Penetration	Delay	25,500	243	
Hills 153-115	Fortified	3			3		317	1,971	0	0	1	Penetration	Anihilation	15,808	243	
Hill-95 1	Fortified	3			3		193	1,222	0	0	2	Penetration	Stalemate	16,091	243	
Hill-95 2	Fortified	2			3		248	1,470	0	0	1	Penetration	Withdrawal*	16,002	243	
Hiram	Prepared	3			3		650	2,100						6,000		
Hushniyah	Hasty	12	10		3	31	450	1,125	24	99	5	Penetration	Withdrawal	12,733		
Il Gioglio Pass	Fortified	4			5		560	560		0	4	Penetration	Withdrawal	15,721	243	
Iron Triangle	Hasty	32			2		1,460	150	0		1	Repulse	Stalemate	37,000		
Ismailia	Hasty	20	16	4	50		600	1,800	40	92	17	Repulse	Stalemate	17,000	20	
Itri-Fondi	Delay	6			3		257	380			2	Penetration	Withdrawal	17,912	243	
Iwo Jima 1	Fortified	5			5		6,845	15,615	11	40	6	Breakthru	Anihilation	33,915		
Iwo Jima 3	Fortified	2			6		3,885	2,685	0	40	1	Breakthru	Anihilation	32,000		
Iwo Jima-Suribachi	Fortified	1			5		510	1,231	0	0	1	Breakthru	Anihilation	3,200	81	
Jebel Geneifa	Hasty	18	24		3	34	300	1,650	30	114	120	Penetration	Withdrawal	16,200	66	
Jebel Libni	Prepared	10	5		1	4	70	450	10	32	5	Penetration	Withdrawal	10,800		
Jenin	Prepared	2	3		1	12	225	200	18	15	5	Penetration	Withdrawal	10,900	30	
Jerusalem	Fortified	11	6		3	28	1,750	1,500	40	35	21	Breakthru	Withdrawal*	27,682	84	
Jerusalem Cor'dor	Prepared	5			5		150	250	5	7				4,500		
Jerusalem Jebussi	Prepared	10			10		375	500	10	0				3,000		
Jitra	Hasty	8			1	15	600	1,200	0	0	11	Breakthru	Withdrawal	7,000	243	
Kakazu-Tombstone	Fortified	4			4		1,079	2,468	0	0	0	Repulse	Stalemate	21,247	243	
Kansas Line	Delay	24			5		5730	470	0		50	Penetration	Delay	30,700		
Kantara Firdan	Hasty	27	45		1	11	700	700	78	27	0	Repulse	Stalemate	25,850	0	
Katibiya	Hasty	5	5		2	16	375	350	18		16	Breakthru	Withdrawal	12,800	10	
Kerama	Prepared	5			1	16	201	497	20	33	0	Withdrawal	Stalemate	11,940		
Kfar Shams-Antar	Hasty	20	8		1	3	100	200	6	34	5	Penetration	Stalemate	11,000	0	
Kochi Cntratk	Hasty	2			2		3,704	339	0	0	0	Repulse	Stalemate	6,850		
Kochi Ridge 4	Fortified	2			2		114	1,464	0	0	1	Penetration	Withdrawal*	15,109	243	
Kochi-Onaga 1	Fortified	3			3		269	1,324	3	0	0	Repulse	Stalemate	14,594	243	
Kochi-Onaga 2	Fortified	3			2		182	814	11	0	0	Repulse	Stalemate	15,986	243	
Kochi-Onaga 3	Fortified	3			4		398	2,276	4	0	0	Repulse	Stalemate	15,764	243	
Korsun-Shechkovsky	Prepared	180			25		63,500	68,000	360	229	145	Breakthru	Withdrawal*	254,950		
Kuneitra	Prepared		9		1		50	500	35	20	15			16,500	20	
Kuneitra 2	Prepared	15	4		2		350	200	40	14	8	Breakthru	Stalemate	17,750		
Kunson	Delay	73			6		100	1,350		0	292	Penetration	Delay	16,200	243	
Kursk Cntratk	Prepared	250			21		117,700	39,500	1340	340	147	Breakthru	Withdrawal	980,600		
Kursk-Belgorod	Fortified	16			3		11,676	2,405			26	Breakthru	Withdrawal	70,000		
Kursk-Oboyan 1	Fortified	16			3		1,364	5,680	42	45	13	Penetration	Withdrawal	62,000		
Kursk-Oboyan 2	Prepared	20			4		3,500	25,800	110	292	23	Penetration	Withdrawal	60,000		
Kursk-Oboyan 3	Prepared	25			5		2,900	30,200	85	139	3	Repulse	Stalemate	56,000		
Kursk-Prokhorovka	Hasty	25			2		5,700	5,100	380	200	0	Penetration	Stalemate	78,000		
Kursk-South	Prepared	30			1		3,180	4,900	134	88	8	Penetration	Withdrawal	140,000		
Lanuvio	Fortified	3			4		825	698			2	Repulse	Stalemate	17,300	243	
Lariano	Prepared	5			2	27	329	1,178			4	Penetration	Withdrawal	22,641	243	
Leniograd-"Spark"	Fortified	13			7		28,000	4,150		7	7	Breakthru	Withdrawal	120,000		
Lvov-Sandomierz	Prepared	440			17		37,400	198,000	1285	520	320	Breakthru	Withdrawal*	1,200,000		
Maeda Escarpment	Fortified	2			4		479	3,810	10	0	2	Penetration	Withdrawal	18,095	243	
Melitopol	Fortified	111			41		79,000	36,500	460	170	320	Breakthru	Withdrawal	524,724		
Melun	Prepared	5			3		99	362	21		22	Penetration	Withdrawal	17,232		
Metz	Fortified	25			1		359	210				Repulse	Stalemate	60,794		
Mishmarhayarden 1	Prepared	5			5		250	2,500	5	0				4,000		
Mishmarhayarden 2	Hasty	6			6		250	270						3,000		
Mitla Pass	Hasty	1	3		1	11	550	90	100	16	0	Repulse	Pursuit	22,000	104	
Moletta River 1	Prepared	3			3		167	107		0	3	Repulse	Stalemate	7,418		
Moletta River 2	Fortified	4			4		1,451	1,693		0	2	Penetration	Stalemate	21,478		
Moletta River 3	Fortified	9			2	19	234	468		0	0	Repulse	Stalemate	17,345	243	

Results													Rifle:		
Defender													Sgds:		
Name	Posture	Wdh	Oph	Days	Hrs	Atkr	Dfdr	Atkr	Dfdr	Attacker	Defender	Men	Sgds		
Monte Acero	Delay	8		2		133		130		5	Penetration	Withdrawal	21,265	243	
Monte Camino 1	Fortified	5		3		240		33		5	Repulse	Stalemate	19,513	243	
Monte Camino 2	Hasty	1		3		34		310	0	1	Repulse	Withdrawal	7,942		
Monte Camino 3	Fortified	2		4		550		141		5	Penetration	Withdrawal	20,744	243	
Monte Grande	Prepared	9		2		200		66		2	Penetration	Withdrawal	16,400	81	
Monte Grande	Hasty	9		2		203		332		2	Penetration	Withdrawal	13,095	243	
Monte Lungo	Fortified	6		2		361		142		3	Penetration	Stalemate	16,600	243	
Monte Maggiore	Fortified	1		2	25	80		20	0	5	Penetration	Withdrawal	5,551	243	
Monte Rotondo	Fortified	5		3		165		118		1	Penetration	Stalemate	16,350	243	
Morhange	Prepared	8		3		1,006		197		7	Penetration	Withdrawal	25,881		
Morhange-Faulquem	Fortified	49		4		3,223	2,665	38	63	7	Penetration	Withdrawal	92,393		
Mortain	Hasty	9		6		4,800	2,673	100		0	Repulse	Penetration	25,500		
Moscow Cntratk	Fortified	1060		34		139,000	85,300	290	510	143	Breakthru	Withdrawal	1,060,300		
Moscow Defense	Prepared	700		65		253,000	885,000	990	840	358	Penetration	Stalemate	1,100,000		
Moselle-Metz	Delay	25		6		1,647	1,700	19	30	32	Repulse	Stalemate	59,631		
Mount Herman 3	Fortified	2	3	1		100		250	0	5	Breakthru	Withdrawal	11,400	40	
Mount Hermon 1	Fortified	1	1	1		50		100	1	2	0	Repulse	Stalemate	2,692	9
Mount Hermon 2	Fortified	1	3	1		150		200	0	0	0	Repulse	Stalemate	5,700	20
Mount Hermonit	Prepared	8	4	2	3	1,200		400	100	24	Repulse	Stalemate	31,650	82	
Mutankiang	Fortified	12		8		10,000	36,000		84	160	Breakthru	Anihilation	147,000		
Naba	Prepared	9	7	1	5	450		100	57	8	0	Repulse	Stalemate	11,500	10
Nablus	Hasty	1	4	1	6	375		350	18	35	10	Breakthru	Withdrawal	10,700	
Nafekh	Hasty	7	5	2	17	500		250	69	10	0	Repulse	Pursuit	12,500	0
Nahl	Hasty	12	8	1	5	60		625	4	60	15	Breakthru	Withdrawal	18,780	40
Nam River	Delay	52		3		230		1,640		0	23	Penetration	Delay	16,400	243
Nikopol Bridgehead	Fortified	12		6		610		480	3	0	6	Breakthru	Withdrawal	25,100	
Nishibaru Ridge	Fortified	2		5		879		2,860	11	0	2	Penetration	Withdrawal*	17,163	243
Nomonhan 1	Hasty	5		2		278		250	10	0	7	Penetration	Withdrawal	1,300	
Nomonhan 2	Fortified	60		12		10,000	11,500			22	Breakthru	Withdrawal	57,000		
Okinawa Beach 1	Delay	2		3		158		628	0	0	10	Penetration	Withdrawal*	22,888	243
Okinawa Beach 2	Delay	5		3		282		1,588	5	0	7	Penetration	Withdrawal*	19,082	243
Okinawa Outposts	Fortified	2		4		286		2,120	5	0	3	Penetration	Withdrawal*	18,398	243
Pierce Line	Hasty	24		4		170		4,780		0	15	Penetration	Stalemate	27,900	243
Pogoreloye	Prepared	36		8	117	21,300		6,530	260	110	54	Penetration	Withdrawal	54,180	
Port of Salerno	Hasty	6		3		1,530		120	0	4	Penetration	Stalemate	12,917	243	
Pozzilli	Fortified	8		2		155		25	2	1	Repulse		17,404	243	
Pusan Breakout	Delay	40		4		380		940		0	11	Penetration	Withdrawal	16,600	243
Pusan Perimeter	Hasty	39		2		110		430	0	2	Penetration	Stalemate	11,000		
Quang Tri	Prepared	44		30				14,300			Breakthru	Withdrawal*	30,000		
Rafah	Prepared	24	9	1	10	700		2,700	15	70	40	Breakthru	Withdrawal*	19,520	20
Rafah-El Arish	Fortified	15		1		229		3,433	5	20	26			10,000	
Rafid	Fortified	14	3	1	24	350		250	52	25	10	Breakthru	Withdrawal	19,525	55
Raviyeh	Fortified	5	3	1	4	150		300	30	20	6	Penetration	Withdrawal	5,350	
Rovno	Prepared	65		5		4,000		88,000	60	560	120	Breakthru	Withdrawal*	132,000	
Saint Lo	Fortified	12		8		2,777		2,350		8	Penetration	Withdrawal	18,228	243	
Saint Vith	Hasty	12		6		4,306		1,731	66	56	30	Penetration	Withdrawal	87,000	
San Martino	Fortified	6		2	25	1,974		720		1	Repulse	Stalemate	17,970	243	
Sarre-Singling	Delay	32		2		835		1,774	42	6	Penetration	Withdrawal	89,977		
Sarre-St. Avoird	Prepared	64		8		2,279		4,942	67	54	22	Penetration	Withdrawal	88,941	
Sarre-Union	Prepared	5		2		234		129	3	2	3	Penetration	Withdrawal	19,773	
Sauer River	Hasty	15		2		268		134	2	3	6	Penetration	Stalemate	10,000	
Schmidt	Fortified	10		12		3,683		3,000	47	5	Repulse	Penetration	20,493	243	
Sedan	Prepared	9		2		800		5,000		0	10	Breakthru	Withdrawal*	48,000	
Sedjanne-Bizerte	Fortified	32		11		1,120		605		5	44	Breakthru	Withdrawal	24,100	243
Seelow Heights	Fortified	2		2		474		150	54	3	3	Breakthru	Withdrawal	13,600	
Seille-Nied	Fortified	48		5		4,265		4,880	89	14	14	Penetration	Withdrawal	99,583	
Seine River	Prepared	45		3		234		906	21	3	38	Penetration	Withdrawal	40,619	
Sele-Calore	Hasty	11		14		251		60	1	4	Repulse	Stalemate	12,447	243	
Sevastopol	Fortified	25		5		35,500		48,500	31	50	18	Breakthru	Anihilation	397,600	
Sezze	Withdrawal	14		3		162		277		16	Penetration	Withdrawal	17,925	243	
Shallufa 1	Hasty	32	16	2	14	150		1,100	15	35	10	Penetration	Withdrawal	16,200	0
Shallufa 2	Withdrawal	32	15	2	27	150		1,100	8	68	20	Penetration	Withdrawal	11,700	20
Shuri Advance	Fortified	4		4		555		2,470	9	0	2	Penetration	Withdrawal*	18,388	243
Shuri Cntratk	Hasty	4		1		1,269		241	0	0	0	Repulse	Stalemate	4,000	
Shuri East 1	Fortified	2		3		502		4,038	6	0	1	Penetration	Stalemate	19,714	243
Shuri East 2	Fortified	3		5		590		4,328	4	0	1	Penetration	Stalemate	20,973	243
Shuri East 3	Fortified	3		2		313		3,022	3	0	1	Penetration	Stalemate	19,658	243
Shuri West 1	Prepared	4		2		170		478	0	0	1	Penetration	Withdrawal	16,043	243
Shuri West 2	Fortified	4		2		124		434	0	0	1	Repulse	Stalemate	15,840	243
Shuri West 3	Fortified	4		3		182		2,564	0	0	1	Penetration	Withdrawal*	15,205	243
Singling-Bining	Fortified	4		1	12	155		121	13	3	1	Repulse	Stalemate	15,224	

