ASSESSING COMBAT POWER: A METHODOLOGY FOR TACTICAL BATTLE STAFFS

A Monograph by
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"ASSESSING COMBAT POWER: A Methodology for Tactical Battle Staffs" by MAJ A. Dwight Raymond, USA, 77 pages.

This monograph presents a methodology to help tactical battle staffs estimate ground force combat power, and consists of three major products. First, pre-calculated "combat potential scores" (CPS) for different friendly and threat units are provided, so that staff officers can determine force ratios based upon the friendly task organization and the enemy order of battle. Second, the "weapon values" (WV) and "category weights" (CV) which were used to develop the CPS values are included. With these, staff officers can modify CPS values as desired and develop values for unique units. Finally, the study addresses ways to use the CPS values during planning (war gaming) and while monitoring tactical operations.

The methodology is a variation of the "Weapons Effectiveness Indices/Weighted Unit Value (WEI/WTU)" approach. It is a relatively simple static measurement of combat power, yet has sufficient detail to permit differentiation among units at the tactical level. It avoids the complexity of other, more dynamic approaches discussed in the monograph; conversely, it is more detailed than the overly-broad method currently taught at the US Army Command and General Staff College. It does not give a comprehensive measurement of combat power, but merely intends to provide a quantitative starting point to estimate relative force ratios.

The text provides an overview of the model and its applications, together with discussion of other models and the field in general. The two appendices are stand-alone sections with the requisite instructions and data for their usage; these are the only portions of the monograph necessary for its practical application.
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I. INTRODUCTION

Although Clausewitz wrote that the conduct of war is more of an art, he nevertheless conceded that certain aspects gives validity to the term "military science."¹ "Science" implies certain activities--such as testing propositions, prediction, explanation, and measurement--with the eventual development of empirically-based laws or maxims. Even the purest arts have certain "scientific" characteristics; one example is that red mixed with yellow creates orange, while another is the musical "chemistry" that creates chords out of a specific combination of individual notes.

However artful the military profession is, it has historically been closely linked to hard sciences such as engineering, ballistics, and physics. Indeed, it was not merely coincidental that the engineering centers of 19th century nations were also military institutions.² One might simplify the matter by the generalization that "military science" was associated with the preparation for war and such routine activities as movement, siegecraft and logistics. Fighting wars, however, was the essence of "military art," and required genius, coup d'œil, or virtu.'

As war became more technical, its conduct in a sense became more systematic and, thus, more "scientific;" examples of this increasingly technical nature include the planning required for preparatory bombardments as well as Desert Storm's "integrated tasking order" that orchestrated the methodical destruction of Iraq's military capability. In addition, the modern fields of
computer science and operations research have facilitated the establishment of models and simulations that further break down the boundary between military art and military science. These models, in effect, seek to preview a conflict through the resolution of mathematical relationships, instead of relying upon the intuition of military commanders and staffs.

Whether one prefers to call war an "art" or "science," a key step in battle's preparation and management is the estimation of relative combat capability. Much of the literature suggests that combat capability can indeed be calculated, however roughly. In *The Causes of War*, Geoffrey Blainey states that war is "a dispute about measurement [of relative strength]; peace on the other hand marks a rough agreement about measurement." If both parties can agree on the relative strength, then battle would be essentially predictable and the weaker party would likely concede before the commencement of hostilities. Conflicts occur, however, because flawless prediction is impossible due to friction (chance) and the inherent difficulty in measuring combat power to begin with.

The estimation of combat capability is a problem common to all levels of conflict. At the strategic level, George Quester has identified "operations research error" (miscalculation) as one of the fundamental causes of war to begin with; in other words, nations have fought wars based upon the mistaken belief that they can be victorious. The problem is no less vexing at the operational and tactical levels, since these echelons actually plan and fight the engagements. No methodologies for estimating
combat capability exist, however, that meet three necessary criteria for practical use, specifically: (1) sufficient detail to permit meaningful differentiation; (2) simplicity both for comprehension and utilization; and (3) adaptability to account for changes in force structures and weapons capabilities. The question is, what approach can portray relative combat strengths with reasonable accuracy, while remaining within the bounds of military staff capabilities?

This study will explain a methodology to assist tactical battle staffs in the estimation of combat potential. This ambition is tempered, however, by two important caveats. First, combat modeling must balance simplicity and detail. All modeling is in a sense simplistic, but to the extent that a methodology overlooks too many important nuances (such as qualitative differences between tanks) it will lack any useful realism. On the other hand, attempts to account for numerous dimensions can quickly create a cumbersome methodology that is difficult to understand or apply. Additionally, an attempt to replicate the friction and fog of combat (such as through random chance generators) could indeed cause plausible game situations that might not occur during an actual operation.

This study will offer three products. First, contained in Appendix 1, are pre-calculated "combat potential scores" (CPS) for different units that battle staffs may need to account for in planning exercises or in actual operations. These CPS values indicate the relative overall combat power of units, and were
developed with the methodology explained in this study. With the CPS figures, staff officers can quickly generate displays to provide instantaneous appraisals of relative combat strengths. An example is the following portion of a situation map:

Second, the methodology used to develop the CPS scores will be explained in order that the interested reader can reconstruct or alter the calculations, as necessary. Finally, this study will discuss ways in which battle staffs can use these figures when planning and monitoring operations.

In theory, battle is determined by the respective combat powers of A and B; the side with the greater combat power will win. In the broadest sense, combat power includes tangible and intangible aspects. Tangible elements comprise a large portion of combat power; these include the measurable numbers of troops, equipment, and supplies that the adversaries bring to battle. In the abstract, this is reflected by the following relationship:

\[ \text{CP}_A \longrightarrow \text{CP}_B \]

in which CP represents the tangible combat power of force A or B.
Perfect algorithms are impossible, however, because intangible elements (such as levels of training, doctrine, leadership, morale, surprise, and fatigue) modify the combat power of the adversaries:

\[ \text{CP}_A (IF_A) \leftrightarrow \text{CP}_B (IF_B) \]

in which \( IF \) represents the net effect of the various intangible factors. If \( IF \) is greater than 1, then that side's combat power is effectively increased; if less than 1, then the combat power is degraded. Some parameters, incidently, are subject to dispute as to how tangible they actually are; these include qualitative differences in equipment, the types of terrain in which battle is conducted, and the methods of employment, particularly as regards whether one side secures a "defender's advantage" which can result in, according to some, a three-fold increase in combat power.\(^7\)

However influential the intangible factors are (and it is quite possible that these are ultimately more determinative than the tangible elements) assessments of combat power inevitably begin with comparisons of the tangible factors. At the brigade, division, and corps levels, an important task for battle staffs is the estimation of relative combat power. This is necessary to war game possible courses of action, to develop branch plans, and to monitor battle status during operations.

II. CONTEMPORARY COMBAT POWER MODELS

Military modeling is much like training, drills, tactical exercises, and other activities in that it serves as a low-cost substitute for actual combat. As such, it is not a new
phenomenon. Assessments such as Napoleon's "the moral is to the physical as three is to one" are in effect attempts to estimate the relative importance of different parameters and to place them on a common scale. Sun Tzu maneuvered courtesans, in lieu of troops, to simulate military activities; in the nineteenth century, military academies and general staffs in Europe conducted their own simulations.\textsuperscript{6} Hundreds of models currently exist;\textsuperscript{\textdagger} however, one of the earliest, and time-honored, approaches was Frederick William Lanchester's 1916 work \textit{Aircraft in Warfare}, which modeled battlefield attrition. His "Lanchester Equations" are still used in dynamic modeling, and consisted of two general equations that related opposing force levels, destructive capabilities, attrition, and time.\textsuperscript{10}

\begin{table}[h]
\centering
\begin{tabular}{ll}
\textbf{Table 1: Lanchester Family Equations} & \\
\hline
\textbf{\( \frac{df}{dt} = -M_a a \)} & \textbf{\( \frac{df}{dt} = -M_b a \)} \\
\text{\(M_a, M_b\) = lethality of red and blue forces at time \(t\).} & \\
\text{\(r, b\) = effectiveness of units (e.g., .25 is 25\% effective)} & \\
\text{\(a, a, \alpha, \alpha\) = constant coefficients ("sometimes interpreted as overall damage probabilities per day.")} & \\
\end{tabular}
\end{table}

These equations simply state that the change in forces \(f\) and \(f\) over time (in other words, the attrition) will be determined by the initial combat strengths of both sides, their respective destructive capabilities, and certain factors that modify the strength of the combatants.

The two family equations can be integrated and combined to form a generalized "state equation," into which values from 0 to 1 inclusive may be inserted for the constant coefficients. This process generates the four "state equations" in Table 2, of which the Square Law is probably the most widely used.
A more recent approach is Trevor Depuy's Quantitative Judgement Method of Analysis, which is overwhelming in its detail, though less so in its rigor. First, he developed a "theoretical lethality index" (TLI) for different weapons systems based upon the number of casualties the systems could inflict in a target-rich laboratory. For example, ancient cutting and thrusting weapons were assigned a TLI of 23, while a World War II medium tank was given a score of 935,458. Second, through an analysis of World War II and Arab-Israeli battles, he developed values for such factors as terrain, weather, leadership, morale, and logistics. Using historical cases, he generated modified forms of the TLIs (called Operational Lethality Indices, or OLIs), applied the appropriate factors discussed above, and then developed unit Combat Power Potential values that were used to predict the battle's outcome. This was then compared with the actual outcome, which was a function of mission success, casualties, and space gained or lost.

Some "static" models are less ambitious in design, and attempt to portray a snapshot, rather than a "dynamic" evolution. Until recently, in ST 100-9 The Command Estimate the US Army's Command and General Staff College advanced a simple static

<table>
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<td>Square Law</td>
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<tr>
<td>Linear Law</td>
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<tr>
<td>Logarithmic variant</td>
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<tr>
<td>Labush variant</td>
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</table>
approach to estimate combat ratios at the tactical level. This system relied upon two types of values; the first was for maneuver units and was couched in terms of a force's combat power relative to a Soviet BTR battalion, and the second was for fire support units. Scores used in this methodology are shown in Table 3.\textsuperscript{16}

<table>
<thead>
<tr>
<th>Identifier</th>
<th>US (3 Series)</th>
<th>US (2 Series)</th>
<th>Soviet</th>
</tr>
</thead>
<tbody>
<tr>
<td>H113 Bu</td>
<td>= 1.5</td>
<td>BTR Bu</td>
<td>= 1.0</td>
</tr>
<tr>
<td>H3 Bu</td>
<td>= 2.0</td>
<td>BHP Bu</td>
<td>= 1.3</td>
</tr>
<tr>
<td>H1 Bu</td>
<td>= 3.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>H1A1 Bu</td>
<td>= 3.15</td>
<td>T90 Bu</td>
<td>= 2.15</td>
</tr>
<tr>
<td>120mm Ht</td>
<td>= 1.25</td>
<td>T-62 1.25</td>
<td>1.25</td>
</tr>
<tr>
<td>ACR Sqdn</td>
<td>= 1.75</td>
<td>T-64 1.24</td>
<td>1.24</td>
</tr>
<tr>
<td>Div Cav Sqdn</td>
<td>= 1.5</td>
<td>T-72 1.26</td>
<td>1.26</td>
</tr>
<tr>
<td>Div Cav Sqdn</td>
<td>= 2.0</td>
<td>T-62 1.34</td>
<td>1.34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T-55 1.30</td>
<td>1.30</td>
</tr>
<tr>
<td>Art Bal Bu (AH-44)</td>
<td>= 3</td>
<td>Art Bal Bu (AH-1)</td>
<td>= 4</td>
</tr>
<tr>
<td>Art Bal Sqdn</td>
<td>= 1</td>
<td>Art Bal Sqdn</td>
<td>= 3</td>
</tr>
</tbody>
</table>

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<tr>
<th>Antilock</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Fl Bu</td>
<td>= 1</td>
</tr>
<tr>
<td>HLA Stry</td>
<td>= 2</td>
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The 1991 version of ST 100-9, Techniques and Procedures for Tactical Decisionmaking, contained an even more simplistic wargaming approach which settled for a rougher approximation, arguing that "more numerical precision . . . would be problematical."\textsuperscript{17} It merely considered all regiment and brigade units, (regardless of type, composition, or numbers of subordinate battalions) as equal.

There are several reasons why the above methods are ill-suited for use by tactical battle staffs, and the problems reflect
the tension between the twin modeling criteria of simplicity and
detail. The 1916 Lanchester Equations can only provide an
abstract value in dynamic application; the revolutionary changes
in weapons systems since the publication of his book would
obviously make any of Lanchester’s static pretentions hopelessly
obsolete. Other similar approaches, such as Joshua Epstein’s
“Adaptive Model of War,” may be theoretically valid, but they tend
to have equations comprised of variables which must somehow be
replaced by numerical values before they can have practical use
(the variables \( r, b, c_1, c_2, c_3, \) and \( c_4 \) in Table 1 illustrate this
problem). Additionally, some claim that the validity of the
Lanchester equations is suspect, both theoretically and
empirically. Epstein, for example, claims that the equations
attempt to predict combat losses, yet do not account for any
withdrawal activity (in terms of intentions and rates) by the
defender. Additionally, he argues that the “square law” generates
unlikely relationships. For example, a force outnumbered by
three-to-one would need to be nine times as effective in order to
achieve parity in combat. This, argues Epstein, is both
intuitively incorrect and historically unsupported.1

Other reservations about the Lanchester models include
skepticism about determining the “combat effectiveness values” as
well as the constant coefficients, particularly as regards the
apparently arbitrary limitation of the latter values to either “0”
or “1”. Even assuming the reliability of these equations, they
are more suited for the purposes of dynamic, complex war gaming.
rather than for efficient staff procedures.