Results													Rifle:		
Defender		Duration:		Casualties--		Tank-Loss:		Move:		Resolution				Rifle:	
Name	Posture	Wdth	Dpth	Days	Hrs	Atkr	Dfdr	Atkr	Dfdr	ment	Attacker	Defender	Men	Sqds	
Skyline Ridge	Fortified	3		5		740	1,661	18	0	2	Penetration	Withdrawal*	16,291		243
Spigno	Delay	6		2	11	343	730			5	Penetration	Withdrawal	18,308		243
Suez Attack-N.	Hasty	50	29	1	9	1,700	380	120	31	0	Repulse	Stalemate	81,160		150
Suez Attack-S.	Hasty	50	19	1	9	1,350	260	140	17	0	Repulse	Stalemate	57,960		100
Suez Buildup-N.	Hasty	110	9	1	23	800	450	9	57	3	Penetration	Withdrawal	63,910		135
Suez Buildup-S.	Hasty	38	7	1	23	750	400	10	44	3	Penetration	Stalemate	45,160		90
Suez Canal-N.	Prepared	110	3	1	10	400	275	2	44	5	Penetration	Withdrawal	29,490		90
Suez Canal-S.	Prepared	38	3	1	10	350	225	20	42	5	Penetration	Stalemate	22,850		60
Suez (City)	Hasty	6	15	2	26	340	1,100	26	18	44	Repulse	Stalemate	14,681		13
Suomussalmi	Hasty	32		29		2,670	19,600	0	44	0	Breakthru	Anihilation	9,000		
S. Maria Infante	Fortified	8		3	25	531	1,035	9		3	Penetration	Withdrawal	18,702		243
S. Maria Oliveto	Prepared	5		2		416	185			3	Penetration	Withdrawal	16,870		243
Tarawa-Betto	Fortified	1		4	48	3,302	4,836	6	14	1	Breakthru	Anihilation	9,000		243
Targui Frumos	Mobile	19		1				350	11		Repulse	Stalemate	35,170		
Tarto-Tiber	Fortified	7		2		572	850		0	5	Penetration	Withdrawal	38,011		
Tel el Hara	Hasty	12	10	1	1	450	50	103	4	2	Repulse	Withdrawal	12,500		0
Tel Fahar-Banias	Fortified	7	4	1	13	300	850	5	20	5	Penetration	Withdrawal	5,375		
Tel Faris	Hasty	14	16	3		450	1,125	30	117	12	Penetration	Withdrawal*	17,833		17
Tel Shaar	Prepared	3	14	2	8	280	900	20	88	4	Penetration	Withdrawal	14,700		0
Tel Shams	Fortified	5	13	3	16	525	1,200	30	126	6	Penetration	Stalemate	16,100		10
Terracina	Hasty	15		2	24	287	380			5	Penetration	Withdrawal	18,030		243
Tiflit-Zababiya	Hasty	5	22	1	12	250	250	18	25	8	Penetration	Withdrawal	5,350		
Tobacco Factory	Hasty	10		2	11	702	317			4	Repulse	Stalemate	14,733		
Tobacco Factory 1	Hasty	7		1		366	62			0	Repulse		15,317		
Tobacco Factory 2	Fortified	2		2	15	101	206			0	Repulse		13,400		243
Tomb Hill-Ouki	Fortified	3		3		466	1,278	5	0	0	Penetration	Withdrawal*	18,111		243
Triflisco	Prepared	9		2	24	267	76			5	Penetration	Withdrawal	18,480		243
Valmontone	Hasty	6		2	31	710	568	7	8	5	Penetration	Withdrawal	26,607		243
Velletri	Fortified	14		1	7	767	1,319	18		2	Repulse	Stalemate	20,683		
Via Anziate	Fortified	4		2	30	316	884	8	12	1	Repulse	Stalemate	23,604		243
Vietri 1	Hasty	15		4		900	1,160			2	Repulse	Stalemate	15,000		
Vietri 2	Prepared	15		2		400	255			0	Repulse	Stalemate	13,300		
Villa Crocetta	Fortified	5		2		263	598			1	Repulse	Stalemate	18,000		243
Vistula Crossing 1	Prepared	12		3		1,150	320	0	4	4	Penetration	Withdrawal*	12,700		
Vistula Crossing 2	Prepared	12		6		3,040	785	27	18	2	Repulse	Stalemate	17,550		
Vistula-Oder	Prepared	480		23		46,900	147,400	1396	750	483	Breakthru	Withdrawal*	2,200,000		
Westwall	Fortified	13		6	65	1,477	3,616	79	49	8	Penetration	Withdrawal	32,283		
Yaeju Dake	Fortified	2		1		48	2,401	0	0	0	Penetration	Anihilation	5,237		243
Yassy-Kishinev	Prepared	590		10		135,000	690,000	335	380	325	Breakthru	Anihilation	1,250,000		
Yehuda el Al	Hasty	20	4	1	8	500	150	46	10	0	Repulse	Pursuit	21,984		50
Yuza Dake Advance	Prepared	3		4		112	798	0	0	2	Penetration	Stalemate	18,777		243
Yuza Dake Attack	Prepared	3		2		88	1,066	2	0	1	Penetration	Stalemate	18,660		243
Yuza Dake Capture	Prepared	3		6		576	3,220	4	0	2	Penetration	Anihilation	19,047		243
Zaoura-Kala	Fortified	1	4	1	9	230	500	55	25	8	Penetration	Withdrawal	5,850		

Attacking Force										Defending Force									
Mor		AT		AD		Arty		Sor		Rifle		Mor		AT		AD		Arty	
Name	Tars	Wpns	Tanks	Wpns	Guns	Msl	ties			Men	Sqds	Tars	Wpns	Tanks	Wpns	Guns	Msl	ties	
Abu Ageila-Umkatef	36	102	72	32	27	0	72	4,800				57	178	38	22	32		24	
Abu Ageila-Umkatef	64	104	120	93	72	0	0	18,450	89	101	189	114	172	126				0	
Acre	28	8	0	6	2	0	38	3,000				18	0	0	4	8	0	0	
Adabiya	22	28	164	49	36	0	82	14,620	25	47	84	199	233	37	3	37			
Ageila-Rafah-Ayin	36	24	50	4	16	0	900	3,000				27	12	67	6	12			
Ahmadiyeh	91	439	147	74	131	0	100	5,745				20	19	78	30	16	0	191	
Alam Halfa			515		558	0		120,000						450		576	0	2,680	
Alamein 2			1,037		908	0	11586	105,223						593		592	0	3,120	
Alamein-Bridgehead			745		906	0		101,528						470			0		
Alamein-Lightfoot			1,037	61	908	0		105,223						593		592	0		
Alamein-Supercharg			700		906	0		97,000						310			0		
Amphitheater	218	470	0	54	138	66	131	4,250				8	23	128	17	56	0	115	
Anzio Breakout		48	424	32	152	0	247	12,815				68	23	89	57	107	0	0	
Anzio-Albano Road	262	535	36	84	100	0	35	11,343				65	18	19	10	96	0	0	
Aprilia 1	262	523	71	72	180	62	0	6,750				38	15	46	52	66	0	28	
Aprilia 2	226	88	113	184	223	0	0	17,730	243	80	429	100	47	226	62	121			
Ardea	218	482	35	54	104	0	0	7,659				80	20	0	85	64	0	0	
Ardenes			2,439			0								2,160			0		
Arracourt			126		12	0	0	4,800				12	122			48	0	130	
Arras			88		8	0	0	18,000						218			0		
Baerendorf 1	192	22	106	42	51	0	0	5,366				18	9	30	74	64	0	0	
Baerendorf 2	383	44	211	62	36	0	0	6,299				30	12	36	123	87	0	0	
Banias-Masaada	32	56	184	56	48	0	81	9,080	33	40	119	175	68	72	0				
Bastogne			359		313	0	0	4,849						152		18	0	0	
Battipaglia 1	51	470	89	60	108	0	112	11,230	243	218	101	30	54	146	74	539			
Battipaglia 2	244	583	97	60	152	74	94	6,995				244	35	58	54	80	0	31	
Bayonette Line	108		118		72	0	60	35,500				290		0		72	0	0	
Bekka Valley			775			0		25,000						362					
Berezina River			196		215	0	0	8,500						15		82	0		
Bir Gifgafa			60		0	0	0	3,600						70		0			
Bir Hama-Gifgafa			220	93	72	0	40	13,500	20	51	132	172		48		0			
Bir Lahfan			180	50	48	0	76	10,050	28			180		48		20			
Bir Rud Salim	24	47	40	11	5	0	24	3,300				15	51	68	18	24		8	
Birhassna-Thamada			146	52	48	0	40	3,000	33	64	93	40		24		0			
Boos			14		0	0	0	189				0	4	10	0	0	0		
Bourgaltroff			115		158	0	0	6,519						16		81	0	0	
Boutmiya	80	120	224	85	72	0	81	16,767	60	72	212	366	123	108					
Bowling Alley 1	331	138	201	248	317	0	335	20,496	243			66	106	32	184	0	1,270		
Brody 1			34		730	0	139	3,300						0		44	0		
Brody 2			55		718	0	3,288	12,900						103		103	0		
Burbach-Durstel	383	44	211	62	104	0	0	6,713				83	13	43	115	81	0	0	
Butte Line	208		215		72	0	60	30,200				315		0		648	0	0	
Caiazzo		66	106	32	104	0	8	6,435				48	32	42	25	51	0	27	
Calabritto	218	470	51	54	130	0	26	7,588				61	13	12	13	37	0	0	
Cambrai			218		0			12,143						238			0		
Campoleone 1	262	523	71	72	242	62	16	15,098				76	30	92	104	123	0	30	
Campoleone 2	207	78	107	160	222	0	53	9,834	81	164	308	35	36	122	31	44			
Campoleone Station		66	102	32	97	0	0	10,593				65	18	19	10	106	0	0	
Canal 1	218	96	158	54	68	0	0	8,138				71	38	40	25	45	0	0	
Canal 2	78	567	51	88	168	0	26	8,128				71	38	39	25	45	0	3	
Capua	218	470	73	54	160	0	14	8,000				24	35	22	37	59	0	0	
Carroceto	204	78	107	160	221	0	18	4,515	243	262	183	139	24	82	23	7			
Castel Volturno	218	470	51	54	199	23	55	8,160				71	38	39	25	45	0	0	
Castellonorato		70	124	32	154	0	40	7,500				32	17	21	5	73	0	0	
Chan River	156		215		72	0	60	12,500				118		0		288	0	0	
Changkufeng 1					14	0	0	1,460						20		20	0	0	
Changkufeng 2			30		40	0	103	3,010						0		22	0	0	
Changkufeng 3			200		100	0	407	8,000						0		37	0	0	
Chartres	385	42	317	64	146	0	0	8,325				52		15	48	76	0	0	
Chateau Salins	570		326	130	239	0	13	11,185				51		20	135	152	0	0	
Chinese Farm 1	83	62	344	108	96	0	0	30,970	25	72	297	389	395	322	0	0			
Chinese Farm 2	72	80	444	155	72	0	267	36,840	25	72	327	419	592	347	0	164			
Chinese Farm-W.	36	30	232	75	72	0	153	18,180	17	421	66	293	554	119	0	80			
Chouigui Pass			13		0	0	0	188						25	0	3	0	0	
Ciechanov 1			73		420	0		3,100						12		78	0		
Ciechanov 2			190		414	0		3,900						32		84	0		
Cisterna	66	106	66	201	0	150		11,928				68	13	49	13	85	0	0	
Cobra			650		792	0	800	30,700						62		318	0	0	
Death to Invader	28	12	25	6	8	0		3,000				27	24	40	6	24		60	
Dragon		66	106	32	101	0	10	5,152				45	32	55	25	51	0	116	
Durstel-Faerberviel	246	303	624	311	543	0	0	30,712				179	26	75	221	456	0	0	

Attacking Force											Defending Force										
Name	Mor	AT	Tanks	Wpns	AD	Arty	Sor	Rifle	Mor	AT	Tanks	Wpns	AD	Arty	Sor						
	tars				Guns	Msl	ties	Men	Sqds	tars				Guns	Msl	ties					
East Prussia			2,035			15540	0	780,000				700		5,740	0						
Eboli	66		106	32	106	40	156	6,702		15	35	59	37	80	0	10					
El Arish			90	32	48	0	38	12,750	63	71	137	78	126	36	0	0					
El Auja-Ayin	54	24	75	6	24	0	206	4,000		36	16	90	8	16	0						
El Guettar 3			103		62	0	123	22,000	243			75	124	0							
Fiocchia	163	78	45	69	164	0	170	19,613	243	66	106	32	187	0	178						
Formia		82	225	32	159	0	0	7,627		32	19	30	10	58	0	0					
Fosso Campoleone		93	281	64	146	17	35	15,801		93	27	100	72	117	0	11					
Francolise	78	567	158	88	68	0	0	8,088		71	38	39	25	45	0	0					
Gaza Strip	32	59	100	60	72	0	38	17,450		101	199	134	114	0	10						
Gaza-Khan Yunis	32	95	25	16	12	0	8	6,400		90	34	8	32	44	0						
Golan Cntratk	94	329	566	111	198	0	50	16,100	10	34	31	270	78	60	0	50					
Goodwood			1,369		720	0	4,000	57,500				528	292	0							
Grazzanise	78	567	158	88	68	0	0	8,068		71	38	39	25	45	0	0					
Guadalajara			50		230	0	200	100,000				70	0	240	0						
Han River	156		215		162	0	0	27,000		198		0	748	0	0						
Hills 153-115			109		141	0	27	2,000				0	6	0	0						
Hill-95 1			122		129	0	98	3,500				0	12	0	0						
Hill-95 2	150		122		180	0	53	2,500		65		0	12	0	0						
Hiram	112	36	60	24	32	0	96	6,000		54	24	60	12	24	0	12					
Hushniyah	36	33	219	66	60	0	249	14,683		37	247	170	58	90	0	111					
Il Gioglio Pass	147	66	70	120	145	0	100	3,700		53	16	0	8	29	0	0					
Iron Triangle	306		0		192	0	60	13,800	243	108	118	85	0	0							
Ismailia	89	57	232	80	72	0	120	23,860	50	60	149	246	375	72	2	72					
Itri-Fondi		70	104	32	126	0	8	6,650		34	14	26	15	40	0	32					
Ivo Jima 1			144		474	0	300	18,300		65		40	100	59	0	10					
Ivo Jima 3			144		800	0	175	2,685				40	120	0	0						
Ivo Jima-Suribachi			23		330	0	40	1,600				0	30	0	10						
Jebel Geneifa	36	30	318	75	48	0	240	35,623		123	196	454	468	150	4	150					
Jebel Libni			184		75	48	53	3,000				60	48	0							
Jenin	50	71	100	53	36	0	12	6,160	23	38	25	40	24	20	0	0					
Jerusalem	136	190	91	122	72	0	11	13,600	50	82	69	40	52	36	4						
Jerusalem Cor'dor	50	22	57	12	14	0	60	2,500		18	8	40	6	8	0	60					
Jerusalem Jebussi	30	12	15	6	2	0	0	3,600		44	16	8	6	4	0						
Jitra			40		52	0	100	12,000				0	56	0	0						
Kabazu-Tombstone			0		246	0	166	3,000				0	32	0	0						
Kansas Line	315		0		240	0	26,900	243	156		215	72	0								
Kantara Firdan	12	41	530	139	44	0	66	67,440	150	248	1,313	516	974	639	0	100					
Katibiya	16	35	140	52	48	0	21	9,900	30	50	52	120	44	24	0						
Kerama			128		67	0	156	16,168				60	91	0							
Kfar Shams-Antar		21	212	57	40	0	30	12,000		5	153	269	50	70	0	20					
Kochi Cntratk	261		0		60	0	15,350	81	100		140	198	0	175							
Kochi Ridge 4	150		140		209	0	173	5,140		261		0	30	0	0						
Kochi-Onaga 1			126		203	0	125	5,000				0	40	0	0						
Kochi-Onaga 2			123		226	0	129	4,500				0	40	0	0						
Kochi-Onaga 3			126		329	0	269	4,050				0	40	0	0						
Korsun-Shevchovsky			451		2,650	0	15,290	84,500				229	828	0							
Kuneitra	32	63	409	79	72	0	81	19,300	60	72	230	505	115	132	0						
Kuneitra 2	69	335	75	68	115	0	49	3,630		12	9	50	19	12	0	107					
Kunson	162		215		72	0	0	7,100		48		0	23	0							
Kursk Cntratk			2,293		6,220	0	280,000					600	1,600	0							
Kursk-Beigorod			291		2,088	0	15,000					50	171	0							
Kursk-Oboyan 1			320		410	0	45,000					55	1,180	0							
Kursk-Oboyan 2			280		375	0	149,000					450	1,600	0							
Kursk-Oboyan 3			205		323	0	129,000					310	1,490	0							
Kursk-Prokhorovka			650		1,380	0	82,300					505	419	0							
Kursk-South			868		470	0	900	75,000				155	2,115	0	837						
Lamevio		51	0	32	94	0	371	6,108		30	10	46	43	61	0	11					
Lariano			106		115	0	66	13,012				30	112	0	1						
Leningrad-"Spark"			316		1,173	0	350	30,000				20	182	0	140						
Lvov-Sandomierz			1,979		11265	0	30,365	900,000				900	4,800	0							
Maeda Escarpment			97		200	0	225	3,900				0	36	0	0						
Melitopol			778		3,450	0	210,000					300	1,300	0							
Melun	387	42	318	64	146	0	46	6,000		36		16	20	32	0	0					
Metz	757	180	472	192	296	0	30	39,580		220	20	88	208	248	0	0					
Nishmarhayarden 1	28	12	100	6	2	0	0	2,500		36	16	0	8	16	0						
Nishmarhayarden 2	30	12	60	6	6	0	0	2,700		27	12	25	6	16	0						
Nitla Pass	116	13	224	35	114	0	0	7,250				186	90	35	48	0	20				
Noletta River 1	50	16	27	11	58	0	9	5,000	243			18	32	76	31	7					
Noletta River 2	95	51	24	151	167	0	45	9,761	243			203	59	72	185	0	58				
Noletta River 3	262	535	35	84	100	0	16	12,569		120	30	0	128	92	0	0					

Name	Attacking Force						Defending Force					
	Mor	AT	AD	Arty	Sor	ties	Rifle	Mor	AT	AD	Arty	Sor
	Tars	Wpns	Tanks	Wpns	Guns	Ms	Men	Sqds	Tars	Wpns	Tanks	Wpns
Monte Acero		66	106	32	89	0	6,435		51	32	44	40
Monte Camino 1	218	470	45	54	160	0	6,750		48	18	38	25
Monte Camino 2	48	18	40	25	41	0	5,200	81	66	112	0	18
Monte Camino 3	218	470	0	54	140	0	3,288		25	8	12	13
Monte Grande	86	233	73	54	112	0	7,239		24	35	22	37
Monte Grande		61	130	32	132	0	4,563		20	11	23	9
Monte Lungo		66	106	32	110	0	6,566		41	32	54	25
Monte Maggiore		18	0		152	0	3,288		25	8	12	13
Monte Rotondo		66	106	32	106	0	7,942		50	17	42	25
Morhange	333	89	202	67	142	0	7,555		40	6	16	97
Morhange-Faulquemt	1,066	288	524		515	0	28,382		140	35	63	169
Mortain			120		218	0	27,673	243			340	192
Moscow Cntratk			667		3,440	0	880,000				850	2,050
Moscow Defense			1,800		5,746	0	1,372,200				950	6,678
Moselle-Metz		180	585	192	520	0	41,500		12	20	160	208
Mount Herman 3	72	67	0	59	24	0	4,750	16	22	79	0	16
Mount Hermon 1	16	16	9	14	12	0	1,583	5	7	28	5	7
Mount Hermon 2	36	34	0	29	12	0	4,750	16	22	79	0	16
Mount Hermonit	114	16	182	115	155	0	5,395	7	20	28	38	30
Mutankiang			770		1,786	0	75,000				105	584
Naba	22	113	269	29	48	0	11,000			21	212	57
Nabius			180	52	48	0	8,640	27	48		84	58
Nafekh	5	153	318	50	71	0	6,946	4	14	19	110	35
Nakhi	64	104	120	93	72	0	18,450	39	101	189	114	72
Nam River	140		200		70	0	9,000		77		0	28
Nikopol Bridgehead			6		201	0	8,230				0	44
Nishibaru Ridge			100		228	0	3,000				0	34
Nomonhan 1			10		4	0	1,228				0	14
Nomonhan 2			498		216	0	30,000				120	135
Okinawa Beach 1	150		134		95	0	1,400		9		0	0
Okinawa Beach 2			138		95	0	2,000				0	0
Okinawa Outposts	150		134		173	0	2,900		0		0	32
Pierce Line	156		215		72	0	35,100		406		0	103
Pogoreloye			539		880	0	45,897				258	370
Port of Salerno	218	470	0	54	138	66	4,250		8	23	38	13
Pozzilli		66	106	32	110	0	6,566		41	32	54	25
Pusan Breakout	140		200		70	0	10,300				57	72
Pusan Perimeter	179		0		72	0	15,200	243	156		215	72
Quang Tri				16	100	0	17,000					78
Rafah	32	65	240	91	84	0	19,520	95	107	105	197	142
Rafah-El Arish	63	156	108	44	32	0	10,050		135	421	108	57
Rafid	76	370	147	68	129	0	4,958	4	16	13	75	19
Raviyeh			90	26	24	0	4,350			83	50	47
Rovno			765		370	0	1,200				852	320
Saint Lo			107		120	0	7,500				23	84
Saint Vith			251		94	0	19,996				152	108
San Martino	32	70	107	32	160	0	8,141			17	21	5
Sarre-Singling	1,279	303	624	268	565	0	31,501		181	12	42	438
Sarre-St. Avoird	968	288	642	285	519	0	32,396		206	39	66	438
Sarre-Union	390	54	237	90	156	0	6,044		28	10	23	106
Sauer River	140	46	4	144	68	0	8,634	81	95	29	40	50
Schmidt			91		162	0	20,250				66	107
Sedan			756		202	0	2,000				200	192
Sedjanne-Bizerte			94		100	0	5,000				5	34
Seelow Heights			78		233	0	3,710				5	26
Seille-Nied			764		543	0	23,588				71	99
Seine River	607	123	472	144	296	0	15,000		90		38	50
Sele-Calore		48	106	32	82	28	8,390		15	45	78	25
Sevastopol			490		3,890	0	72,000				50	1,050
Sezze		70	110	22	138	0	6,957		38	15	52	52
Shailufa 1	36	30	318	75	72	0	25,600	25	63	164	445	431
Shailufa 2	60	47	126	105	48	0	22,570	42	79	214	259	275
Shuri Advance			74		174	0	2,900				0	32
Shuri Cntratk			0		8	0	15,777	243			0	157
Shuri East 1			121		157	0	5,284				0	34
Shuri East 2			129		210	0	4,757				0	34
Shuri East 3			140		183	0	4,227				0	34
Shuri West 1			0		50	0	3,338				0	2
Shuri West 2			0		171	0	3,000				0	24
Shuri West 3	150		79		150	0	2,600		150		0	3
Singling-Bining	385	43	211	62	104	0	5,044		21	8	18	83