Similarly, Dupuy's Quantitative Judgement Method of Analysis is an overly-detailed approach that would strain both the time and the inclinations of most tactical battle staffs. There are also at least three other reasons to question Dupuy's methodology. First, the QJMA is comprised of over seventy independent variables that were derived from a sample of approximately sixty cases. Aside from technical issues such as how precisely these independent variables were measured, and how these test cases were selected, most statisticians would be suspect of any inferences drawn from such a small data set.

Second, one must question how applicable to modern warfare the QJN's World War II sample can be. Dupuy claims that his model accurately predicted the results of several Arab-Israeli engagements, but this was done retroactively, and by parties that had a strong interest in demonstrating that the model was useful. Moreover, to claim that the model is "accurate" by Dupuy's standards, the user must only ensure that the victor's Combat Power Potential is greater than the loser's. The model becomes tautological; with over seventy modifying variables to choose from, it is a relatively easy task to pile on selected additional factors until the desired ratio is achieved. Indeed, Depuy's iterative process encourages such manipulation. It is worth noting that Dupuy's only known a priori estimate (before Operation Desert Storm) was not especially prescient. He predicted between 5,729 and 8,929 US casualties, between 2,794 and 4,133 allied
casualties, and Iraqi casualties of approximately 100,000.²¹

Third, examination of Dupuy's Operational Lethality Index (OLI) scores reveals some debatable relationships. On his scale, a 60mm mortar (OLI = 21.00) is "worth" nearly eight M-113's (OLI = 2.69). Although it is equipped with an excellent thermal sight, according to Dupuy an M-60A3 (643) is only 3% better than an M-60A1 (622), while being inferior to a T-62 (691). An M-2 Bradley (534) is worth more than an MLRS (511), while a T-72 (977) is worth nearly four AH-64 Apaches (256). Finally, he implies that an M-1A1 tank (1,049) and an F-16 (1,359) are fairly comparable.²²

The static CGSC approaches avoid the complications of the Lanchester and Dupuy models. They are, however, too simplistic; moreover, the origin of the assigned values is not explained. The latest approach equates US brigades (of unspecified size and type) with Soviet regiments; this is too rough an approximation for most staff work. The earlier methodology is perhaps suitable if one is accounting for pure battalions of the type included in Table 3, but additional work is needed to account for task organization and for other units not reflected. Along these lines, the methodology is mathematically sound only as long as TO&Es do not change. Additionally, the generation of two types of scores (for maneuver units and fire support units) is an unnecessary complication if one accepts the proposition that combat power includes aspects of both maneuver and firepower, as well as other characteristics.

To incorporate both simplicity and detail, a more fruitful approach is a variation of the WEI/VUV methodology developed by
the US Army Concepts Analysis Agency in the early 1970s. In this approach, weapons were divided into categories (e.g., tanks, artillery pieces, mortars, etc.) and each category was assigned a category weight indicative of its value relative to other categories. Within a given category, weapons were assigned a Weapon Effectiveness Index (WEI) to reflect its value relative to other weapons in the same category. By multiplying

\[
\text{Quantity} \times \text{Weapon Effectiveness Index} \times \text{Category Weight}
\]

for each weapon type in a unit, and adding the products, a Weighted Unit Value (WUV) was generated, which then could be compared with other units.\textsuperscript{33}

<table>
<thead>
<tr>
<th>WUV</th>
<th>Category</th>
<th>\times \quad \text{Weapon Effectiveness Index} \quad \times \quad \text{Category Weight}</th>
<th>\text{Sub-Total}</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-60 A Tank</td>
<td>20</td>
<td>0.90</td>
<td>1.071</td>
</tr>
<tr>
<td>M-113 APC</td>
<td>30</td>
<td>1.00</td>
<td>285</td>
</tr>
<tr>
<td>M-190 155mm How</td>
<td>6</td>
<td>0.80</td>
<td>177</td>
</tr>
</tbody>
</table>

\text{Weighted Unit Value (WUV)} = 1,713

There have been many variations to the basic WEI/WUV methodology. Typically, a unit's WUV was divided by the WUV for a baseline unit (the US 1st Armored Division was normally used) to create "Armored Division Equivalent" (ADE) values; a later modification used a notional "NATO Composite Division" value to generate "Division Equivalent Firepower" (DEF) scores.\textsuperscript{34}

In order to fine-tune the methodology, an early application developed both offensive and defensive scores for units. This was

12
modified still further by the inclusion of terrain as a factor; a
given unit would thus have six scores, based upon whether it was
considered in an offensive or defensive role, and depending upon
its theater of operations.

Conversely, other modifications have attempted to simplify
the WEI/WUV methodology. The DEF variant, for example, omitted
some weapons categories, to include small arms, from its
calculations. Consequently, it was not able to account for
infantry units in its aggregation. Additionally, it considered as
equal weapons systems in the same generation (e.g., Chieftains,
Leopard Is, and M-60s were all scored equally). 25

Although many analysts such as Mearsheimer, Epstein, and
William Mako have used WEI/WUV, ADEs, or DEFs, 26 many problems
exist with the basic approach. By itself, it ignores most of the
intangible factors (such as training and leadership) addressed
earlier, not to mention the tangible effects of airpower, engineer
capability, electronic warfare, and other battlefield systems.
Additionally, it assumes away the fact that the combat value of
any system is not fixed, but depends upon the situation (METT-T).
The reader should indeed be skeptical about any attempt to
quantify something as complex, changeable, and intangible as
combat power. The figures presented in this paper should be
considered indicative, not predictive, and the reader is
encouraged to modify, alter, or temper them as necessary.

Despite the inherent problems of this type of methodology, a
roughly accurate quantitative scale can be useful to help staff
officers plan and monitor tactical operations. Much as the "tale of the tape" is used to assess boxers before the fight, the scale presented here can help measure relative combat potential.

III. THE MODEL EXPLAINED

This paper uses an adaptation of the WEI/WUV methodology to achieve a suitable blend of simplicity and detail for staff planning. This effort is an application of an earlier study for the Office of the Secretary of Defense Program Analysis and Evaluation, which resulted in a revised set of category weights that will be utilized here. In an adaptation of the Delphi technique, the previous study was based upon a survey administered to 109 NATO field grade officers to obtain their collective judgment of the relative worths of different categories of weapons systems in rolling, desert, and mountainous terrain. The respondents, given hypothetical situations which placed them as the commander of a combined arms company team, were asked to assess the relative value of different kinds of weapons systems in terms of tanks (e.g., a respondent would indicate that a tank was worth, say, three mortars in rolling terrain). Another portion of the survey asked the respondent to judge the effectiveness of weapons systems in rolling, mountainous, desert, urban, and forested terrain in both offensive and defensive scenarios. Analysis of the results shows that terrain generally has the same proportional effect on a system regardless of whether it is in the offense or defense (see Table 5). For the purposes of war gaming, this indicates that a weapon system could have a certain score for
a given terrain type, which could be modified by a constant factor whenever it is in a defensive posture.

**TABLE 5: Survey Results (Mean Responses)**

**PART I. Tank Exchange Rates (Mean Responses)**

<table>
<thead>
<tr>
<th>Terrain</th>
<th>Rolling</th>
<th>Forested</th>
<th>Mountains</th>
<th>Urban</th>
<th>Desert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanks: IFVs</td>
<td>1 Tk = 2.49 IFVs</td>
<td>1.68 Tk = 1 IFV</td>
<td>1.61 Tk = 1 IFV</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: APCs</td>
<td>1 Tk = 3.61 APCs</td>
<td>1 Tk = 1.06 APC</td>
<td>1 Tk = 1 APC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: MCTRS</td>
<td>1 Tk = 3.49 MCTRS</td>
<td>1 Tk = 1.20 MCTRS</td>
<td>1 Tk = 1 MCTRS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: Artillery</td>
<td>1 Tk = 2.62 Artillery</td>
<td>1.57 Tk = 1 Artillery</td>
<td>1.56 Tk = 1 Artillery</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: MLRS</td>
<td>1.35 Tk = 1 MLRS</td>
<td>2.38 Tk = 1 MLRS</td>
<td>1.38 Tk = 1 MLRS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: ATK Bnks</td>
<td>1.67 Tk = 1 ATK Bnks</td>
<td>2.30 Tk = 1 ATK Bnks</td>
<td>2.30 Tk = 1 ATK Bnks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: AV GP</td>
<td>1 Tk = 2.05 AV GP</td>
<td>1 Tk = 1.80 AV GP</td>
<td>1 Tk = 1 AV GP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: IF Plts</td>
<td>1 Tk = 1.76 IF Plts</td>
<td>2.62 Tk = 1 IF Plt</td>
<td>2.62 Tk = 1 IF Plt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tanks: Arm Hot Bns</td>
<td>1 Tk = 3.39 Arm Hot Bns</td>
<td>1 Tk = 1.61 Arm Hot Bns</td>
<td>1 Tk = 1 Arm Hot Bns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*NOTE: The above information should be interpreted as follows: "In rolling terrain, the collective assessment (mean response) of the survey’s respondents is that a tank is equal to 1.49 infantry fighting vehicles, in terms of overall combat power."

**PART II. System degradation by terrain type (Mean responses)**

<table>
<thead>
<tr>
<th>Terrain</th>
<th>Rolling</th>
<th>Forested</th>
<th>Mountains</th>
<th>Urban</th>
<th>Desert</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>97.7</td>
<td>58.1</td>
<td>44.6</td>
<td>61.1</td>
<td>77.9</td>
</tr>
<tr>
<td>Defense</td>
<td>97.7</td>
<td>58.1</td>
<td>44.6</td>
<td>61.1</td>
<td>77.9</td>
</tr>
<tr>
<td>Combined</td>
<td>97.7</td>
<td>58.1</td>
<td>44.6</td>
<td>61.1</td>
<td>77.9</td>
</tr>
<tr>
<td>Normalized</td>
<td>100.0</td>
<td>53.0</td>
<td>42.0</td>
<td>60.0</td>
<td>65.0</td>
</tr>
<tr>
<td>Urban</td>
<td>97.3</td>
<td>58.5</td>
<td>52.7</td>
<td>54.0</td>
<td>69.7</td>
</tr>
<tr>
<td>Defense</td>
<td>97.3</td>
<td>58.5</td>
<td>52.7</td>
<td>54.0</td>
<td>69.7</td>
</tr>
<tr>
<td>Combined</td>
<td>97.3</td>
<td>58.5</td>
<td>52.7</td>
<td>54.0</td>
<td>69.7</td>
</tr>
<tr>
<td>Normalized</td>
<td>100.0</td>
<td>63.0</td>
<td>48.0</td>
<td>51.0</td>
<td>72.0</td>
</tr>
<tr>
<td>Forest</td>
<td>95.2</td>
<td>65.3</td>
<td>61.4</td>
<td>51.2</td>
<td>64.9</td>
</tr>
<tr>
<td>Defense</td>
<td>95.2</td>
<td>65.3</td>
<td>61.4</td>
<td>51.2</td>
<td>64.9</td>
</tr>
<tr>
<td>Combined</td>
<td>95.2</td>
<td>65.3</td>
<td>61.4</td>
<td>51.2</td>
<td>64.9</td>
</tr>
<tr>
<td>Normalized</td>
<td>100.0</td>
<td>69.0</td>
<td>49.0</td>
<td>54.0</td>
<td>70.0</td>
</tr>
<tr>
<td>Mountain</td>
<td>89.2</td>
<td>75.5</td>
<td>70.2</td>
<td>63.7</td>
<td>67.7</td>
</tr>
<tr>
<td>Defense</td>
<td>89.2</td>
<td>75.5</td>
<td>70.2</td>
<td>63.7</td>
<td>67.7</td>
</tr>
<tr>
<td>Combined</td>
<td>89.2</td>
<td>75.5</td>
<td>70.2</td>
<td>63.7</td>
<td>67.7</td>
</tr>
<tr>
<td>Normalized</td>
<td>100.0</td>
<td>84.0</td>
<td>79.0</td>
<td>70.0</td>
<td>75.0</td>
</tr>
</tbody>
</table>

CONTINUED
PART II. System degradation by terrain type (Mean responses) (continued)

<table>
<thead>
<tr>
<th>Terrain</th>
<th>Offense</th>
<th>Defense</th>
<th>Combined</th>
<th>Normalized</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHT</td>
<td>96.7</td>
<td>62.4</td>
<td>52.9</td>
<td>47.3</td>
</tr>
<tr>
<td></td>
<td>97.2</td>
<td>66.1</td>
<td>56.2</td>
<td>50.4</td>
</tr>
<tr>
<td></td>
<td>97.0</td>
<td>66.5</td>
<td>56.6</td>
<td>48.9</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>67.0</td>
<td>56.0</td>
<td>50.0</td>
</tr>
<tr>
<td>AHT+</td>
<td>97.0</td>
<td>67.7</td>
<td>69.4</td>
<td>46.4</td>
</tr>
<tr>
<td></td>
<td>97.1</td>
<td>69.9</td>
<td>71.4</td>
<td>49.7</td>
</tr>
<tr>
<td></td>
<td>97.1</td>
<td>68.9</td>
<td>70.4</td>
<td>48.3</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>71.0</td>
<td>73.0</td>
<td>50.0</td>
</tr>
<tr>
<td>AHT+</td>
<td>96.9</td>
<td>53.4</td>
<td>53.6</td>
<td>40.3</td>
</tr>
<tr>
<td></td>
<td>95.4</td>
<td>58.6</td>
<td>57.4</td>
<td>44.9</td>
</tr>
<tr>
<td></td>
<td>95.2</td>
<td>56.0</td>
<td>55.5</td>
<td>42.6</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>59.0</td>
<td>58.5</td>
<td>45.5</td>
</tr>
<tr>
<td>AN</td>
<td>88.6</td>
<td>85.7</td>
<td>71.2</td>
<td>64.5</td>
</tr>
<tr>
<td></td>
<td>98.4</td>
<td>86.0</td>
<td>73.9</td>
<td>65.1</td>
</tr>
<tr>
<td></td>
<td>88.5</td>
<td>85.9</td>
<td>72.6</td>
<td>64.9</td>
</tr>
<tr>
<td></td>
<td>94.0</td>
<td>100.0</td>
<td>85.0</td>
<td>99.0</td>
</tr>
<tr>
<td>AN+</td>
<td>98.0</td>
<td>60.2</td>
<td>45.5</td>
<td>45.9</td>
</tr>
<tr>
<td></td>
<td>96.7</td>
<td>64.9</td>
<td>50.4</td>
<td>48.8</td>
</tr>
<tr>
<td></td>
<td>97.4</td>
<td>62.6</td>
<td>48.0</td>
<td>47.6</td>
</tr>
<tr>
<td></td>
<td>100.0</td>
<td>64.0</td>
<td>49.0</td>
<td>49.5</td>
</tr>
</tbody>
</table>

**NOTE:** The above information is interpreted as follows: "In forested terrain, in an offensive role, the collective assessment of the respondents is that a tank is 48.9% as effective as it is when employed in its optimum terrain." The "combined" scores are the averages of the "offensive" and "defensive" values. These combined scores were then normalized so that each system can be assigned an optimum terrain category which is rated at 100.

The mean responses from the first section were then used to develop new category weights for rolling, desert, and mountainous terrain. Developing ratios between these values and the values from the second section, new category weights were also developed for urban and forested terrain. The combination of these two approaches yielded the "category weights" (CM) in Table 6, after tanks in rolling terrain (the "currency") were assigned 10.00 as a standard value.
The tables in Appendix 2 contain Weapon Value (WV) scores for most of the modern weapons systems found in friendly and threat inventories. Using the WEI/WUV methodology to assess a unit's combat potential, the quantity, category weight, and weapon value are multiplied together to yield a sub-total, and the subtotals for all weapons systems in the unit are added to provide that unit's Combat Potential Score (CPS). For example, the CPS for a mechanized infantry battalion task force (two mechanized companies and two tank companies) in rolling terrain is depicted in Table 7.
The reader can use the CWs from Table 6 and the WVs from Appendix 2 to generate Combat Potential Scores for any unit, as long as the numbers and types of weapons systems are known. Appendix 1, however, contains pre-calculated CPS values for selected US, Soviet, NATO, Iraqi, North Korean, and South Korean units. (The balanced mechanized task force CPS entry in Table A-1 (page 38) is 693; this is different from the above value of 691 because of rounding.) CPS values can thus be determined for any desired level of aggregation, and a reasonably clear picture of relative combat strength can be generated. For example, assume that the 52nd Mechanized Infantry Division has been ordered to attack in a zone defended by depleted elements of the 28th Combined Arms Army, and that the division has the task...
The G-2 has assessed the enemy order of battle, and has estimated the effectiveness (in terms of percent) of the remaining units. This information is shown in Table 9.
<table>
<thead>
<tr>
<th>TABLE 2: 28th Combined Arms Army (Division 89 Structure)</th>
<th>Original Strength</th>
<th>Percent</th>
<th>Current Strength</th>
<th>Original Strength</th>
<th>Percent</th>
<th>Current Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>11 MED (T-64) ..................................................................</td>
<td>942 ..................</td>
<td>100</td>
<td>283 ...............</td>
<td>7 GTR (T-60) ................................................................</td>
<td>1,681 ..................</td>
<td>100</td>
</tr>
<tr>
<td>233 MED (48th) ..................................................................</td>
<td>1,157 ..................</td>
<td>100</td>
<td>231 ...............</td>
<td>246 GTR ................................................................</td>
<td>242 ..................</td>
<td>100</td>
</tr>
<tr>
<td>237 MED (BMP) ..................................................................</td>
<td>194 ..................</td>
<td>100</td>
<td>194 ...............</td>
<td>243 GTR (RMP) ................................................................</td>
<td>1,219 ..................</td>
<td>100</td>
</tr>
<tr>
<td>5/204 Arty Regt ..................................................................</td>
<td>84 ..................</td>
<td>100</td>
<td>84 ...............</td>
<td>1/207 Arty Regt ................................................................</td>
<td>71 ..................</td>
<td>100</td>
</tr>
<tr>
<td>11 AT Dn ..................................................................</td>
<td>79 ..................</td>
<td>100</td>
<td>59 ...............</td>
<td>7 Recon Dn ................................................................</td>
<td>84 ..................</td>
<td>100</td>
</tr>
<tr>
<td>20 MED (T-64) ..................................................................</td>
<td>1,157 ..................</td>
<td>100</td>
<td>115 ...............</td>
<td>12 Indep AA Art Regt (Mv) ........................................</td>
<td>1,102 ..................</td>
<td>100</td>
</tr>
<tr>
<td>225 GTR ..................................................................</td>
<td>1,157 ..................</td>
<td>100</td>
<td>115 ...............</td>
<td>37 Arty Bn ................................................................</td>
<td>1,187 ..................</td>
<td>100</td>
</tr>
<tr>
<td>1/201 Arty Regt ..................................................................</td>
<td>84 ..................</td>
<td>100</td>
<td>84 ...............</td>
<td>1 Gun Bn (8-10) ................................................................</td>
<td>79 ..................</td>
<td>100</td>
</tr>
<tr>
<td>201 Hn Bn (50-21) ..................................................................</td>
<td>102 ..................</td>
<td>100</td>
<td>102 ...............</td>
<td>4 Gun Bn ................................................................</td>
<td>114 ..................</td>
<td>100</td>
</tr>
<tr>
<td>27 GCRD (T-64) ..................................................................</td>
<td>942 ..................</td>
<td>100</td>
<td>942 ...............</td>
<td>75 RB Bn (RB-31) ................................................................</td>
<td>567 ..................</td>
<td>100</td>
</tr>
<tr>
<td>216 GCRD (BRT) ..................................................................</td>
<td>1,157 ..................</td>
<td>100</td>
<td>115 ...............</td>
<td>27 AT Bn ................................................................</td>
<td>237 ..................</td>
<td>100</td>
</tr>
<tr>
<td>212 GCRD (BRT) ..................................................................</td>
<td>1,157 ..................</td>
<td>100</td>
<td>115 ...............</td>
<td>42 SEB Bn (SCB) ................................................................</td>
<td>1,263 ..................</td>
<td>100</td>
</tr>
<tr>
<td>214 GCRD (BRT) ..................................................................</td>
<td>1,157 ..................</td>
<td>100</td>
<td>115 ...............</td>
<td>65 SEB Bn ................................................................</td>
<td>906 ..................</td>
<td>100</td>
</tr>
<tr>
<td>159 Arty Regt ..................................................................</td>
<td>84 ..................</td>
<td>100</td>
<td>84 ...............</td>
<td>21 Recon Dn ................................................................</td>
<td>84 ..................</td>
<td>100</td>
</tr>
</tbody>
</table>

The numbers to the right of the units reflect their respective CPS values, and the 28th CAA table also lists current CPS figures after attrition has been accounted for. The G-2's percentage effectiveness values were translated into the revised CPS entries; these were then used to calculate current CPS values for the divisions, as well as an estimate of the percent effectiveness of these units. The "rolling terrain" values were used in this case, and for simplicity the reader may choose to use these values in all instances; however, values for other terrain are also included in Appendix 1. Total CPS for the 52nd
Mechanized Division is 9,338 while the 28th CAA is rated at 5,110 (or 22% strength overall).

Although it may be compounded by the intangible effects of the destruction experienced by the 28th CAA thus far, the overall force ratio is 1.8-to-1 in favor of the 52nd Mech. Perhaps even more important, the detailed breakdown of CPS values is useful for particularized comparisons. For example, if 1st and 2nd Brigades, together with the GSR artillery, were massed against the depleted 11th MRD, the ratio would be 4,345-to-602 (or 7.2-to-1).

It should be quickly noticed that some assets (notably air defense, engineer, CSS organizations and fixed wing aircraft) do not receive a CPS. This is due to the particular difficulty the original survey respondents would have had in assigning values based upon the scale used in the methodology. When using the approach presented in this study, these and other "intangible" elements of combat power must not be ignored, any more than maneuver fire support and maneuver should be focused upon to the exclusion of the other battlefield operating systems. In other words, CPS scores should not be taken out of the context that is shaped by these elements.

IV. WAR GAMING

The information presented in Tables 8 and 9 has additional uses, as well. For example, as the staff conducts war games during the operation's planning phase, the above information can be used as screening criteria to determine if proposed courses of action would result in necessary force ratios in selected areas.
Staffs should use two methods to facilitate the process. The first step is to list the friendly and enemy orders of battle, accounting for all units. A suitable format is that used to portray the 28th CAA in Table 9. This is done for a US unit in the following example.

### TABLE 10: Order of Battle (Extract)

<table>
<thead>
<tr>
<th>UNIT</th>
<th>ORIGINAL</th>
<th>EFFECTIVE</th>
<th>CURRENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Bde</td>
<td>(2354)</td>
<td>80%</td>
<td>(2,059)</td>
</tr>
<tr>
<td>TF 2-91 Inf (22141)</td>
<td>481</td>
<td>95%</td>
<td>742</td>
</tr>
<tr>
<td>TF 2-10 Ar (371.1H)</td>
<td>701</td>
<td>85%</td>
<td>342</td>
</tr>
<tr>
<td>TF 2-11 Ar (471.1H)</td>
<td>991</td>
<td>90%</td>
<td>82</td>
</tr>
<tr>
<td>2-50 FA (86)</td>
<td>991</td>
<td>90%</td>
<td>82</td>
</tr>
</tbody>
</table>

*NOTE:* Authorized strength, but modified based upon current task organization.

The list should be made easily changeable, to account for alterations in task organization as well as strength report updates. The same information can be displayed graphically by developing a "status chart" similar to the one in Appendix 1 (see page 36 and the discussion below). During the staff war gaming process, additional columns can be added to reflect, for example, projected strengths at the end of different operational phases.

In addition to the unit list or status chart, staffs can post moveable unit icons on operations maps, and indicate the appropriate CPSs. These can be locally fabricated by printing red and blue unit symbols on sheets of clear plastic; the individual unit symbols can be cut out and affixed to overlays with double-sided celophane tape. These icons are superior to paper symbols because, in addition to being movable, they are more durable and
permit the reading of map features beneath their map positions. A example of this type of display is shown in Appendix 1 (page 35.)

Together, these two products can be quite effective during the staff planning process to provide rapid estimates of relative combat power as alternative courses of action are explored. They are merely essential tools for the actual war game itself, however; the actual resolution of hypothetical engagements is perhaps the most difficult aspect of war gaming.

Broadly speaking, four different methods are available. First, ambitious staffs may elect to use the Lanchester, Dupuy, or Eyresein attrition models, with the appropriate CPS values. This, however, will necessitate several mathematical calculations as well as an estimate of the constant coefficients to be used in the equations.

A second approach is an adaptation of rules used in commercial wargames, and there are several variants to this technique. For example, a range of possible outcomes (such as a "most likely" case, a "highly successful" case, and a "highly unsuccessful" case) could be established and resolved using a means (such as a dice roll) to select between the probabilities. In addition to the simplistic limitation of three possible outcomes, the main disadvantage of this method is that a low-probability outcome could occur during the war-game, but would not necessarily be repeated during an actual operation. This method, however, can be an effective way of systematically developing branches and sequels, even if the resolution ultimately assumes
the most likely outcome at each critical event. Another obvious variant to the commercial war game technique is to establish a table with probabilistic outcomes and the ability to allow for combat modifiers, such as terrain and strongpointed positions.\textsuperscript{33} This can most easily be done by adapting the rules from an appropriate war game.