Attacking Force										Defending Force									
Mor		AT		AD		Arty		Sor		Rifle		Mor		AT		AD		Arty	
Name	Tars	Vpns	Tanks	Vpns	Guns	Msl	ties			Men	Sqds	Tars	Vpns	Tanks	Vpns	Guns	Msl	ties	
Skyline Ridge			125			221	0	526	2,600					0			38	0	0
Spigno		70	249	32	166	0	31	8,215	8,215	88	21	40	24	128	0	0			
Suez Attack-N.	268	268	1,002	1,298	585	15	44	43,400	30	110	714	221	144	15	72				
Suez Attack-S.	186	904	709	936	447	15	44	28,600	80	116	95	348	146	96	0	72			
Suez Buildup-N.	229	231	464	1,547	639	15	100	14,000	10	30	38	192	84	40	0	67			
Suez Buildup-S.	153	811	310	1,431	555	15	100	10,980	10	30	35	148	67	24	0	67			
Suez Canal-N.	112	984	67	1,547	1,223	0	104	4,455	7	21	21	67	35	40	0	70			
Suez Canal-S.	19	756	71	1,431	971	15	104	3,020	5	17	14	52	24	28	0	70			
Suez (City)	48	43	225	68	60	0	154	22,570	42	79	214	259	375	139	4	57			
Suomussalmi					8	0	0	29,954				55		96	0	0			
S. Maria Infante	88	70	249	32	160	0	160	9,250			21	34	24	123	0	0			
S. Maria Oliveto		72	106	32	92	0	83	6,321		61	14	30	12	41	0	48			
Tarava-Betto			46		278	0		4,836				14		53	0	0			
Targul Frumos			410		0			13,725				160		0					
Tarto-Tiber	436	952	71	204	200	0	3	10,855		120	30	0	30	125	0	0			
Tel el Hara		153	318	50	71	0	440	14,300		24	20	318	66	60	0	28			
Tel Fahar-Banias	32	46	10	30	24	0	119	8,160		36	108	75	63	70	0	0			
Tel Faris	46	31	249	87	60	0	250	23,750		71	325	253	91	150	0	111			
Tel Shaar		21	318	72	60	0	220	21,500	25	40	323	387	84	130	0	80			
Tel Shams	34	31	270	78	60	0	330	19,400	41	59	325	329	75	110	0	120			
Terracina		70	131	32	148	0	6	6,653		34	14	26	15	40	0	0			
Tiflit-Zababiya			90	26	24	0	21	5,450	15	25	31	60	28	24	0	0			
Tobacco Factory	46	101	98	46	106	0	24	12,691	243	48	106		112	52	170				
Tobacco Factory 1	76	30	92	104	130	0	50	17,976	243	262	523	71	72	242	62	33			
Tobacco Factory 2		39	70	32	155	0	7	7,077			36	28	38	102	0	0			
Tomb Hill-Ouki	150		151	221	0	123		4,731		77		0	32	0	0				
Triflisco		66	106	66	113	0	33	7,250		24	35	22	35	59	0	10			
Valmontone			126		146	0	121	10,111				31		110	0	0			
Velletri		30	462	32	92	0	8	12,327		71	20	65	22	64	0	0			
Via Anziate			156		121	0	38	19,255				35		202	0	2			
Vietri 1	125	470	108	90	164	0	112	12,917	243	218	106	30	54	146	74	40			
Vietri 2	125	81	108	68	164	0	31	18,912	243	244	501	96	90	152	74	33			
Villa Crocetta		66	102	32	93	0	0	13,715		92	36	71	103	117	0	0			
Vistula Crossing 1			0	205	0			5,100				12		78	0				
Vistula Crossing 2			34		308	0		6,400				24		156	0				
Vistula-Oder			4,230		17,990	0		560,000				1,200		3,050	0				
Westvall			312		234	0		19,632				63		116	0	79			
Yaeju Dake			40		53	0	0	2,500				0		6	0	0			
Yassy-Kishinev			1,428		10,469	0		800,000				400		5,320	0				
Yehuda el Al	71	381	189	90	129	0	70	6,300		6	15	106	35	136	0	132			
Yuza Dake Advance			113		177	0	151	4,000				0		21	0	0			
Yuza Dake Attack			117		172	0	0	4,250				0		11	0	0			
Yuza Dake Capture			115		206	0	76	3,250				0		5	0	0			
Zaoura-Kala			90	26	24	0	119	8,560			113	75	63	82	0	0			

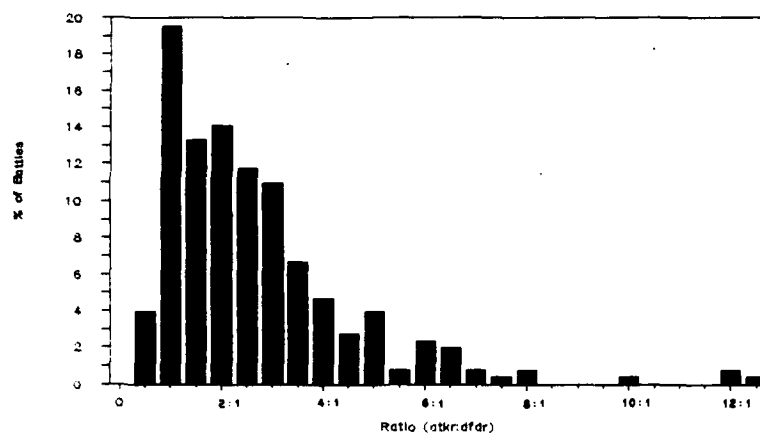
APPENDIX E
STATISTICAL CHARACTERISTICS OF HISTORICAL DATA

Table E-1. Amount of Data on Which Characteristics are Based

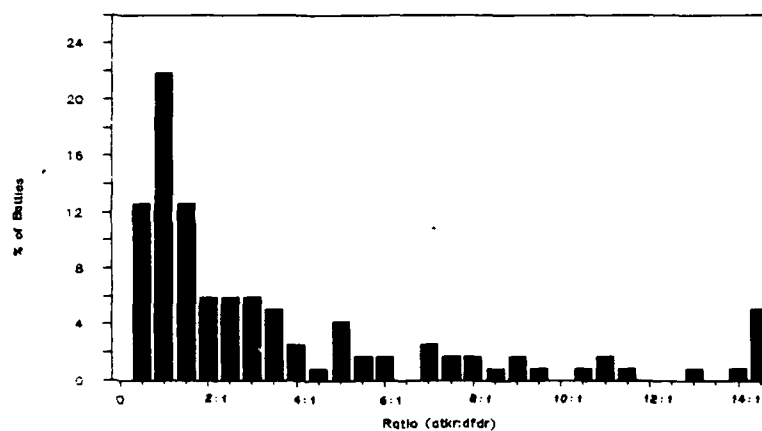
Combat characteristic	Posture		
	Attacker	Joint	Defender
Force ratio - men		256	
Force ratio - mortars		116	
Force ratio - guns		245	
Troop density	251		251
Weapons system density	48		37
Rifle squad density	115		57
Mortar density	122		142
Antitank weapon density	113		136
Tank density	234		201
Artillery density	245		240
Air defense density	140		133
Close air support density	168		91
Casualty rate	251		253
Casualty ratio		251	
Tank loss rate	164		131
Advance rate	241		
Hours of combat per day		89	

(THIS PAGE INTENTIONALLY LEFT BLANK)

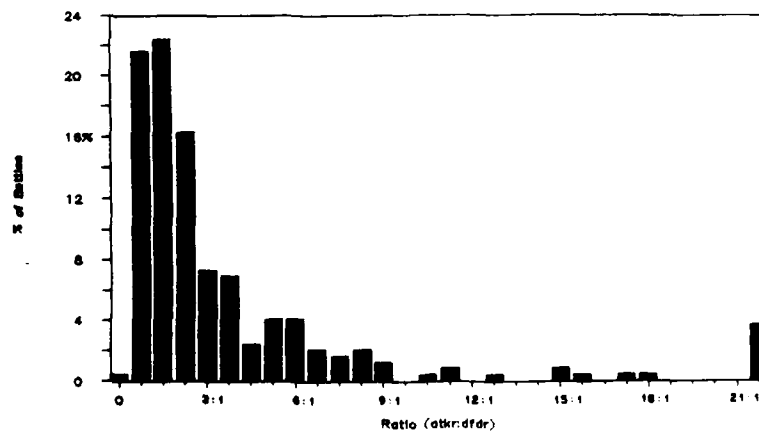
FORCE RATIO

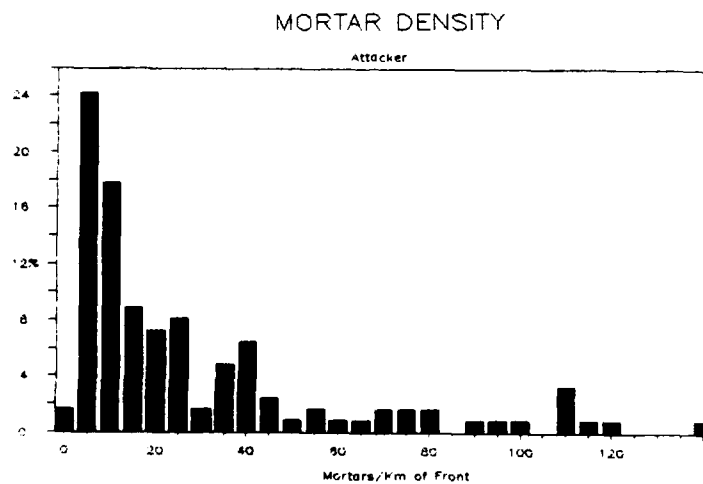
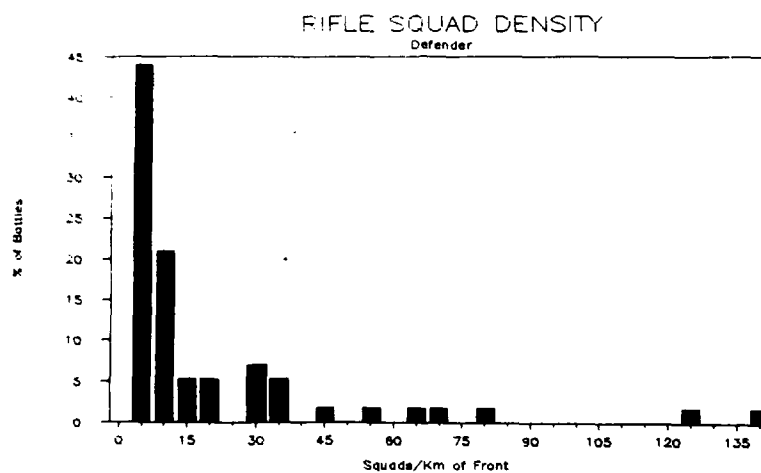
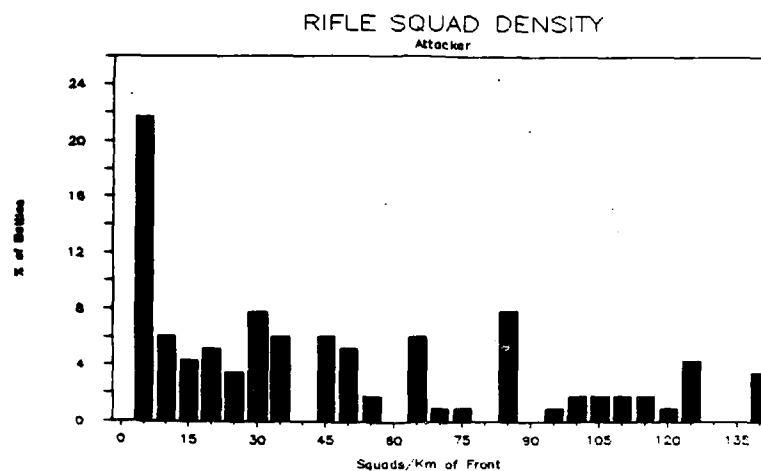