A third approach is far simpler, though less realistic, and merely assumes a constant exchange rate in terms of attrition. For simplicity, a 3:1 exchange rate in favor of the defender is often used; this, however, is based upon several assumptions that may not be valid, not the least of which is that the specific conditions must logically support this rate.\textsuperscript{34} Moreover, a judgment is required as to what level of attrition a defender is likely or willing to sustain. Another variation is to estimate loss rates based upon a doctrinal or historical source.\textsuperscript{35} A slightly more flexible relationship would be as follows:

\textbf{TABLE 11: War Game Resolution}

\begin{tabular}{l}
\textbf{Equation:} \quad \text{Lessee}_{\text{Att}} = \frac{\left(\text{S} \times \left(\text{Lessee}_{\text{Def}} \times \text{CPA}_{\text{Att}}\right)\right)}{\left(\text{CPA}_{\text{Def}}\right)} \\
\text{Lessee}_{\text{Att}} = \text{Attacker's Attrition} \\
\text{Lessee}_{\text{Def}} = \text{Defender's Attrition} \\
\text{CPA}_{\text{Att}} = \text{Attacker's Combat Potential Score} \\
\text{CPA}_{\text{Def}} = \text{Defender's Combat Potential Score} \\
s = \text{Modifier(s): (greater than one favors defender; less than one favors attacker)}
\end{tabular}

\textbf{Example 1:}

\begin{itemize}
\item Let \text{CPA}_{\text{Def}} = 100 \\
\item \text{CPA}_{\text{Att}} = 300 \\
\item \text{s} = 0 (no modification) \\
\item assume 30\% loss rate to the defender--then \text{Lessee}_{\text{Def}} = 30 \\
\item \text{Lessee}_{\text{Att}} = \frac{\left(0 \times \left(30 \times 100\right)\right)}{100} = 90 \text{ (30\% of original strength)}
\end{itemize}
TABLE 11: War Game Resolution (continued)

Example 2: If the attacker has a CPS of 500 (5:1 combat power ratio), then

\[ \text{Loss} = \left(\frac{500}{100}\right)^{0.75} = 56 \text{ (11\% of original strength)} \]

Example 3: If the attacker has air superiority, superior training, and the element of surprise, while the enemy is exhausted and has been cut off from its supply lines (attacker's CPS is 500), then:

1. Let \( a \) = a series; \( [.75]^{5} \) for each of the five dimensions identified = \( (.75)^{5} = .237 \)
2. Losses = \( (.75)^{5} \times 500 \times 50 \) = 21 (7\% of original strength)

In the above equations, the term "\((a)\)" permits adjustment of the relative rates of attrition. If \((a = 1)\) the consequent coefficient of 9 implies a 3:1 defender's advantage, as well as a 3:1 loss rate favoring the defender when the force ratio is in fact 3:1. One could modify the relationship based upon such factors as fatigue, logistics difficulties, morale, air superiority, or level of training; if the net result is an \( a \) greater than one, the equation would shift in favor of the defender. Conversely, if the net result is an \( a \) less than one the opposite effect would occur (as shown in Example 3, above). This variant, like the second one, requires that an estimate of the likely or acceptable loss rate be made for one of the forces. Additionally, some value for \( a \) would have to be determined; the above example assumed a standard value of .75 for each intangible factor that affects \( a \).

The fourth method of wargaming requires no mathematical equations or adjudicatory rules; rather, the war gamers themselves determine combat resolution. It is usually beneficial to have an
impartial umpire who can determine reasonable outcomes while being
unencumbered either by the biases of the wargaming parties, or by
a complicated set of rules for war-game resolution. The process
would simply consist of sequential repositioning of the
appropriate icons, and informal assessments such as: "At the end
of two hours, 1st Brigade should reach Phase Line Orange and still
be at 90% strength." This will usually be the preferred method
when little time is available.

Normally, battle staffs should reflect units two levels
below their own echelons; for example, divisions should account
for maneuver battalions. Some specialty units, such as MLRS
can be portrayed at the division level. On the other hand, it might be more convenient to limit
the number of icons by consolidating certain units. For example,
a Soviet Motorized Rifle Division could be represented by six
icons for the following:

<table>
<thead>
<tr>
<th>TABLE 12: Sample Representation of Soviet MRD</th>
</tr>
</thead>
<tbody>
<tr>
<td>39th Ods Motorized Rifle Division (Division 99) (7-64)</td>
</tr>
<tr>
<td>39 Recon Battalion</td>
</tr>
<tr>
<td>146 GRR (VTR)</td>
</tr>
<tr>
<td>150 GRR (VTR)</td>
</tr>
<tr>
<td>144 GRR (REP)</td>
</tr>
<tr>
<td>145 GRR (REP)</td>
</tr>
<tr>
<td>39 MDR Div Troops</td>
</tr>
</tbody>
</table>

Note A. Includes a 4-battalion Regimental Artillery Group.
Note B. Includes Division Artillery Regiment (465) (assumed to be the strength of the DAS).
Anti-tank battalion (79). and "ERB Base" (55) which includes armored vehicles
not otherwise accounted for.
V. BATTLE MONITORING

During actual operations, a unit's current location should be reflected by the icon's position on the map; this enables the commander and staff to track the battle and to calculate rapidly relative combat strengths in localized areas. If spot reports or other events are also reflected on the map, these should be recorded with a different type of marker (see example in Appendix 1). CPS scores on the icons should be updated to reflect status changes and task organizations during the battle; these changes should be posted on the "order of battle" list as well.

For a graphic portrayal of unit strength, two other methods can be useful. First, a "status board" can be kept which depicts friendly and enemy unit symbols. These symbols are then partially colored in to reflect attrition, as shown in Appendix 1. A second, more detailed method is to represent each individual weapon system in a unit, either by a symbol or an alpha-numeric code. Annotations can subsequently be made to reflect suspected or confirmed losses; these can be differentiated by color-coding or some other method, as shown in Table 13.

**TABLE 13: Individual System Array (Motorized Rifle Regiment)**

<table>
<thead>
<tr>
<th>343rd MRB (MIP)</th>
<th>9 = REP, 1 = HTX, + = Task, T = HTX</th>
<th>(/* = suspected loss, X = confirmed loss)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPS (original)</td>
<td>1157 CPS (current) = 720 (61%)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LST HN</th>
<th>210 HN</th>
<th>310 HN</th>
<th>61 HN</th>
</tr>
</thead>
<tbody>
<tr>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
</tr>
<tr>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
</tr>
<tr>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
</tr>
<tr>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
</tr>
<tr>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
</tr>
<tr>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
<td>EVN</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TR. HN</th>
<th>9 = REP, 1 = HTX, + = Task, T = HTX</th>
</tr>
</thead>
<tbody>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
<tr>
<td>9 = REP, 1 = HTX, + = Task, T = HTX</td>
<td></td>
</tr>
</tbody>
</table>

**ILLUS:** Individual System Arrays (Motorized Rifle Regiment)
As reports are received and recorded, they can periodically be consolidated and used to update CPS values. For example, the above annotations were made after an engagement in which an estimated twenty T-64s and thirty BMP-2s were destroyed. From Appendix 2, Tables B-1 and B-2, the T-64 and BMP-2 Individual System Values (ISV, or simply the Weapon Value times the Category Weight) are extracted, and then multiplied by the respective losses to determine the CPS reduction.

**TABLE 14: Updating a Unit's CPS (Method 1)**

1. **Original CPS** = 1,157 (Div 49 BMP MR in rolling terrain)

2. Estimated Losses: 20 T-64s  
   30 BMP-2s

3. **Individual System Values (ISV)** (From Appendix 2, Tables B-1 and B-2)
   - T-64 ISV = 12.50
   - BMP-2 ISV = 4.22

4. **CPS Losses**:
   - 20 x 12.50 = 250
   - 30 x 4.22 = 127
   - Total Loss = 377

5. **Revised CPS and strength estimates**:
   - \((1,157 - 377) = 780\)
   - \((780/1,157) = 670\) strength

Similar methods can be used to update the CPS of friendly units, though it may prove more convenient to rely upon normal status reports, and to estimate the CPS based upon the operational status of the dominant weapon systems in the unit. For example, after an engagement the updated CPS for the tank-heavy brigade in Table 15 might be estimated as follows:

28
TABLE 15: Updating a Unit's CPS (Method 2)

A. 1st Brigade CPS (Full-Strength, based upon task organization) ........ 2,354
B. Status of Primary Systems:

<table>
<thead>
<tr>
<th></th>
<th>Authorized</th>
<th>Operational</th>
<th>Operational Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-1 Tanks</td>
<td>116</td>
<td>106</td>
<td>91%</td>
</tr>
<tr>
<td>H-2 IFVs</td>
<td>54</td>
<td>43</td>
<td>80%</td>
</tr>
</tbody>
</table>

C. Estimated Overall Unit Combat Effectiveness Rate: ....................... 88%
D. Updated CPS: 2,354 x .88 = ............................................. 2,072

NOTE A: Personnel strengths should be used for light infantry units.
NOTE B: The estimate is between the operational rates for H-1s and H-2s. The estimate is skewed towards the H-1 rate, since the brigade is tank-heavy.

VI. IMPLICATIONS FOR FURTHER RESEARCH

At least three major opportunities for future refinements exist. The first is that at present the methodology does not account for such vital battlefield assets as air power, air defense, and engineer support. The first two categories, at least, might hypothetically be adapted to the methodology through further research. Indeed, early versions of the WEI/NUV methodology included an "air defense" category; this was later dropped to simplify the approach, since air defense weapons are most significant against air forces not included in the model.

The incorporation of air power would clearly change that, and it is possible, in the abstract at least, to envision a relationship such as "generally speaking, an A-10 sortie provides about as much combat power as do three tanks." This would be the first step towards assigning CPS values to fixed-wing aircraft.

A second potential area for further research is the
integration of this system with the Maneuver Control System (MCS) and the Battlefield Planning System (BPS). Although the CPS methodology is readily managed with spreadsheet software, it nevertheless remains a manual system which requires continual recalculations as the available information changes.

The third, and most difficult, area returns to the original question of how best to estimate combat power. The CPS methodology, at best, provides a rough quantitative base from which qualitative judgements will have to be made; in other words, "military art" cannot be made wholly "scientific." Nevertheless, one can conceptually try to measure even more of the "unmeasurable" than has been attempted here; this would necessitate a quantification of the "intangible factors" addressed earlier. While this is beyond the scope of the immediate study, such an approach might include a series of coefficients as shown in Table 16.

In the following example, two forces are assumed to have equal CPS values of 1,000. However, five "intangible factors are then accounted for to illustrate that one force indeed has a demonstrable advantage. All of the enhancing values are assumed to be 1.25 while the degradation values are all .75; in other words, for example, a side that has air supremacy is assumed to receive a 25% increase in its combat potential. Conversely, the opposing side is assumed to have a 25% decrease. The factors and values in the table are merely to suggest lines of inquiry; further research would be required to determine the appropriate
intangible factors, and the proper values to be assigned to each one.

**TABLE 16: Accounting for Intangible Factors**

Let Combat Power = \( CP^2 \prod (IA) \times (IA) \times (IA) \times \ldots \times (IA) \)

**NOTE:** The following identified factors and the values are illustrative only.

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>Significantly Positive</th>
<th>No Effect</th>
<th>Significantly Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Training/Combat Experience</td>
<td>1.25</td>
<td>1</td>
<td>.75</td>
</tr>
<tr>
<td>Air Force Situation</td>
<td>1.25</td>
<td>1</td>
<td>.75</td>
</tr>
<tr>
<td>Logistical Situation</td>
<td>1.25</td>
<td>1</td>
<td>.75</td>
</tr>
<tr>
<td>Ideological Motivation</td>
<td>1.25</td>
<td>1</td>
<td>.75</td>
</tr>
<tr>
<td>Fatigue Level</td>
<td>1.25</td>
<td>1</td>
<td>.75</td>
</tr>
</tbody>
</table>

If two adversaries had equal \( CP^2 \) values of 1.000, but the above "intangible" factors had a uniformly positive effect on \( A \) and, conversely, a uniformly negative effect on \( A \), the resultant combat power ratio would be estimated as follows:

\[
\text{Combat Power} = CP^2 \times 1.25 \times 1.25 \times 1.25 \times \ldots \times 1.25
\]

**SUMMARY**

This study offers a methodology to estimate the relative combat strengths of opposing units, while meeting three criteria. First, it is detailed in that unique scores have been assigned to different units based upon the organizations’ force structures and upon the capabilities of their weapons systems. Second, the methodology is simple enough to be understood by battle staffs and is easy to use. Finally, the methodology is adaptable enough to
be modified if, for example, the user wishes to make changes based upon new force structures, the fielding of newer and more capable weapons systems, or if the user disagrees with certain numerical values contained in this study and prefers to substitute other ones.

Appendix 1 contains pre-calculated Combat Potential Scores (CPSs) for units from several nations, which can be extracted in accordance with the desired level of aggregation. Appendix 1 includes CPSs for different types of terrain; however, the reader may prefer to rely exclusively upon the "rolling" values for simplicity. Appendix 2 includes the Weapon Values (WVs) and Category Weights (CWs) which were used to develop the CPSs in Appendix 1. The interested reader may use Appendix 2 to reconstruct or adjust the CPS calculations, or to generate Combat Potential Scores for units not that do not appear in Appendix 1.