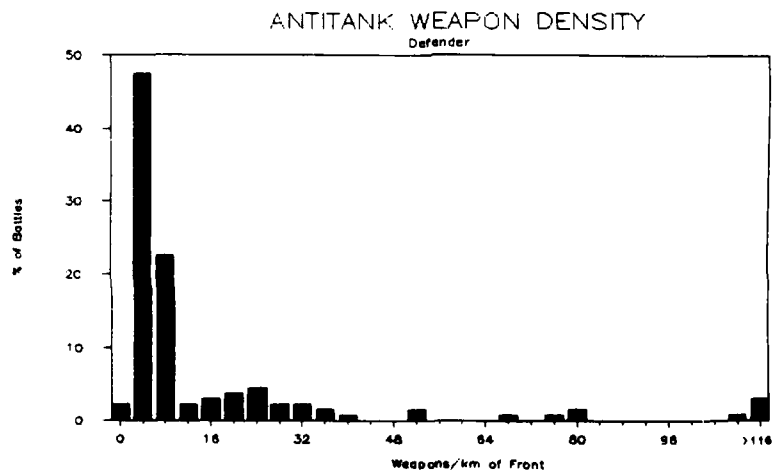
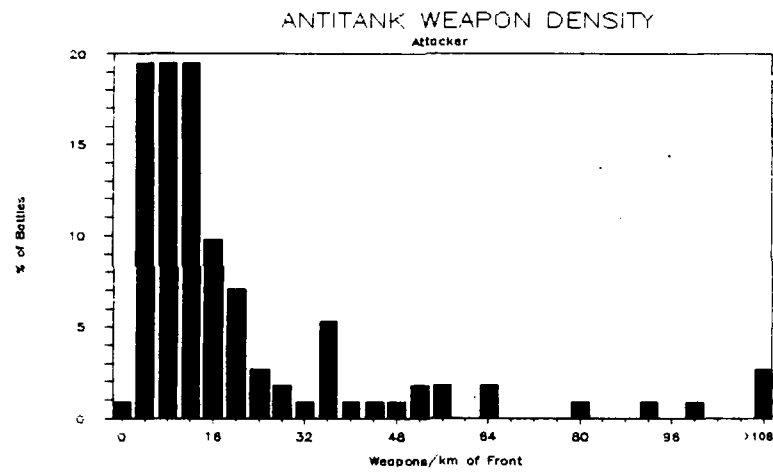
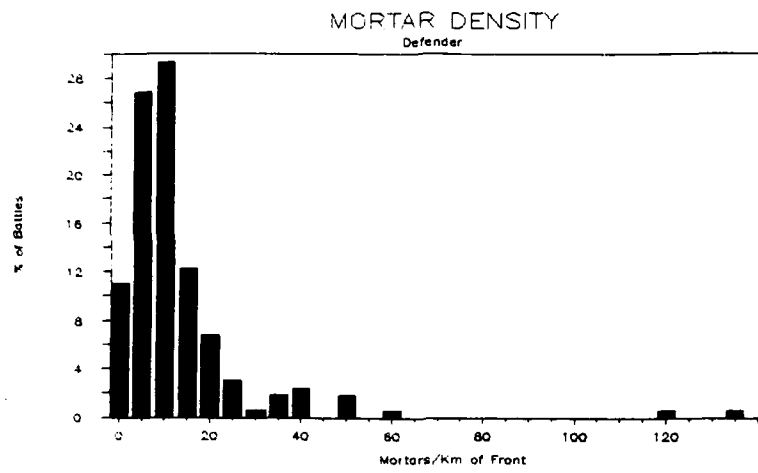
MORTAR RATIO

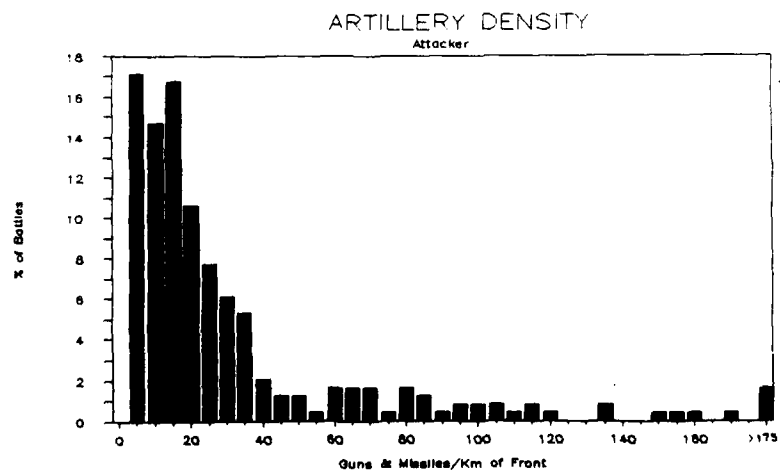
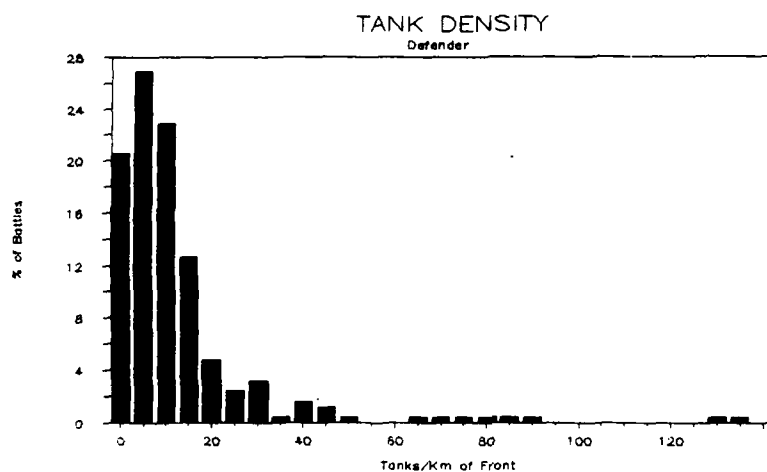
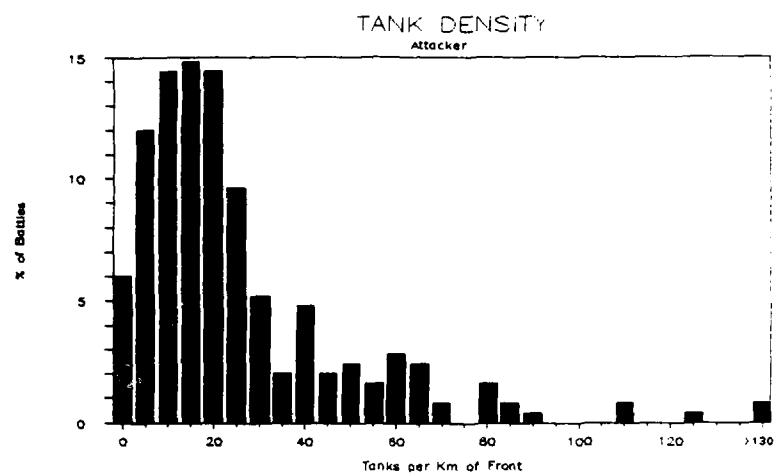