The methodology can aid battle-staff war gaming and the monitoring of tactical operations. Because it seeks to balance the contradictory virtues of simplicity and detail, it does not attempt to quantify many of the less tangible elements of combat power; nor can it be expected to. However, the methodology can be used to sketch a general picture of opposing strengths, and in this regard is better than no method at all. It can assist good tactical judgement in division and corps staffs; it cannot serve as its substitute.
APPENDICES
APPENDIX 1: Combat Potential Scores (CPS) For Selected Units

INSTRUCTIONS: This appendix contains pre-calculated Combat Potential Scores for units of different countries. Given a friendly task organization and an enemy order of battle, the staff officer can estimate the force values at any desired level of aggregation. For example, a full-strength US division aggregated by battalion would be arrayed as follows:

<table>
<thead>
<tr>
<th>13th Brigade</th>
<th>1st CF</th>
<th>1st Strength</th>
<th>Current CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Brigade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF 1-91 Mech (2H. 27)</td>
<td>693</td>
<td>90%</td>
<td>624</td>
</tr>
<tr>
<td>FF 1-10 Ar (11H. 37)</td>
<td>781</td>
<td>95%</td>
<td>742</td>
</tr>
<tr>
<td>FF 1-11 Ar (11H. 39)</td>
<td>781</td>
<td>90%</td>
<td>703</td>
</tr>
<tr>
<td>1-50 PA (155 SP) (BS)</td>
<td>99</td>
<td>95%</td>
<td>94</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2nd Brigade</th>
<th>1st CF</th>
<th>1st Strength</th>
<th>Current CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Brigade</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FF 1-92 Mech (3H. 17)</td>
<td>552</td>
<td>69%</td>
<td>459</td>
</tr>
<tr>
<td>FF 1-12 Ar (11H. 37)</td>
<td>781</td>
<td>70%</td>
<td>547</td>
</tr>
<tr>
<td>1-13 Ar (47)</td>
<td>922</td>
<td>75%</td>
<td>692</td>
</tr>
<tr>
<td>1-51 PA (155 SP) (BS)</td>
<td>99</td>
<td>50%</td>
<td>50</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd Brigade</th>
<th>1st CF</th>
<th>1st Strength</th>
<th>Current CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>FF 1-93 Mech (2H. 27)</td>
<td>552</td>
<td>80%</td>
<td>462</td>
</tr>
<tr>
<td>FF 1-14 Ar (2H. 27)</td>
<td>640</td>
<td>90%</td>
<td>574</td>
</tr>
<tr>
<td>FF 1-15 Ar (11H. 39)</td>
<td>781</td>
<td>89%</td>
<td>625</td>
</tr>
<tr>
<td>1-52 PA (155 SP) (BS)</td>
<td>99</td>
<td>75%</td>
<td>74</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd Arm Brigade (-)</th>
<th>1st CF</th>
<th>1st Strength</th>
<th>Current CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>146th ARD (AR-1)</td>
<td>301</td>
<td>75%</td>
<td>226</td>
</tr>
<tr>
<td>147th ARD (AR-1)</td>
<td>301</td>
<td>80%</td>
<td>241</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Div Types:</th>
<th>1st CF</th>
<th>1st Strength</th>
<th>Current CF</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-22 Cav</td>
<td>306</td>
<td>90%</td>
<td>275</td>
</tr>
<tr>
<td>9/55 PA (KSKS)</td>
<td>152</td>
<td>100%</td>
<td>192</td>
</tr>
<tr>
<td>Other</td>
<td>193</td>
<td>100%</td>
<td>193</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Division Total:</th>
<th>1st CF</th>
<th>1st Strength</th>
<th>Current CF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(651)</td>
<td>(95%)</td>
<td>(620)</td>
</tr>
</tbody>
</table>

The above CPS values should then be reflected on unit icons that are posted on situation maps. Additionally, a list such as the above should be maintained that includes authorized strengths (as modified by task organization) and current strengths, as updated strength reports are received. This information can be used to display percent strengths as well as the combat power ratios between friendly and enemy forces at any desired level.
APPENDIX 1: Combat Potential Scores (CPS)

10TH CORPS

22,908
Full Strength CPS

0000
Start

17,407
Current CPS

77%
Current %

10TH CORPS UNITS

XX

8401/2400 (85%)

1
2364/
159/
449/

2
1847/
908/

3
2766/

XX

8911/505 (73%)

1
2364/
159/
449/

2
2354/
908/

3
2766/

208

2222/2000 (65%)

10

2222/15/15 (71%)

X

392/3/4 (80%)

OPFOR ON REVERSE SIDE
### APPENDIX I: Combat Potential Scores (CPS) For Selected Units (continued)

#### TABLE A-1: US Force Values**

<table>
<thead>
<tr>
<th>US DIVISIONS</th>
<th>Rolling</th>
<th>Desert</th>
<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEC Infantry (5x5) (H-1)²</td>
<td>0.405</td>
<td>6.647</td>
<td>7.957</td>
<td>6.225</td>
<td>0.010</td>
</tr>
<tr>
<td>MEC Infantry (5x5) (H-1A1)²</td>
<td>0.546</td>
<td>6.766</td>
<td>6.008</td>
<td>6.283</td>
<td>0.586</td>
</tr>
<tr>
<td>Armored (6x6) (H-1)²</td>
<td>0.914</td>
<td>7.859</td>
<td>7.750</td>
<td>6.008</td>
<td>7.066</td>
</tr>
<tr>
<td>Armored (6x6) (H-1A1)²</td>
<td>0.905</td>
<td>7.322</td>
<td>7.023</td>
<td>6.153</td>
<td>7.956</td>
</tr>
<tr>
<td>avy Division Base³</td>
<td>365</td>
<td>252</td>
<td>489</td>
<td>372</td>
<td>485</td>
</tr>
</tbody>
</table>

| 2 Ki Infantry (9 in Bus) | 1.548 | 1.108 | 1.004 | 2.263 | 2.541 |
| 2 Ki Infantry (motorized) | 1.695 | 1.237 | 1.371 | 2.521 | 2.801 |
| Airborne (9 Abn Bus) | 2.031 | 1.533 | 1.113 | 2.300 | 2.694 |
| Air Assault (9 Bus) | 2.519 | 1.902 | 1.813 | 2.660 | 3.104 |
| 2d Infantry¹ | 4.524 | 3.594 | 3.942 | 3.641 | 4.556 |

| ARNG Inf Divisions² | 3.105 | 2.466 | 4.559 | 3.227 | 3.776 |
| ARNG Div | 3.010 | 2.194 | 6.289 | 4.818 | 5.587 |

**Note a: Assumes Abn-64s in Arv Bde: subtract 101 (rolling terrain) from CPS if Arv-1s are in Arv bus.**

**Note b: Includes HHC battery and all H-113s (except ambulances) not found in maneuver battalions.**

**Note c: Includes 2 Armor, 2 Mechanized, 7 Infantry Battalions**

**Note d: 8 Infantry Bns, 1 Mechanized Bn, 1 Armor Bn (H-6011)**

#### US BRIGADES

| 2 Mech, 2 Tank (H-1)² | 2.786 | 2.199 | 2.491 | 2.066 | 2.632 |
| 1 Mech, 2 Tank (H-1)² | 2.235 | 1.390 | 1.622 | 1.516 | 1.751 |
| 2 Mech, 1 Tank (H-1)² | 1.847 | 1.449 | 2.034 | 1.661 | 1.192 |
| 2 Mech, 2 Tank (H-1A1)² | 2.436 | 2.247 | 2.515 | 2.089 | 2.163 |
| 1 Mech, 2 Tank (H-1A1)² | 2.412 | 1.937 | 1.847 | 1.539 | 1.981 |
| 2 Mech, 1 Tank (H-1A1)² | 2.476 | 1.473 | 2.046 | 1.673 | 2.127 |

| Sep Inf Bde (5x2, 27)² | 2.845 | 2.261 | 2.599 | 2.137 | 2.724 |

**Note a: Includes Abn-64s in Arv Bde: subtract 101 (rolling terrain) from CPS if Arv-1s are in Arv bus.**

**Note b: Includes HHC battery and all H-113s (except ambulances) not found in maneuver battalions.**

**Note c: Includes 2 Armor, 2 Mechanized, 7 Infantry Battalions**

**Note d: 8 Infantry Bns, 1 Mechanized Bn, 1 Armor Bn (H-6011)**

---

CONTINUED

---

38
### US BRIGADES (continued)

<table>
<thead>
<tr>
<th>Brigade</th>
<th>Rolling</th>
<th>Desert</th>
<th>Mountain</th>
<th>Tundra</th>
<th>Forested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avn Bde (Rdy Div) (AR-64)</td>
<td>1,089</td>
<td>857</td>
<td>1,121</td>
<td>610</td>
<td>841</td>
</tr>
<tr>
<td>Avn Bde (-) (Rdy Div) (AR-64)</td>
<td>783</td>
<td>618</td>
<td>751</td>
<td>386</td>
<td>545</td>
</tr>
<tr>
<td>Avn Bde (Rdy Div) (AR-1)</td>
<td>904</td>
<td>714</td>
<td>948</td>
<td>521</td>
<td>715</td>
</tr>
<tr>
<td>Avn Bde (-) (Rdy Div) (AR-1)</td>
<td>602</td>
<td>475</td>
<td>577</td>
<td>297</td>
<td>419</td>
</tr>
<tr>
<td>Avn Bde (Lt Div) (AR-1)</td>
<td>510</td>
<td>398</td>
<td>537</td>
<td>299</td>
<td>399</td>
</tr>
<tr>
<td>Avn Bde(-) (Lt Div) (AR-1)</td>
<td>351</td>
<td>277</td>
<td>337</td>
<td>173</td>
<td>284</td>
</tr>
<tr>
<td>Avn Bde(-) (Lt Div) (AR-64)</td>
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<td>Atk Hel Bde (AR-64)</td>
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<td>Heavy Division Artya</td>
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<td>643</td>
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<td>USMC Artillery Bnt</td>
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<td>241</td>
<td>735</td>
<td>473</td>
<td>638</td>
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**NOTE a:** Includes 155mm Arty on US (CPS = 99 in rolling terrain)
**NOTE b:** Includes 105 T Arty on US (CPS = 52 in rolling terrain)
**NOTE c:** Does not include Cavalry Sqdrna (CPS Heavy Cav Sqdrna = 166; CPS Light Cav Sqdrna = 159)
**NOTE d:** Five AR-64 Battalions (10 AR-64s per battalion); 1 Air Cav Sqdrna (16 AH-1s)

**NOTE A:** Includes US artillery battalions.
**NOTE A:** Includes US artillery battalions.
**NOTE A:** Includes US artillery battalions.

---

**CONTINUED**
## APPENDIX 1: Combat Potential Scores (CPA) for Selected Units (continued)

### US BATTALIONS/SQUADRONS

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<td>Mech Bn</td>
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<td>Mech Bn Base: HHC, E Co</td>
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<td>110</td>
<td>201</td>
<td>113</td>
<td>142</td>
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<td>Mech Bn (H-113)</td>
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<td>305</td>
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<tr>
<td>Th Bn (H-1)</td>
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<td>752</td>
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<td>460</td>
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<tr>
<td>Th Bn (H-1AA)</td>
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<td>776</td>
<td>474</td>
<td>420</td>
<td>550</td>
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<tr>
<td>Th Bn (H-60AS)</td>
<td>719</td>
<td>586</td>
<td>377</td>
<td>327</td>
<td>423</td>
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<tr>
<td>Th Bn Base: HHC</td>
<td>82</td>
<td>64</td>
<td>105</td>
<td>72</td>
<td>91</td>
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</tbody>
</table>

| Mech TT: 1H, 1P | 621     | 462    | 757      | 633   | 793      |
| Mech TT: 1H, 1P | 552     | 432    | 640      | 526   | 654      |
| Mech TT: 1H, 1P | 443     | 362    | 533      | 415   | 523      |
| Mech TT: 2H, 2P | 691     | 554    | 611      | 619   | 614      |
| Mech TT: 1H, 1P | 414     | 332    | 406      | 306   | 386      |
| Mech TT: 1R, 2P | 624     | 506    | 496      | 390   | 499      |
| Mech TT: 1H, 3P | 834     | 676    | 582      | 474   | 610      |

| Th TT: 1H, 6P  | 991     | 692    | 570      | 517   | 670      |
| Th TT: 1H, 3P  | 781     | 630    | 490      | 433   | 559      |
| Th TT: 1H, 2P  | 571     | 458    | 402      | 369   | 444      |
| Th TT: 1H, 2P  | 361     | 286    | 218      | 265   | 337      |
| Th TT: 2H, 2P  | 640     | 508    | 519      | 458   | 543      |
| Th TT: 1H, 1P  | 430     | 336    | 432      | 374   | 471      |
| Th TT: 1H, 1P  | 499     | 366    | 548      | 483   | 607      |

**Note:** Assumes H-1 and H-2 Companies.
- if H-1AA: add 7 per tank company to CPS.
- if H-60AS: subtract 45 per tank company from CPS.
- if H-113: subtract 30 per mech company from CPS.

### US Light Infantry Battalions

| Lt Inf Bn        | 94      | 67     | 220     | 182   | 190      |
| Lt Inf Bn (motorized) | 107     | 75     | 248     | 210   | 214      |
| Inf Bn (2nd ID and Reserve) | 144     | 130    | 311     | 215   | 236      |
| Air Assault Bn   | 163     | 128    | 290     | 212   | 229      |
| Arm Bn           | 163     | 128    | 290     | 212   | 229      |
| Ranger Battalion | 96      | 67     | 220     | 182   | 190      |

**Note:** Assumes enough truck augmentation for 100% mobility.

CONTINUED
### APPENDIX J: Combat Potential Scores (CPS) for Selected Units (continued)

#### US BATTALIONS/SQUADRONS (continued)

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<th>Unit Type</th>
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<td>AH-66 (AH-1)</td>
<td>302</td>
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<td><strong>US Cavalry Squadrons</strong></td>
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<tr>
<td>Regimental Cav Sqdrn (H-1)</td>
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<td>567</td>
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<td>674</td>
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<td>456</td>
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<td>Regt Aviation Sqdrn</td>
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<td>Div Cav Sqdrn (Heavy)</td>
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<td>Div Cav Sqdrn (Light)</td>
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<td><strong>US Artillery Battalions</strong></td>
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<td>FA Bn: 6&quot; (16 tubes)</td>
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<td>FA Bn: 155 SP (18 tubes)</td>
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<td>FA Bn: 155 SP (24 tubes)</td>
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<td>75</td>
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<td>FA Bn: 155 T (18 tubes)</td>
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<td>FA Bn: 155 T (24 tubes)</td>
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<td>FA Bn: 105 T (18 tubes)</td>
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<tr>
<td>FA Bn: 105 T (24 tubes)</td>
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<td><strong>USMC Battalions</strong></td>
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<td>600</td>
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**NOTE:** CPS values assume that infantrymen are in vehicles; these marines are usually organic to one of the regular rifle battalions.