ARTILLERY RATIO

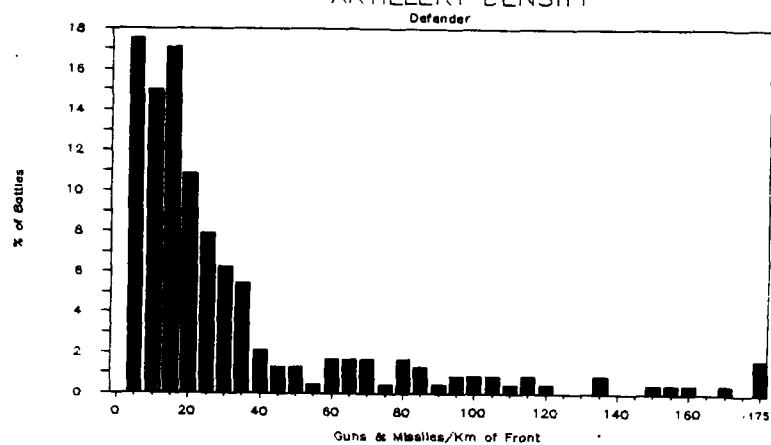




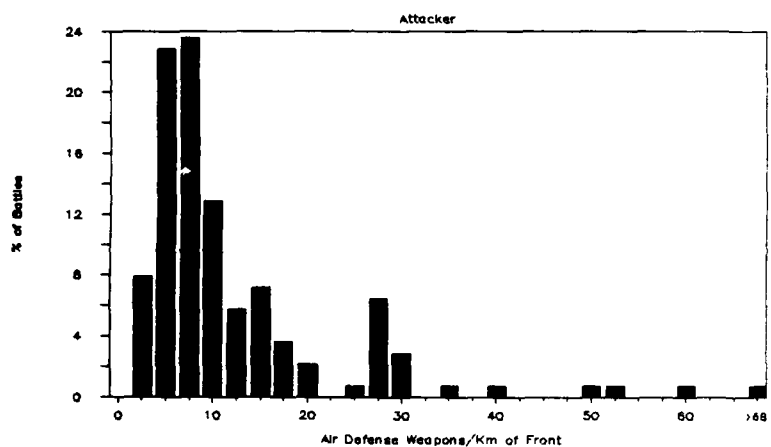




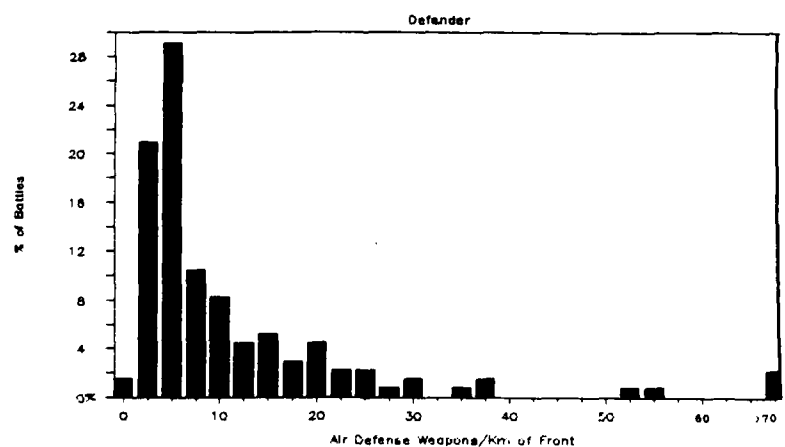
ARTILLERY DENSITY

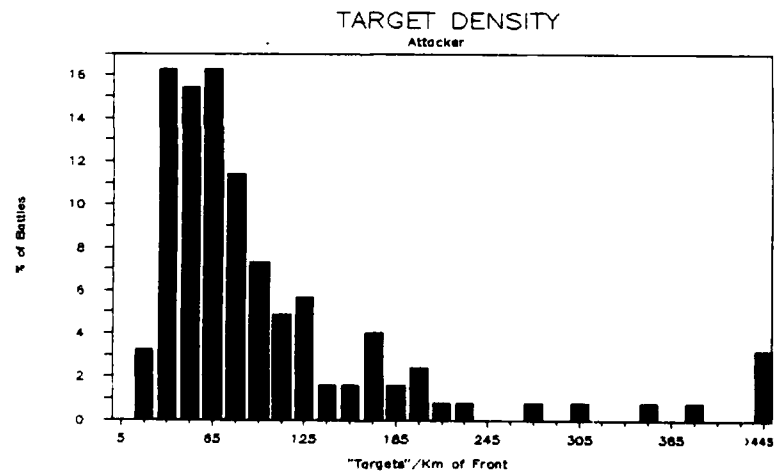
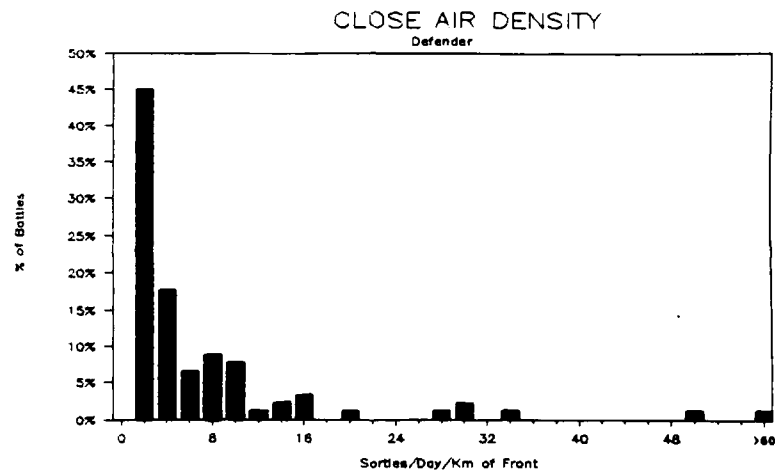
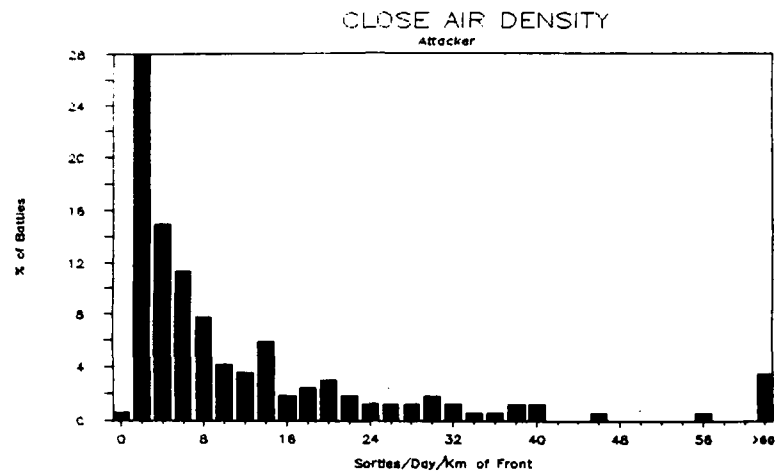


AIR DEFENSE WEAPON DENSITY

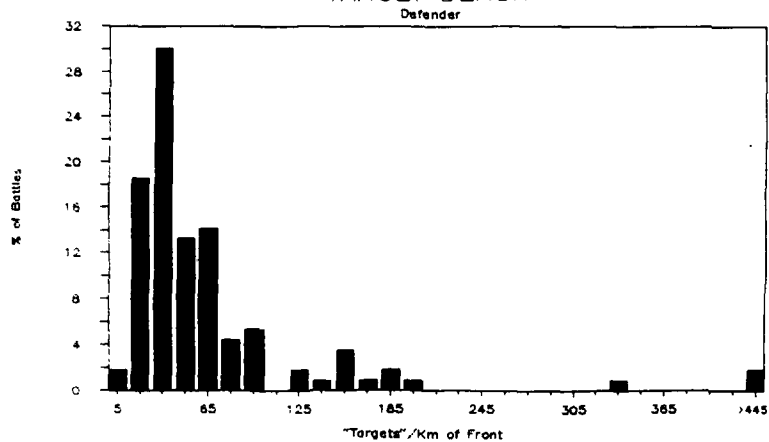


AIR DEFENSE WEAPON DENSITY

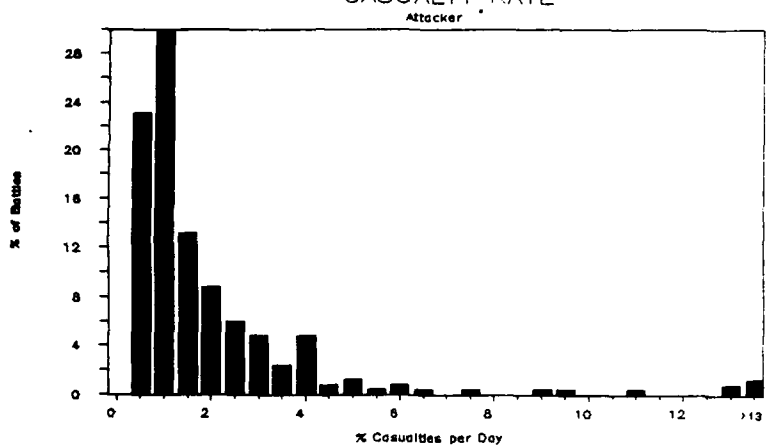




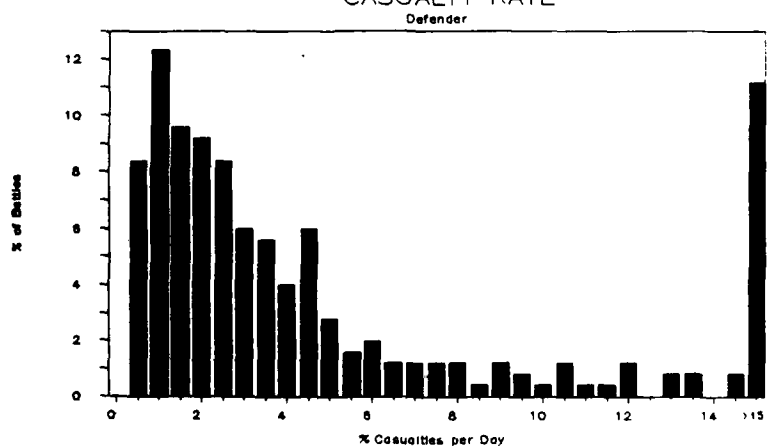
TARGET DENSITY



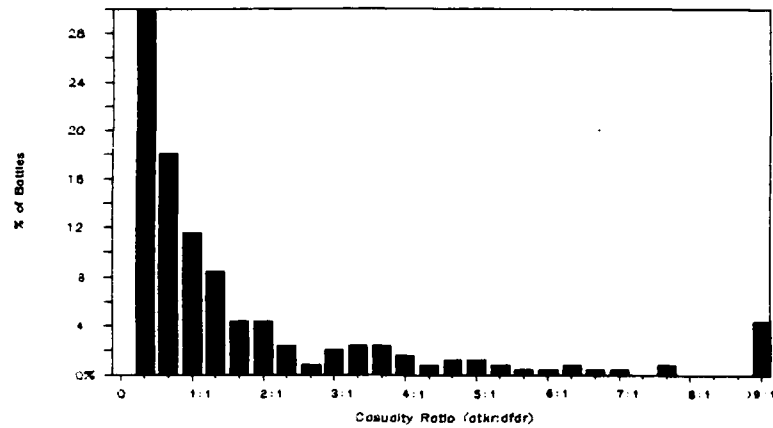
CASUALTY RATE



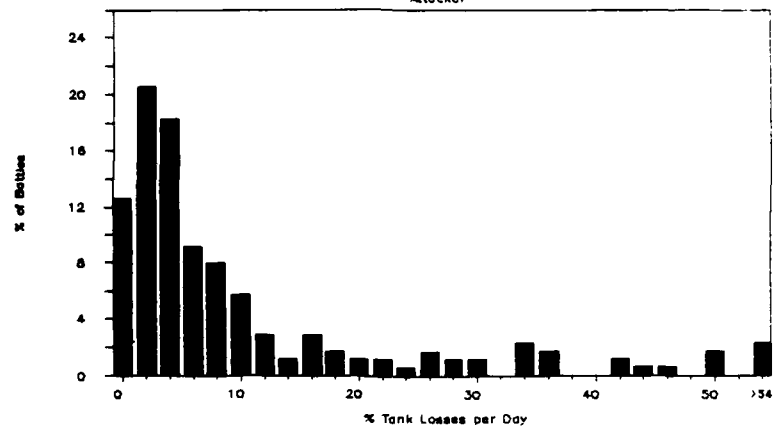
CASUALTY RATE



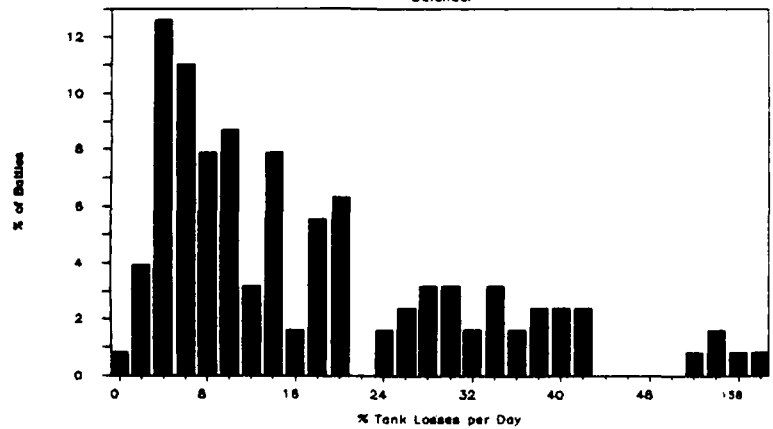
CASUALTY RATIO

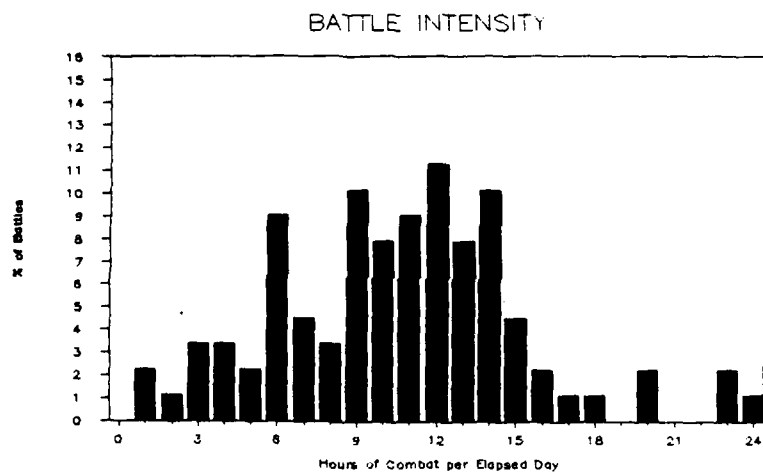
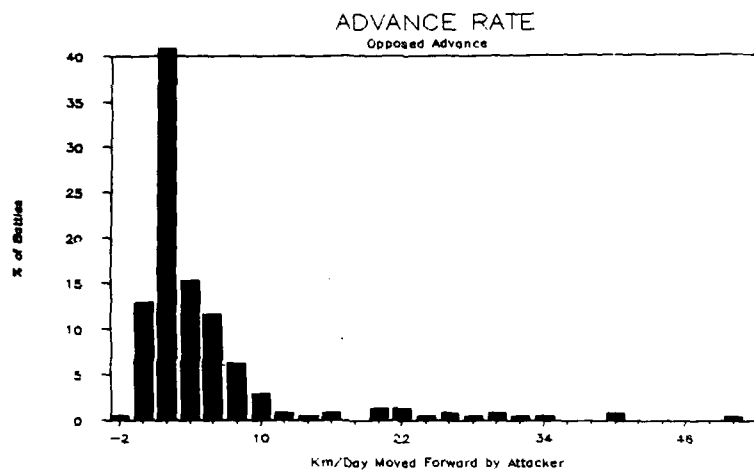


TANK LOSS RATE Attacker



TANK LOSS RATE Defender





APPENDIX F
BLANK EVALUATION FORMS

The following pages contain blank forms. These may be reproduced to enable a user to apply the benchmarks to a particular wargame.

C R E D I B I L I T Y O F S I M U L A T E D C O M B A T

Run Date: _____ Scenario: _____ ☒ AttackerModel: _____ Unit: _____ ☐ DefenderType of Test: ☒ Centrality ☐ Plausibility

TYPE OF CRITERIA FROM MILITARY HISTORY			VALUES OF THE CRITERIA			RESULTS OF SIMULATED COMBAT	
Characteristic	Measure		Lower	Median	Upper	Value	Status
-----	-----		-----	-----	-----	-----	-----
I N I T I A L C O N D I T I O N S							
RELATIVE ADVANTAGE	Troop	ratio(atk:def)	1.1:1	1.9:1	3.0:1	---	---
	Mortar	ratio/atk:def)	.67:1	1.6:1	4.6:1	---	---
	Gun & Missile	ratio(atk:def)	.87:1	1.7:1	3.7:1	---	---
TARGET DENSITY	Troop	men/meter	1.3	2.5	4.6	---	---
	Weapon System	"systems"/km	54	82	130	---	---
WEAPON DENSITY	Rifle Squad	squads/km	7.6	30	71	---	---
	Mortar	mortars/km	5.0	13	36	---	---
	Antitank	AT weapons/km	4.6	9.8	19	---	---
	Tank	tanks/km	9.7	18	31	---	---
	Artillery	guns & msis/km	7.6	16	31	---	---
	Air Defense	weapons/km	4.5	7.1	14	---	---
	Close Air	sorties/km/day	1.6	5.5	14	---	---
O U T C O M E S							
TROOP ATTRITION	% / day		.57	.93	2.0	---	---
CASUALTY RATIO	atkr:dfdr		.26:1	.68:1	1.8:1	---	---
TANK LOSSES	% / day		1.7	4.3	14	---	---
OPPOSED MOVEMENT	km / day		.4	1.7	5.0	---	---
COMBAT INTENSITY	hrs / day		7.3	10	13	---	---

CREDIBILITY OF SIMULATED COMBAT

Run Date: _____ Scenario: _____ [] Attacker
 Model: _____ Unit: _____ [X] Defender
 Type of Test: [X] Centrality [] Plausibility

TYPE OF CRITERIA FROM MILITARY HISTORY			VALUES OF THE CRITERIA			RESULTS OF SIMULATED COMBAT	
Characteristic	Measure		Lower	Median	Upper	Value	Status
INITIAL CONDITIONS							
RELATIVE ADVANTAGE	Troop	ratio(atk:def)	1.1:1	1.9:1	3.0:1	---	---
	Mortar	ratio(atk:def)	.67:1	1.6:1	4.6:1	---	---
	Gun & Missile	ratio(atk:def)	.87:1	1.7:1	3.7:1	---	---
TARGET DENSITY	Troop	men/meter	.72	1.3	1.9	---	---
	Weapon System	"systems"/km	30	71	150	---	---
WEAPON DENSITY	Rifle Squad	squads/km	1.9	6.7	21	---	---
	Mortar	mortars/km	3.2	7.2	13	---	---
	Antitank	AT weapons/km	2.2	4.2	13	---	---
	Tank	tanks/km	3.5	6.9	14	---	---
	Artillery	guns & msis/km	4.8	8.9	16	---	---
	Air Defense	weapons/km	2.9	5.0	12	---	---
	Close Air	sorties/km/day	1.0	2.6	7.5	---	---
OUTCOMES							
TROOP ATTRITION	% / day		1.2	2.8	5.7	---	---
CASUALTY RATIO	atkr:dfdr		.26:1	.68:1	1.8:1	---	---
TANK LOSSES	% / day		4.9	12	27	---	---
OPPOSED MOVEMENT	km / day		.40	1.7	5.0	---	---
COMBAT INTENSITY	hrs / day		7.3	10	13	---	---

C R E D I B I L I T Y O F S I M U L A T E D C O M B A T

Run Date: _____ Scenario: _____ [X] Attacker
 Model: _____ Unit: _____ [] Defender
 Type of Test: [] Centrality [X] Plausibility

TYPE OF CRITERIA FROM MILITARY HISTORY			VALUES OF THE CRITERIA			RESULTS OF SIMULATED COMBAT	
Characteristic	Measure		Lower	Median	Upper	Value	Status
I N I T I A L C O N D I T I O N S							
RELATIVE ADVANTAGE	Troop	ratio(atk:def)	.57:1	1.9:1	6.3:1	---	---
	Mortar	ratio(atk:def)	.21:1	1.6:1	13:1	---	---
	Gun & Missile	ratio(atk:def)	.24:1	1.7:1	15:1	---	---
TARGET DENSITY	Troop	men/meter	.45	2.5	9.3	---	---
	Weapon System	"systems"/km	24	82	600	---	---
WEAPON DENSITY	Rifle Squad	squads/km	1.1	30	120	---	---
	Mortar	mortars/km	.76	13	110	---	---
	Antitank	AT weapons/km	1.5	9.8	82	---	---
	Tank	tanks/km	2.9	18	80	---	---
	Artillery	guns & msis/km	1.7	16	110	---	---
	Air Defense	weapons/km	2.0	7.1	35	---	---
	Close Air	sorties/km/day	.31	5.5	43	---	---
O U T C O M E S							
TROOP ATTRITION	% / day		.2	.93	5.5	---	---
CASUALTY RATIO	atk:dfdr		.08:1	.68:1	7.0:1	---	---
TANK LOSSES	% / day		0	4.3	44	---	---
OPPOSED MOVEMENT	km / day		0	1.7	21	---	---
COMBAT INTENSITY	hrs / day		3	10	19	---	---

CREDIBILITY OF SIMULATED COMBAT

Run Date: _____ Scenario: _____ ☐ Attacker
 Model: _____ Unit: _____ ☒ Defender
 Type of Test: ☐ Centrality ☒ Plausibility

TYPE OF CRITERIA FROM MILITARY HISTORY		VALUES OF THE CRITERIA			RESULTS OF SIMULATED COMBAT	
Characteristic	Measure	Lower	Median	Upper	Value	Status
I N I T I A L C O N D I T I O N S						
RELATIVE ADVANTAGE	Troop	ratio(atk:def)	.57:1	1.9:1	6.3:1	-----
	Mortar	ratio(atk:def)	.21:1	1.5:1	13:1	-----
	Gun & Missile	ratio(atk:def)	.24:1	1.7:1	15:1	-----
TARGET DENSITY	Troop	men/meter	.30	1.3	5.7	-----
	Weapon System	"systems"/km	3.7	71	610	-----
WEAPON DENSITY	Rifle Squad	squads/km	.13	6.7	80	-----
	Mortar	mortars/km	.63	7.2	38	-----
	Antitank	AT weapons/km	.59	4.2	75	-----
	Tank	tanks/km	1.3	6.9	45	-----
	Artillery	guns & msis/km	1.5	8.9	50	-----
	Air Defense	weapons/km	1.1	5.0	36	-----
	Close Air	sorties/km/day	.2	2.6	29	-----
O U T C O M E S						
TROOP ATTRITION	% / day		.3	2.8	22	-----
CASUALTY RATIO	atk:dfdr		.08:1	.38:1	7.0:1	-----
TANK LOSSES	% / day		.5	12	53	-----
OPPOSED MOVEMENT	km / day		0	1.7	21	-----
COMBAT INTENSITY	hrs / day		3	10	19	-----

COMPARISON OF SIMULATED BATTLES

Run Date: _ _ _ _ _ Type of Test: [] Centrality [] Plausibility
 Model: _ _ _ _ _ Scenario: _ _ _ _ _

TYPE OF CRITERIA FROM MILITARY HISTORY			BATTLE _ _		BATTLE _ _		BATTLE _ _	
Characteristic		Measure	-----		-----		-----	
			Atkr	Dfdr	Atkr	Dfdr	Atkr	Dfdr
I N I T I A L C O N D I T I O N S								
RELATIVE ADVANCE- TAGE	Men	ratio(atk:def)	_ _ _		_ _ _		_ _ _	
	Mortars	ratio(atk:def)	_ _ _		_ _ _		_ _ _	
	Guns & MsIs	ratio(atk:def)	_ _ _		_ _ _		_ _ _	
TARGET DENSITY	Troop	men/meter	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
	Weapon System	"systems"/km	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
WEAPON DENSITY	Rifle Squad	squads/km	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
	Mortar	mortars/km	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
	Antitank	AT weapons/km	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
	Tank	tanks/km	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
	Artillery	guns & msIs/km	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
	Air Defense	weapons/km	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
	Air Support	sorties/km/day	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
O U T C O M E S								
TROOP ATTRITION	% / day		_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
CASUALTY RATIO	atkr:dfdr		_ _ _		_ _ _		_ _ _	
TANK LOSSES	% / day		_ _ _	_ _ _	_ _ _	_ _ _	_ _ _	_ _ _
OPPOSED MOVEMENT	km / day		_ _ _		_ _ _		_ _ _	
COMBAT DURATION	hrs / day		_ _ _		_ _ _		_ _ _	

APPENDIX G
DISTRIBUTION

Addressee	No of copies
The Pentagon Library (Army Studies Section) The Pentagon Washington, DC 20310	2
Defense Intelligence Agency DSI-5C/DIA-Charles Abzug Washington, DC 20340-3420	1
Defense Nuclear Agency ATTN: NANF (CPT Dick Trip) 6801 Telegraph Road Alexandria, VA 22307	1
Commandant Armed Forces Staff College Norfolk, VA 23511	1
Director US Army Human Engineering Lab Aberdeen Proving Ground, MD 21005-5001	1
Commander US Army Logistics Center ATTN: ATCL-OPF (Mr. Jim Fitzgerald) Fort Lee, VA 23801-6000	1
Commander US Army Logistics Center ATTN: Library Fort Lee, VA 23801	1

Addressee	No of copies
-----------	-----------------

Commander
US Army Intelligence and Threat Analysis Center
Building 203, Stop 314
Washington Navy Yard
Washington, DC 20374

1

Commander
US Army Logistics Center
ATTN: Historians Office
Fort Lee, VA 23801

1

Commandant
US Army War College
Center for Land Warfare
Carlisle Barracks, PA 17013

1

Commandant
US Army War College
ATTN: Library
Carlisle Barracks, PA 17013

1

Commander
US Army Research Institute
ATTN: Library
5001 Eisenhower Avenue
Alexandria, VA 22333

1

Commander
US Army RDSA Information Systems
Agency
Radford, VA 24141

1

Commander
US Army Soldier Support Center
ATTN: ATSG-DDN
Fort Benjamin Harrison, IN

1

Addressee	No of copies
Commandant US Air War College Maxwell Air Force Base, AL 36112-5532	1
US Air Force Center for Studies and Analyses ATTN: Library Room 10363, Pentagon Washington, DC 20330-5425	1
US Air Force Office of Worldwide Management of Studies & Analyses ATTN: AF/SAL The Pentagon Washington, DC 20330	1
Commander US Army Research Institute Field Unit P. O. Box 5787 Presidio of Monterey, CA 93944-5011	1
Mr. Irving Alderman US Army Research Institute 5001 Eisenhower Avenue Alexandria, VA 22333	1
Director US Army Materiel Systems Analysis Activity ATTN: Combat Support Division Aberdeen Proving Ground, MD 21005-5071	1
Mr. Brian Bader Data Memory Systems, Inc. 10392 Democracy Lane Fairfax, VA 22030	2

Addressee	No of copies
Mr. Bruce Bennett The Rand Corporation 2100 M Street, NW Washington, DC 20037	1
Mr. Edmund J. Bitinas BDM Corporation 7515 Jones Branch Drive McLean, VA 22102	1
Director US Army Ballistic Research Laboratories Building 305 - Library Aberdeen Proving Ground, MD 21005	1
Commandant US Army Command and General Staff College Fort Leavenworth, KS 66027	1
Commandant US Army Command and General Staff College Doctrine Development Division ATTN: COL B Miller Fort Leavenworth, KS 66027	1
Commander US Army Command and General Staff College ATTN: Combat Studies Institute (Dr. Roger Spilter) Fort Leavenworth, KS 66027	1
Commander US Army Command and General Staff College ATTN: ATZL-SWX (LTC Hal Winton) Fort Leavenworth, KS 66027	1

Addressee	No of copies
Commander US Army Center of Military History ATTN: Library Washington, DC 20310	1
Commander US Army Combat Developments Experimentation Center Fort Ord, CA 93941	1
Headquarters US Air Force Checkmate Program ATTN: USAF/XOC Washington, DC 20330-5054	1
Headquarters, Department of the Army Deputy Chief of Staff for Operations and Plans ATTN: DAMO-FDL Washington, DC 20310	1
Deputy Chief of Staff for Personnel Headquarters, Department of the Army Washington, DC 20310	1
Headquarters, Department of the Army Deputy Chief of Staff for Logistics ATTN: DALO-SMA Washington, DC 20310	1
Headquarters, Department of the Army Chief of Staff for Information Management ATTN: LTC Anthony Anconetani Washington, DC 20310	1