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CONTINUED

41
### APPENDIX I: Combat Potential Scores (CPS) For Selected Units (continued)

#### US COMPANIES/BATTERIES/TROOPS

<table>
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<tr>
<th>Unit Description</th>
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<td>Th Co Th: 3K, 17K</td>
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<td>73</td>
<td>69</td>
<td>85</td>
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</table>

**Notes:**
- Assumes H-1 and H-1 platoons
- If H-1AI: add 2 per tank platoon to CPS
- If H-60A3: subtract 16 per tank platoon from CPS (rolling terrain)
- If H-113: subtract 10 per tank platoon from CPS (rolling terrain)
### APPENDIX 1: Combat Potential Scores (CPS) For Selected Units (continued)

#### US COMPANIES/BATTERIES/TROOPS (continued)

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<tr>
<th></th>
<th>Rolling</th>
<th>Desert</th>
<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
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<td>Att Bns Co (AB-64)</td>
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<td>Att Bns Co (AB-1)</td>
<td>100</td>
<td>79</td>
<td>96</td>
<td>49</td>
<td>70</td>
</tr>
</tbody>
</table>

| **US Cavalry Troops** |         |        |          |       |          |
| Att Div Air Cav Troop | 67      | 53     | 64       | 33    | 47       |
| Att Div Ground Cav Troop | 79  | 62     | 108      | 71    | 91       |
| Cav Troop, Regt Cav Sqdn (H-1) | 187 | 151    | 131      | 102   | 133      |
| Cav Troop, Regt Cav Sqdn (H-1A) | 192 | 155    | 133      | 104   | 136      |
| St Div Air Cav Troop  | 25      | 16     | 62       | 60    | 61       |
| St Div Ground Cav Troop |       |        |          |       |          |

| **US Artillery Batteries** |         |        |          |       |          |
| FA Btry: 8" (6 tubes)    |          |        |          |       |          |
| FA Btry: 155 SP (6 tubes) | 33      | 25     | 77       | 50    | 66       |
| FA Btry: 155 18 (6 tubes) | 25      | 19     | 57       | 37    | 50       |
| FA Btry: 155 T (6 tubes) | 26      | 20     | 61       | 40    | 51       |
| FA Btry: 155 15 (6 tubes) | 20      | 15     | 46       | 30    | 40       |
| FA Btry: 105 15 (6 tubes) | 17      | 13     | 40       | 26    | 15       |
| HNB Btry (9 launchers)   | 152     | 116    | 142      | 101   | 136      |

#### US PLATOONS

<table>
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<td>Tank Plt (M-60A3)</td>
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<td>6th Inf Plt</td>
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<td>Scent Platoon, Mech and 1st Div</td>
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<tr>
<td>Scent Platoon, 1st Inf</td>
<td>6</td>
<td>4</td>
<td>16</td>
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</tr>
<tr>
<td>AF Platoon (K Co)</td>
<td>24</td>
<td>21</td>
<td>29</td>
<td>12</td>
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</tbody>
</table>

43
### APPENDIX A: Combat Potential Scores (CPs) for Selected Units (continued)

TABLE A-2: Soviet Force Values

<table>
<thead>
<tr>
<th>SOVIET DIVISIONS</th>
<th>Rolling</th>
<th>Desert</th>
<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
</tr>
</thead>
</table>

**Soviet Motorized Rifle Divisions**

<table>
<thead>
<tr>
<th>Division</th>
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<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Div 00 MRR (T-00)</td>
<td>6.276</td>
<td>4.869</td>
<td>6.374</td>
<td>4.897</td>
<td>6.137</td>
</tr>
<tr>
<td>Div 00 MRR (T-64)</td>
<td>5.750</td>
<td>4.518</td>
<td>6.201</td>
<td>5.726</td>
<td>6.077</td>
</tr>
<tr>
<td>Div 00 MRR (T-72)</td>
<td>5.642</td>
<td>4.431</td>
<td>6.153</td>
<td>6.163</td>
<td>6.035</td>
</tr>
<tr>
<td>Div 00 MRR (T-62)</td>
<td>4.805</td>
<td>3.753</td>
<td>5.518</td>
<td>4.147</td>
<td>5.393</td>
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<tr>
<td>Div 00 MRR (T-55)</td>
<td>4.687</td>
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<td>4.018</td>
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<tr>
<td>Div 09 MRR (T-90)</td>
<td>5.129</td>
<td>3.964</td>
<td>6.607</td>
<td>5.135</td>
<td>6.552</td>
</tr>
<tr>
<td>Div 09 MRR (T-64)</td>
<td>4.801</td>
<td>3.760</td>
<td>6.503</td>
<td>5.055</td>
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<tr>
<td>Div 09 MRR (T-72)</td>
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<td>3.708</td>
<td>6.475</td>
<td>5.083</td>
<td>6.384</td>
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<tr>
<td>Div 09 MRR (T-62)</td>
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<td>3.222</td>
<td>5.093</td>
<td>5.099</td>
<td>5.738</td>
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<tr>
<td>Div 09 MRR (T-55)</td>
<td>4.015</td>
<td>3.070</td>
<td>5.013</td>
<td>4.413</td>
<td>5.542</td>
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<td>Post-CFY MRR (T-90)</td>
<td>5.706</td>
<td>4.468</td>
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<tr>
<td>Post-CFY MRR (T-64)</td>
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<td>4.162</td>
<td>6.179</td>
<td>6.069</td>
<td>6.210</td>
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<tr>
<td>Post-CFY MRR (T-72)</td>
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<td>6.179</td>
<td>6.069</td>
<td>6.210</td>
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<tr>
<td>Post-CFY MRR (T-62)</td>
<td>4.162</td>
<td>3.456</td>
<td>5.612</td>
<td>5.392</td>
<td>5.637</td>
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<tr>
<td>Post-CFY MRR (T-55)</td>
<td>4.162</td>
<td>3.456</td>
<td>5.612</td>
<td>5.392</td>
<td>5.637</td>
</tr>
</tbody>
</table>

**MD BARI**

| | 35 | 39 | 93 | 85 | 106 |

Note A: The "Division 00" MRR structure consists of one tank regiment, one MRP motorized rifle regiment, and two MTR motorized rifle regiments. Additionally, the division has an artillery regiment of three howitzer battalions and one multiple rocket launcher battalion, an attack helicopter squadron, a surface-to-surface missile battalion, an anti-tank battalion, and a recon battalion that includes six tanks. The MRR tank battalions have 60 tanks, while the TR tank battalions have 31. The tank regiment of an MRR does not include an MRR. There may also be an independent tank battalion (ITB) of 51 tanks (not included in the above figures).

The "Division 09" MRR structure (or "square" division) has two MRP MRRs and two MTR MRRs. Other changes include the deletion of the AS squadron and the SSX battalion, the removal of the six tanks from the reconnaissance battalion, and the standardization of all tank battalions at 31 tanks. An ITB is not normally present.

The "Post-CFY" MRR has one TR (without an MRR), two MRP MRRs, and one MTR MRR. Other changes to the "Division 09" structure include the deletion of six BM-21 rocket launchers from the SK battalion, and the addition of three AT-5s to the division AT battalion. Additionally, the MRRs now have an AT battalion (vice a battery) with the addition of six T-72 AT guns to the nine AT-5s already present. A reconnaissance battalion of three MRRs has also been added to each MRR. An ITB may be present, but now would consist of 31 tanks (not included in the above figures).

Note B: Includes armored vehicles not organic to the maneuver regiments.

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### APPENDIX J: Combat Potential Scores (CPS) For Selected Units (continued)

#### SOVIET DIVISIONS (continued)

<table>
<thead>
<tr>
<th>Rolling</th>
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<th>Urban</th>
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<tr>
<td>Soviet Tank Divisions*</td>
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<td></td>
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<tr>
<td>Div 80 TD (T-55)</td>
<td>7.130</td>
<td>5.655</td>
<td>6.062</td>
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<tr>
<td>Div 89 TD (T-64)</td>
<td>6.492</td>
<td>5.130</td>
<td>5.785</td>
<td>6.032</td>
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<tr>
<td>Div 80 TD (T-72)</td>
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<td>4.997</td>
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<tr>
<td>Div 89 TD (T-55)</td>
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<td>4.242</td>
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<tr>
<td>Div 80 TD (T-55)</td>
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<td>1.740</td>
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<td>Div 89 TD (T-64)</td>
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<td>4.017</td>
<td>6.040</td>
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<td>Div 89 TD (T-64)</td>
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<td>4.409</td>
<td>5.832</td>
<td>6.099</td>
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<tr>
<td>Div 89 TD (T-72)</td>
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<td>4.305</td>
<td>5.776</td>
<td>4.808</td>
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<tr>
<td>Div 89 TD (T-55)</td>
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<td>5.593</td>
<td>5.258</td>
<td>4.375</td>
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<td>Post-CTB TD (T-50)</td>
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<td>Post-CTB TD (T-64)</td>
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<td>5.561</td>
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<td>Post-CTB TD (T-72)</td>
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<td>5.481</td>
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<td>Post-CTB TD (T-55)</td>
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<td>Post-CTB TD (T-55)</td>
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<td>2.499</td>
<td>4.765</td>
<td>3.922</td>
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<tr>
<td>TD REINF</td>
<td>55</td>
<td>39</td>
<td>93</td>
<td>85</td>
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</table>

Note A: The "Division 60" tank division structure has three T3s (three tank battalions of 31 tanks and one MR) and one DTM MR (three MRs and one tank battalion of 40 tanks). Divisional assets are the same as for the "Division 60" MR, except that there is no divisional AT battalion, and the artillery regiment has only two howitzer battalions (instead of three).

The "Division 89" tank division is also "square" and has two tank regiments and two DTM MRs; all of the tank battalions have 31 tanks. The relations at the divisional level are the same as for the "Division 60" MR.

The "Post-CBD" tank division has three tank regiments and one MR (the MR probably has only two MRs, though the above figures assume that three are present). Other modifications are the same as for the "Post-CBD" MR, except that there is no divisional AT battalion.

The "Post-CBD" MR has three tank regiments and one MR (the MR probably has only two MRs, though the above figures assume that three are present). Other modifications are the same as for the "Post-CBD" MR, except that there is no divisional AT battalion.

Note B: Includes armored vehicles not organic to the maneuver regiments.

<table>
<thead>
<tr>
<th>Other Soviet Divisions</th>
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</thead>
<tbody>
<tr>
<td>Airborne Division</td>
</tr>
<tr>
<td>Artillery Division</td>
</tr>
<tr>
<td>Naval Infantry Division</td>
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### Appendix J: Combat Potential Scores (CPS) for Selected Units (continued)

#### SOVIET BRIGADES AND GROUPS

<table>
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<th>Rolling</th>
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<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
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</thead>
<tbody>
<tr>
<td>Air Assault Bde (Front)</td>
<td>457</td>
<td>316</td>
<td>912</td>
<td>678</td>
<td>795</td>
</tr>
<tr>
<td>ARMA Artillery Bde (Front)</td>
<td>156</td>
<td>263</td>
<td>749</td>
<td>562</td>
<td>614</td>
</tr>
<tr>
<td>SP Aircrew (Front)</td>
<td>224</td>
<td>144</td>
<td>560</td>
<td>544</td>
<td>568</td>
</tr>
<tr>
<td>Naval Infantry Bde</td>
<td>1,059</td>
<td>819</td>
<td>1,119</td>
<td>941</td>
<td>1,224</td>
</tr>
</tbody>
</table>

**Soviet Artillery Brigades**

- 15M Bde (152mm) (Army) | 243 | 185 | 227 | 162 | 217 |
- Artillery Bde (Army) (40 B-30, 62 210mm) | 187 | 194 | 897 | 582 | 778 |
- SP Artillery Bde (Front) (24 240, 104) | 223 | 164 | 552 | 327 | 412 |
- SP Artillery Bde (Post-CBT) (68 287) | 268 | 203 | 521 | 403 | 538 |
- GM Bde (Artillery) (72 3-30) | 208 | 158 | 483 | 313 | 419 |
- GM-Batt (Artillery) (72 283) | 282 | 215 | 655 | 425 | 568 |
- GM Bde (Artillery) (72 287) | 357 | 271 | 828 | 537 | 718 |
- Kt Lehr Bde (Artillery) | 1,069 | 813 | 998 | 714 | 955 |
- KU Bde (Artillery) | 315 | 281 | 366 | 139 | 181 |

**Note:** CPS values based upon organizations depicted in FV-100-2-1. Post-CBT alignment of artillery appears to consist of 18 tubes in divisional artillery battalions, and 12 tubes in other battalions (which might be expanded during war). All multiple rocket launcher battalions are being reduced from 10 to 11 launchers.

**Soviet Artillery Groups**

- LAG (4 21 How) | 296 | 128 | 688 | 448 | 590 |
- LAG (4 21 How) | 296 | 238 | 648 | 448 | 590 |
- LAG (4 21 How) | 296 | 228 | 658 | 488 | 600 |
- Army plume-up (24 How) | 821 | 646 | 1,064 | 1,244 | 1,800 |
- Division Artillery plume-up (9 How) | 606 | 513 | 1,348 | 1,000 | 1,350 |
- LAG plume-up (3 How) | 223 | 172 | 516 | 356 | 450 |

**Note:** Artillery groups vary in size and composition; normally, they have from two to six battalions. These values assume the equivalent of four battalions of 155 152mm SP howitzers; other CPS values should be calculated if the specific composition of the artillery groups can be determined. These LAG, LAG, and LAG values include whatever organic artillery units have been assigned to the group; for example the LAG value includes the regiment's organic artillery battalion.

**Note:** First-echelon armies may receive front-level artillery battalions to supplement their own artillery assets. These CPS values assume the equivalent of 12 front-line 255 battalions in addition to organic artillery battalions.

**Note:** First-echelon divisions may receive two front-line artillery battalions, and battalions from second-echelon divisions, to supplement their own artillery assets. These CPS values assume the equivalent of 9 255 battalions in addition to organic division artillery battalions.

**Note:** First-echelon regiments also receive the artillery assets of higher echelons. These CPS values assume the equivalent of 3 255 battalions in addition to the organic 251 artillery battalion.

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### APPENDIX I: Combat Potential Scores (CPs) for Selected Units (continued)

#### SOVIET REGIMENTS

<table>
<thead>
<tr>
<th>Soviet Motorized Rifle Regiments*</th>
<th>Rolling</th>
<th>Desert</th>
<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
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<tbody>
<tr>
<td>Div 08 MRR (BP-2, T-60)</td>
<td>1.349</td>
<td>1.562</td>
<td>1.593</td>
<td>1.360</td>
<td>1.710</td>
</tr>
<tr>
<td>Div 08 MRR (BP-2, T-64)</td>
<td>1.269</td>
<td>1.576</td>
<td>1.599</td>
<td>1.328</td>
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<td>Div 08 MRR (BP-2, T-72)</td>
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<td>1.560</td>
<td>1.550</td>
<td>1.300</td>
<td>1.657</td>
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<tr>
<td>Div 08 MRR (BP-1, T-60)</td>
<td>1.081</td>
<td>0.826</td>
<td>1.422</td>
<td>1.200</td>
<td>1.503</td>
</tr>
<tr>
<td>Div 08 MRR (BP-1, T-55)</td>
<td>1.011</td>
<td>0.780</td>
<td>1.397</td>
<td>1.176</td>
<td>1.472</td>
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<tr>
<td>Div 09 MRR (BP-2, T-60)</td>
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<td>0.935</td>
<td>1.538</td>
<td>1.300</td>
<td>1.641</td>
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<tr>
<td>Div 09 MRR (BP-2, T-64)</td>
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<td>0.844</td>
<td>1.512</td>
<td>1.280</td>
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<td>Div 09 MRR (BP-2, T-72)</td>
<td>1.161</td>
<td>0.871</td>
<td>1.505</td>
<td>1.370</td>
<td>1.630</td>
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<tr>
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<td>0.760</td>
<td>1.448</td>
<td>1.160</td>
<td>1.450</td>
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<tr>
<td>Div 09 MRR (BP-1, T-55)</td>
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<td>0.722</td>
<td>1.368</td>
<td>1.149</td>
<td>1.436</td>
</tr>
<tr>
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<td>1.164</td>
<td>0.971</td>
<td>1.593</td>
<td>1.340</td>
<td>1.663</td>
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<td>Post-CFR MRR (BP-2, T-64)</td>
<td>1.197</td>
<td>0.920</td>
<td>1.567</td>
<td>1.315</td>
<td>1.500</td>
</tr>
<tr>
<td>Post-CFR MRR (BP-2, T-72)</td>
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<td>0.907</td>
<td>1.560</td>
<td>1.302</td>
<td>1.562</td>
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<td>1.443</td>
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<td>1.502</td>
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<tr>
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<td>0.999</td>
<td>0.758</td>
<td>1.423</td>
<td>1.181</td>
<td>1.478</td>
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<td>1.134</td>
<td>0.890</td>
<td>1.363</td>
<td>0.942</td>
<td>2.215</td>
</tr>
<tr>
<td>Div 09 MRR (BP-70, T-64)</td>
<td>1.054</td>
<td>0.824</td>
<td>1.229</td>
<td>0.910</td>
<td>1.157</td>
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<tr>
<td>Div 09 MRR (BP-70, T-72)</td>
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<td>0.800</td>
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<td>0.653</td>
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<td>0.732</td>
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<td>1.114</td>
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<td>Div 09 MRR (BP-60, T-62)</td>
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<td>0.585</td>
<td>1.036</td>
<td>0.730</td>
<td>0.939</td>
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</table>

**HRR BASIS**

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<td>40</td>
<td>44</td>
<td>51</td>
<td>22</td>
<td>29</td>
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</tbody>
</table>

**NOTE a:** "Division 60" MRR has 60 tanks in the tank battalion. "Division 69" MRR has 31 tanks in the tank battalion. The "Post-CFR" MRR also has 31 tanks in the tank battalion; moreover, the regimental AT battery has been transformed into an AT battalion with the addition of six T-12 anti-tank guns. Another modification is the addition of a Recon platoon (three BRPs) to each MRR. Under the Post-CFR organization, the MRR in the tank division probably has only two MRRs, rather than the three reflected above.

**NOTE b:** Includes all assets except for those organic to the maneuver battalions and to the reconnaissance company.

**CONTINUED**
APPENDIX J: Combat Potential Scores (CPS) For Selected Units (continued)

SOVIET REGIMENTS (continued)

<table>
<thead>
<tr>
<th></th>
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<th>Urban</th>
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<td>TB, Bn (T-50)</td>
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<td>1.201</td>
<td>797</td>
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<td>1.599</td>
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</table>

**NOTE A:** The tank regiment organizations have remained constant during the divisional reorganizations; in each case, all battalions have 31 tanks. Unlike its tank division counterpart, the tank regiment of the KGB has no SSB.

**NOTE B:** Includes regimental combat vehicles not accounted for under the maneuver battalions or reconnaissance company.

**NOTE C:** Army-level ITRs are being eliminated under the Soviet Army reorganization; they may be replaced by independent motorized rifle regiments. 

Other Soviet Regiments

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<tr>
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<th>County</th>
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<th>Urban</th>
<th>Forested</th>
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<tbody>
<tr>
<td>Airborne Bn (CHD)</td>
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<td>587</td>
<td>492</td>
<td>610</td>
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<td>AFT Bn (Army)</td>
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<td>211</td>
<td>275</td>
<td>184</td>
<td>136</td>
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<td>AK Bn (Army)</td>
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<td>770</td>
<td>966</td>
<td>530</td>
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<td>625</td>
<td>547</td>
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<td>Artillery BN (Post-CRH)*</td>
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<td>416</td>
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<td>365</td>
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<td>Naval Infantry Regiment</td>
<td>726</td>
<td>564</td>
<td>622</td>
<td>611</td>
<td>790</td>
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**NOTE A:** KGB artillery regiments have three 152mm battalions, while the TB regiments have two.

**NOTE B:** Divisional and army rocket launcher battalions have been reduced from 18 launchers to 12. 

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APPENDIX I: Combat Potential Scores (CPs) For Selected Units (continued)

### SOVIET BATTALIONS

<table>
<thead>
<tr>
<th>Type</th>
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<th>Forested</th>
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<tr>
<td>MMD (BM-3)</td>
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<td>204</td>
<td>147</td>
<td>359</td>
<td>319</td>
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<tr>
<td>MMD(+) (BM-3, T-60)</td>
<td></td>
<td>169</td>
<td>266</td>
<td>420</td>
<td>377</td>
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<tr>
<td>MMD(+) (BM-3, T-64)</td>
<td></td>
<td>279</td>
<td>250</td>
<td>412</td>
<td>369</td>
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<tr>
<td>MMD(+) (BM-3, T-72)</td>
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<td>324</td>
<td>245</td>
<td>409</td>
<td>367</td>
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<td>MMD (BM-11)</td>
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<td>295</td>
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<td>MMD(+) (BM-1, T-62)</td>
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<td>372</td>
<td>331</td>
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<td>MMD(+) (BM-1, T-55)</td>
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<td>163</td>
<td>198</td>
<td>365</td>
<td>325</td>
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<tr>
<td>MMD (BTR-70)</td>
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<td>192</td>
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<tr>
<td>MMD(+) (BTR-70, T-60)</td>
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<td>MMD(+) (BTR-70, T-64)</td>
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<td>265</td>
<td>269</td>
<td>318</td>
<td>242</td>
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<tr>
<td>MMD(+) (BTR-70, T-72)</td>
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<td>200</td>
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<td>MMD (BTR-60)</td>
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<td>220</td>
<td>157</td>
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<tr>
<td>MMD(+) (BTR-60, T-62)</td>
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<td>205</td>
<td>158</td>
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<td>193</td>
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<tr>
<td>MMD(+) (BTR-60, T-55)</td>
<td></td>
<td>190</td>
<td>146</td>
<td>252</td>
<td>187</td>
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</tbody>
</table>

**NOTE a:** Post-CFP MMD's may have a recon platoon of three BMPs (add 10 to CPs).  
**NOTE b:** Includes attached tank company of four tanks.  
**NOTE c:** Includes mortar battery and automatic grenade launcher platoon. (BTR be also has AT battery.)

### Soviet Tank Battalions

<table>
<thead>
<tr>
<th>Type</th>
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<th>Forested</th>
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<tbody>
<tr>
<td>TD (60 T-60) (Div 00)</td>
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<td>250</td>
<td>238</td>
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<tr>
<td>TD (60 T-64) (Div 00)</td>
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<td>564</td>
<td>412</td>
<td>217</td>
<td>206</td>
</tr>
<tr>
<td>TD (60 T-72) (Div 00)</td>
<td></td>
<td>488</td>
<td>396</td>
<td>208</td>
<td>194</td>
</tr>
<tr>
<td>TD (60 T-62) (Div 00)</td>
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<td>264</td>
<td>299</td>
<td>150</td>
<td>150</td>
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<tr>
<td>TD (60 T-55) (Div 00)</td>
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<td>204</td>
<td>249</td>
<td>133</td>
<td>126</td>
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<tr>
<td>TD(+) (60 T-60) (Div 00)</td>
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<td>637</td>
<td>516</td>
<td>339</td>
<td>322</td>
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<td>TD(+) (60 T-72) (Div 00)</td>
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<td>TD(+) (60 T-62) (Div 00)</td>
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<td>239</td>
<td>226</td>
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<tr>
<td>TD(+) (60 T-55) (Div 00)</td>
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<td>352</td>
<td>264</td>
<td>214</td>
<td>202</td>
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<tr>
<td>TD (31 T-60) (Div 09 &amp; Post-CFP)</td>
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<td>456</td>
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<td>196</td>
<td>186</td>
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<tr>
<td>TD (31 T-64) (Div 09 &amp; Post-CFP)</td>
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<td>392</td>
<td>320</td>
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<td>161</td>
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<tr>
<td>TD (31 T-72) (Div 09 &amp; Post-CFP)</td>
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<td>376</td>
<td>307</td>
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<td>144</td>
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<tr>
<td>TD (31 T-62) (Div 09 &amp; Post-CFP)</td>
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<td>283</td>
<td>229</td>
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<td>116</td>
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<td>TD (31 T-55) (Div 09 &amp; Post-CFP)</td>
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<td>191</td>
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<td>99</td>
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CONTINUED
**APPENDIX 1: Combat Potential Scores (CPA) For Selected Units (continued)**

SOVIET BATTALIONS (continued)

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<th></th>
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<th>Desert</th>
<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
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<tbody>
<tr>
<td>TH (+) (31 T-80) (Div 89 &amp; P-CTB)</td>
<td>507</td>
<td>609</td>
<td>145</td>
<td>270</td>
<td>349</td>
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<td>TH (+) (31 T-64) (Div 89 &amp; P-CTB)</td>
<td>445</td>
<td>354</td>
<td>259</td>
<td>245</td>
<td>314</td>
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<td>TH (+) (31 T-721) (Div 89 &amp; P-CTB)</td>
<td>429</td>
<td>345</td>
<td>252</td>
<td>232</td>
<td>304</td>
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<td>TH (+) (31 T-63) (Div 89 &amp; P-CTB)</td>
<td>311</td>
<td>264</td>
<td>213</td>
<td>194</td>
<td>249</td>
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<tr>
<td>TH (+) (31 T-55) (Div 89 &amp; P-CTB)</td>
<td>285</td>
<td>226</td>
<td>185</td>
<td>175</td>
<td>225</td>
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</tbody>
</table>

Indep Tk Bn (51 T-80) | 740 | 606 | 311 | 216 | 391 |
Indep Tk Bn (51 T-64) | 638 | 523 | 268 | 255 | 337 |
Indep Tk Bn (51 T-721) | 612 | 502 | 257 | 243 | 324 |
Indep Tk Bn (51 T-63) | 459 | 376 | 193 | 184 | 263 |
Indep Tk Bn (51 T-55) | 383 | 314 | 161 | 153 | 202 |

**NOTE a:** Tank battalion reinforced with BMP company of 10 BMPs.

**NOTE b:** "Division 69" structure may include an ITH of 51 tanks. "Division 89" structure does not have an ITH; some "Post-CTB" divisions have an ITH of 31 tanks.