Addressee	No of copies
Director US Army Logistics Management Center ATTN: DLSIE Fort Lee, VA 23801	5
Defense Technical Information Center ATTN: DTIC-DDA Cameron Station Alexandria, VA 22314-6145	5
COL Trevor N. Dupuy, USA (ret) Data Memory Systems Inc 10392 Democracy Lane Fairfax, VA 22030	2
Mr. Paul Davis The Rand Corporation 2100 M Street, NW Washington, DC 20037	1
Director Program Analysis and Evaluation ATTN: Projection Forces Division Office of the Secretary of Defense Room 2E330, The Pentagon Washington, DC 20310	1
Director Program Analysis and Evaluation ATTN: Land and Forces Division Office of the Secretary of Defense Room 2E330, The Pentagon Washington, DC 20310	1
Defense Nuclear Agency ATTN: Library 6801 Telegraph Road Alexandria, VA 20305	1

Addressee	No of copies
Michael Ellis BDM Corporation 7915 Jones Branch Drive McLean, VA 22102	1
Mr. Michael Flint Forces Program Central Intelligence Agency Room 2E37, The Pentagon Washington, DC 20505	1
Mr. James Dunnigan 328 West 19th Street Bay Dunnigan and Nolfo New York, New York 10011	1
Edward Girard Defense Electronics Operations Rockwell International Corp 1800 Satellite Boulevard Duluth, GA 30136	1
Center for Naval Analyses James Graves 4401 Ford Avenue Post Office Box 16268 Alexandria, VA 22302-0268	1
Defense Intelligence Agency ATTN: Lloyd Hoffman Washington, DC 20340-6621	1
The Honorable Walter Hollis Deputy Under Secretary of the Army (OR) Room 2E660, The Pentagon Washington, DC 20310	1

Addressee	No of copies
Organization of the Joint Chiefs of Staff ATTN: J-8 (V. Roske) Room 1D936, The Pentagon Washington, DC 20310-5000	1
Organization of the Joint Chiefs of Staff Force Structure, Resources and Assessment Directorate (J-8) Capabilities Assessment Division Room 1D936, The Pentagon Washington, DC 20310-5000	1
Mr. Curtiss Johnson Data Memory Systems, Inc 10392 Democracy Lane Fairfax, VA 22030	2
Joint Studies Group (TAC) Langley Air Force Base, VA 23665	1
Joint Studies Group (TAC) Wright-Patterson Air Force Base, OH 45433	1
George Kuhn Logistics Management Institute 6400 Goldsboro Road Bethesda, MD 20817	1
Mr. John Kuntzman SYSCON Corporation 1000 Jefferson Street, NW Washington, DC 20007	1

Addressee	No of copies
Commander US Army Logistics Evaluation Agency New Cumberland Army Depot New Cumberland, PA 17070	1
Commander US Army TRADOC Analysis Center ATTN: CPT John Szaka Leavenworth, KS 66027	1
Raymond M. Macedonia AVCO Systems 201 Lowell Street Wilmington, MA 01887	1
Frederick McClintic CACI 5010 Trindel Road Warminster, PA 17055	1
Dr. Kleber S. Masterson, Jr. Booz-Allen and Hamilton, Inc. 1725 Jefferson Davis Highway Arlington, VA 22202-4148	1
Dr. Don S. Marshall The Military Conflict Institute 2842 Ashby Avenue Berkeley, CA 94705-2341	3
Director US Army Military History Institute Carlisle Barracks, PA 17013	1
President National Defense University Fort McNair Washington, DC 20319-6000	1

Addressee	No of copies
-----------	-----------------

Superintendent
US Naval Postgraduate School
ATTN: Department of Operations Research
Code 55PY (Parry)
Monterey, CA 93940

1

Commandant
US Navy War College
ATTN: Library
Newport, RI 02840

1

Commander
US Naval War College
ATTN: Naval Warfare Gaming System (Code 33)
Newport, RI 02840

1

Paul Olson
The Rand Corporation
P.O. Box 2138
Santa Monica, CA 90406-2138

1

Chip Pickett
Northrop Analysis Center
Suite 700
1133 21st Street, NW
Washington, DC 20036

1

Dr. S. Christian Simonson III
Conflict Simulation Center
Lawrence Livermore Laboratory
P.O. Box 808, L-315
Livermore, CA 94550

1

BG William Stofft
US Army Center for Military History
20 Massachusetts Avenue, NW
Washington, DC 20314-0200

1

Addressee	No of copies
Commander US Army Training and Doctrine Command ATTN: Library Fort Monroe, VA 23651	1
Director US Army TRADOC Analysis Center White Sands Missile Range, NM 88002	1
Director US Army TRADOC Analysis Center Fort Monroe, VA 23651	1
Director US Army TRADOC Analysis Center Fort Leavenworth, KS 66027	1
Commandant US Army Armor School Fort Knox, KY 40121-5215	1
Commandant US Army Field Artillery School Fort Sill, OK 73503	1
Command Historian US Army Field Artillery School Fort Sill, OK 73503	1
Director of Combat Developments US Army Field Artillery School ATTN: ATSF-COF (CPT Alan Provins) Fort Sill, OK 73503-5600	1

Addressee	No of copies
-----------	-----------------

Commandant US Army Infantry School ATTN: Library Fort Benning, GA 31905	1
--	---

Commandant US Army Field Artillery School ATTN: Morris Sweat Library Fort Sill, OK 73503	1
---	---

Commandant US Army Air Defense School Fort Bliss, TX 79916	1
--	---

Commandant US Army Aviation School Fort Rucker, AL 36360	1
--	---

Commandant US Army Engineer School Fort Belvoir, VA 22060	1
---	---

Commandant US Army Transportation School Fort Eustis, VA 23604	1
--	---

Commandant US Army Intelligence Center and School Fort Huachuca, AZ 85613	1
---	---

Director USMC Development and Education Center Quantico, VA 22134	2
---	---

Addressee	No of copies
-----------	-----------------

Superintendent
United States Military Academy
ATTN: History Department
(LTC Edward Smith)
West Point, NY 10996

1

Superintendent
United States Military Academy
ATTN: Engineering Department
(COL James Kays)
West Point, NY 10996

1

Superintendent
United States Military Academy
ATTN: History Department
(COL Robert Daugherty)
West Point, NY 10996

1

Mr. Mark Zabik
Center for Naval Analyses
4401 Ford Avenue
Alexandria, VA 22302-0268

1

USMC Operations Analysis Group
Center for Naval Analyses
4401 Ford Avenue
Alexandria, VA 22302-0268

1

Director
US Army Materiel Systems Analysis
Activity
ATTN: Library
Aberdeen Proving Ground, MD 21005-5071

1

Commander in Chief
Joint Readiness Command
ATTN: Library
MacDill Air Force Base, FL 33608

1

Addressee	No of copies
Mr. Denny d'Alelio SYSCON Corporation 1000 Jefferson Street, NW Washington, DC 20007	1
Mr. Seth Bonder Vector Research, Inc. P.O. Box 1506 Ann Arbor, MI 48106	1
Dr. Daniel Willard Office of the Deputy Undersecretary of the Army (OR) Room 2E660, The Pentagon Washington, DC 20310	1
David Rowland Defense Operational Analysis Establishment Parvis Road West Byfleet, Surrey KT146LY United Kingdom	1
Mr. Dudley Edwards Defense Operational Analysis Establishment Parvis Road West Byfleet, Surrey KT146LY United Kingdom	1
BG Stephen Silvasy, Jr. Deputy Commandant Army War College Carlisle Barracks, PA 17013	1
Dr. Roger P. Creaser Dept. of Defense, Russell Offices Canberra, ACT 2600 Australia	1

Addressee	No of copies
-----------	-----------------

Commander US Army Intelligence and Threat Analysis Center Building 203, Stop 314 Washington Navy Yard Washington, DC 20374	1
--	---

Commander US Army Logistics Center ATTN: Historians Office Fort Lee, VA 23801	1
--	---

Commandant US Army War College ATTN: Land Systems Laboratory Carlisle Barracks, PA 17013	1
---	---

Commandant US Army Research Institute ATTN: Library 5001 Eisenhower Avenue Alexandria, VA 22333	1
---	---

Commander US Army RDSA Information Systems Agency Radford, VA 24141	1
--	---

Commander US Army Soldier Support Center ATTN: ATSG-DDN Fort Benjamin Harrison, IN	1
---	---

Internal Distribution:

Unclassified Library	2
Mr. Wallace Chandler, Model Development Division	1
Ms. Patricia Fleming, Models Application Division	1
Mr. Gerald Cooper, Advanced Research Projects Office	1
COL Thomas P. Easum, Force Systems Directorate	1
Dr. Ralph Johnson, Model Development Division	1
COL Harry Ota, Requirements Directorate	1
MAJ Berner E. Johnson, Forces Directorate	1

GLOSSARY

air superiority

A characteristic of a force that enables it to conduct air operations at the time and place of the engagement without prohibitive interference from the opposing air force.

antitank weapons

The sum of all bazookas, shoulder-fired guided missiles, infantry cannon, and antitank guns.

artillery

In the benchmarks, it is the sum of all guns, howitzers, and ground-to-ground missiles. Tank guns were included in a few instances where they were employed in an artillery role.

attacker

That force which, in the first phase of an engagement, initiates significant offensive advance of its maneuver units.

battle

A significant combat encounter between hostile forces at various echelons of aggregation up to and including corps, army, and army group.

campaign

A related series of battles, all directed towards the same objective.

central

A characteristic of a simulated combat that lies within the interquartile range of values found in battles from 1937 through 1982.

cover

The vegetation or buildings in a battle area. The cover conditions on the sources describing a battle are grouped where possible as: forest, mixed trees, bare, swamp, desert, and urban.

defender

That force which, in the first phase of an engagement, chooses not to advance its maneuver units.

delay

A retrograde movement in which the defender slows down and damages an advancing enemy to gain time, but does not become decisively engaged in combat or allow himself to be outflanked.

distance advanced

The distance from the line of departure to the farthest point reached by significant maneuver elements of the attacking force, in kilometers measured along the axis of advance.

duration

The total number of days during which an engagement took place for at least one hour. A portion of a day is considered a full day.

engagement

A part of a battle where the data does not describe either all of the units in combat or all of the time that they were engaged or both.

fortified defense

A coordinated defense system prepared with sufficient time and material to complete planned entrenchments, field fortifications, and obstacles.

hasty defense

A defense normally organized while in contact with the enemy or when contact is imminent and time for battle preparation is limited. It involves use of foxholes, emplacements and obstacles. With enough time, usually taken to be 1 day, a hasty defense position can be improved to a prepared or fortified defense.

plausible

A characteristic of simulated combat that is lower than the top 5 percent and higher than the bottom 5 percent of values found in historical battles.

prepared defense

A defense prepared with time, often considered to be 1 day, to improve the position, but which due to lack of time and material has less than the strength of a fortified position.

resolution

The changes of position and location to both sides as a result of a battle.

success

The resolution of the combat in favor of one side or the other, considering how well each force accomplished its mission. In some battles, neither force or both forces have been successful.

surprise

Surprise occurs when one force is able to confront its opponent with tactical circumstances that the opponent did not anticipate or adequately prepare for. Surprise may be achieved with respect to time, location, maneuver or firepower.

terrain

The total topography of the battlefield as described in the sources; categorized as rough, rolling or flat.

weapons density

As used in the characteristic, "weapons systems density," the term means the sum of all crew-served ground weapons and rifle squads. It excludes close air support sorties.

weather

The weather conditions in the sources describing a battle are categorized where possible as: light [rain], heavy [rain], dry and snow.

width of front

The space from side to side or flank to flank occupied or covered by a force just before the engagement, measured in kilometers. The measurement following the shape of the front and ignores minor salients or restraints. It may be different for the two forces.

withdrawal

A movement in accordance with the will of a force's commander away from the enemy that terminates combat on contact with the enemy force.