Other Soviet Maneuver Battalions

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<tbody>
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<td>Airborne Div (Inf Div)</td>
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<td>68</td>
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<td>63</td>
<td>217</td>
<td>178</td>
<td>215</td>
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<td>Para Bn (BATTLE Bde)</td>
<td>93</td>
<td>66</td>
<td>212</td>
<td>166</td>
<td>179</td>
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<tr>
<td>Indep BATTLE Div (Army)</td>
<td>102</td>
<td>71</td>
<td>228</td>
<td>193</td>
<td>214</td>
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<tbody>
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<td>Recon Bn (Div 69)</td>
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<td>Recon Bn (Div 89 and Post-CTB)</td>
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<td>94</td>
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<td>AV Bn (MD and Army AV Bde)</td>
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<td>AV Bn (Post-CTB)</td>
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<td>111</td>
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</thead>
<tbody>
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<td>AV SQN (Div 69)</td>
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<td>AV SQN (Army AV Bde)</td>
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<td>AV SQN (Army AV Bde)</td>
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Soviet Artillery Battalions

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<td>FA 152mm SP Bn (10 x 29)</td>
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<td>FA 152mm SP Bn (10 x 29)</td>
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<td>FA 203mm SP Bn (12 x 29)</td>
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<td>FA 233mm Bn</td>
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<td>FA 130mm Y Bn (34 x 30)</td>
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<td>161</td>
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<td>FA 130mm Y Bn (34 x 30)</td>
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<td>45</td>
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<td>95</td>
<td>120</td>
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<td>FA 152mm Y Bn (34 x 30)</td>
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<td>FA 140mm Y Bn (18 x 40)</td>
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<td>FA 140mm Y Bn (12 x 40)</td>
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<td>71</td>
<td>169</td>
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CONTINUED
### APPENDIX J: Combat Potential Scores (CPS) For Selected Units (continued)

#### SOVIET BATTALIONS (continued)

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<th>Mountain</th>
<th>Urban</th>
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<td>RVy 240m Btr Bn (12 x 254)</td>
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<tr>
<td>RL Br (Div) (18 x BM-21)</td>
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<td>RL Br (1st-COR) (13 x BM-21)</td>
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<td>113</td>
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<td>ZRK Br (Div 88) (6 x 55-31)</td>
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**Other Soviet Battalions**

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<thead>
<tr>
<th>Battalion</th>
<th>Rolling</th>
<th>Desert</th>
<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
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<td>Spetsnaz Br (Army)</td>
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<tr>
<td>Naval Infantry Br</td>
<td>105</td>
<td>77</td>
<td>187</td>
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<td>Tk Br (PI-76) (Naval Infantry)</td>
<td>167</td>
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#### SOVIET COMPANIES

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<tr>
<td>MRC (RMP-3)</td>
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<td>30</td>
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<td>44</td>
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<tr>
<td>MRC (+) (RMP-3, 3 T-60a)</td>
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<td>74</td>
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<td>MRC (+) (RMP-3, 3 T-64a)</td>
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<td>MRC (+) (RMP-3, 3 T-72a)</td>
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<td>68</td>
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**Motorized Rifle Companies**

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<td>MRC (+) (RNP-1, 3 T-62a)</td>
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<td>MRC (+) (RNP-1, 3 T-72a)</td>
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<td>51</td>
<td>56</td>
<td>53</td>
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**Soviet Airborne/Air Assault Companies**

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<td>Assatt Co (RMP)</td>
<td>26</td>
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<td>Pura Co (+) (100p MABT Br)</td>
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<td>Airborne Co (RMP)</td>
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**Soviet Tank Companies**

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<td>Tk Co (T-69)</td>
<td>145</td>
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<td>Tk Co (T-64)</td>
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<td>Tk Co (T-72)</td>
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<td>48</td>
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<td>Tk Co (T-62)</td>
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<tr>
<td>Tk Co (T-85)</td>
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<td>62</td>
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<td>Assatt Gun Co (100p Brv)</td>
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<td>45</td>
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### APPENDIX I: Combat Potential Scores (CPA For Selected Units) (continued)

#### SOVIET COMPANIES (continued)

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<td>Recon Co (Ro)</td>
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<td>Recon Co (Div Recon)</td>
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<td>45</td>
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<td>31</td>
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<tr>
<td>Recon Co (Post-CPE Div Recon)</td>
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<tr>
<td>Recon Lstt Co (Div Recon)</td>
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<td>30</td>
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<tr>
<td>Recon Co (RESF Div)</td>
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<td>18</td>
</tr>
<tr>
<td>Recon Co (Abt Div)</td>
<td>27</td>
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<td>33</td>
<td>23</td>
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</tbody>
</table>

| **Soviet Anti-tank Batteries** | | | | |
| AT Battery (AT-3) (Ro) | 44 | 36 | 47 | 48 |
| AT Battery (AT-5) (Ro) | 64 | 44 | 57 | 57 |
| AT Gun Btry (6 x T-12) | 15 | 13 | 17 | 7 |
| ATGM Battery (HEK AT Bn) | 49 | 44 | 57 | 57 |
| ATGM Btry (Post-CPE HEK AT Bn) | 61 | 55 | 72 | 24 |

| **Other** | | | | |
| L36m Htr Btry (M6-1) M1 | 19 | 15 | 52 | 28 |
| L36m Htr Btry (Post-CPE) | 14 | 11 | 13 | 21 |
| Spetznas Company | 19 | 13 | 47 | 45 |

#### SOVIET PLATOONS

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<tr>
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<td><strong>RED (RED-2)</strong></td>
<td>12</td>
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<td>10</td>
<td>19</td>
</tr>
<tr>
<td><strong>RED (RED-3)</strong></td>
<td>7</td>
<td>6</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td><strong>RED (RED-4)</strong></td>
<td>9</td>
<td>6</td>
<td>13</td>
<td>12</td>
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<tr>
<td><strong>RED (RED-5)</strong></td>
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<td>13</td>
<td>18</td>
<td>17</td>
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<tr>
<td><strong>RED (RED-6)</strong></td>
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<td>23</td>
<td>22</td>
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<tr>
<td><strong>RED (RED-7)</strong></td>
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<td>16</td>
<td>25</td>
<td>24</td>
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<tr>
<td><strong>RED (RED-8)</strong></td>
<td>21</td>
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<td>26</td>
<td>25</td>
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</table>

| **TR Flt (T-60)** | 44 | 16 | 18 | 17 |
| **TR Flt (T-64)** | 38 | 11 | 16 | 15 |
| **TR Flt (T-72)** | 37 | 10 | 15 | 14 |
| **TR Flt (T-62)** | 27 | 22 | 11 | 15 |
| **TR Flt (T-55)** | 23 | 10 | 9 | 13 |
| **ARM-17 Flt (HEK and RESF Div)** | 6 | 5 | 15 | 10 |
| **AT Flt (HEK AT Bty)** | 16 | 15 | 19 | 7 |

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APPENDIX I: Combat Potential Scores (CP$ for Selected Units (continued))

TABLE A-3: Iraqi Force Values

IRAQI DIVISIONS

<table>
<thead>
<tr>
<th>Divisions</th>
<th>Rolling</th>
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<th>Urban</th>
<th>Forested</th>
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<tbody>
<tr>
<td>Infantry Div</td>
<td>1.894</td>
<td>1.429</td>
<td>1.429</td>
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<td>2.876</td>
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<tr>
<td>Mechanized Div</td>
<td>3.916</td>
<td>3.049</td>
<td>5.372</td>
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<tr>
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<td>4.091</td>
<td>3.221</td>
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<td>1st Div (Rep Gd)</td>
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<td>5.714</td>
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<tr>
<td>Armored Div (Rep Gd)</td>
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<td>4.837</td>
<td>5.588</td>
<td>4.956</td>
<td>5.725</td>
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<tr>
<td>97 Division (Rep Gd)</td>
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<td>1.267</td>
<td>2.527</td>
<td>1.973</td>
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IRAQI BRIGADES/WINGS

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<tr>
<td>Infantry Bde</td>
<td>329</td>
<td>237</td>
<td>741</td>
<td>571</td>
<td>626</td>
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<tr>
<td>Mechanized Bde</td>
<td>1.003</td>
<td>770</td>
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<td>467</td>
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<td>Mechanized Bde (Rep Gd)</td>
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<td>Armored Bde (Rep Gd)</td>
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<td>Special Forces Bde</td>
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<td>721</td>
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<td>Mech Div Artillery</td>
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<td>Rocket Bde (Corps) (FM96-7)</td>
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<td>111</td>
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<td>Air Wing (Corps)</td>
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IRAQI BATTALIONS

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<td>Mechanized Dn</td>
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<td>330</td>
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<td>Armored Dn (35 T-62)</td>
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<tr>
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<td>Armored Dn (Rep Gd) (44 T-72)</td>
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<td>244</td>
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<td>Reconnaissance Dn (Corps)</td>
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APPENDIX 1: Combat Potential Scores (CPH) For Selected Units (continued)

IRAQI BATTALIONS (continued)

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<td>RB Bu: 105mm-21</td>
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<td>SF Bu</td>
<td>69</td>
<td>66</td>
<td>175</td>
<td>154</td>
<td>159</td>
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<td>Commando Bu</td>
<td>59</td>
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<td>130</td>
<td>134</td>
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<td>Art Del Sqdr (9 KEKH)</td>
<td>165</td>
<td>131</td>
<td>159</td>
<td>82</td>
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<td>Assault Del Sqdr (15 HIP)</td>
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### APPENDIX 1: Combat Potential Scores (CPU) For Selected Units (continued)

#### TABLE A-4: North Korean Force Values

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<tbody>
<tr>
<td>Infantry Corps</td>
<td>12,840</td>
<td>5,600</td>
<td>22,851</td>
<td>16,616</td>
<td>19,075</td>
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<tr>
<td>Infantry Corps (Res.)</td>
<td>8,047</td>
<td>4,435</td>
<td>16,752</td>
<td>10,728</td>
<td>12,270</td>
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<tr>
<td>Armor Corps (T-62, BTR-60)</td>
<td>6,042</td>
<td>4,414</td>
<td>5,163</td>
<td>3,984</td>
<td>5,255</td>
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<td>Armor Corps (T-62, BMP)</td>
<td>6,266</td>
<td>4,970</td>
<td>5,519</td>
<td>4,182</td>
<td>5,727</td>
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<tr>
<td>Armor Corps (T-72, BMP)</td>
<td>7,242</td>
<td>5,914</td>
<td>5,947</td>
<td>4,761</td>
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<td>Recon Inf Corps (T-62, BTR-60)</td>
<td>6,100</td>
<td>4,412</td>
<td>10,791</td>
<td>8,263</td>
<td>9,777</td>
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<td>Recon Inf Corps (T-62, BMP)</td>
<td>7,010</td>
<td>5,352</td>
<td>11,841</td>
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<td>11,259</td>
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<td>Recon Inf Corps (T-72, BMP)</td>
<td>7,596</td>
<td>5,420</td>
<td>12,675</td>
<td>9,684</td>
<td>12,559</td>
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<td>Artillery Corps</td>
<td>8,541</td>
<td>4,984</td>
<td>10,672</td>
<td>7,139</td>
<td>9,545</td>
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**NOTE:** It is doubtful that the North Korean units are equipped with T-72s or BMPs at this time.

#### NORTH KOREAN DIVISIONS

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<thead>
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<th>Desert</th>
<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
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<tr>
<td>Infantry Div</td>
<td>1,656</td>
<td>1,331</td>
<td>3,929</td>
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<td>Infantry Div (Tzk Mobile)</td>
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<td>1,282</td>
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<td>2,526</td>
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<td>Infantry Div (Res.)</td>
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<td>625</td>
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<td>1,497</td>
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<td>Rocket Luft Div (Arty Corps)</td>
<td>1,207</td>
<td>1,439</td>
<td>2,993</td>
<td>2,140</td>
<td>2,665</td>
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#### NORTH KOREAN REGIMENTS

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<th>Mountain</th>
<th>Urban</th>
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</thead>
<tbody>
<tr>
<td>Infantry Bde</td>
<td>1,183</td>
<td>1,166</td>
<td>993</td>
<td>903</td>
<td>1,355</td>
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<td>Armor Bde (T-62, BTR-60)</td>
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<td>1,147</td>
<td>1,003</td>
<td>902</td>
<td>1,173</td>
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<td>Armor Bde (T-62, BMP)</td>
<td>1,181</td>
<td>985</td>
<td>1,485</td>
<td>1,754</td>
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<td>1,447</td>
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**CONTINUED**
NORTH KOREAN REGIMENTS (continued)

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NORTH KOREAN BATTALIONS

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<td>49</td>
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<td>Light Infantry Bn</td>
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North Korean Infantry Battalions

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<td>Armor Bn (T-34)</td>
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<tr>
<td>Armor Bn (PT-76)</td>
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North Korean Artillery Battalions

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<td>FA Bn: 10 x 283</td>
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<td>FA Bn: 10 x 9-30</td>
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<td>FA Bn: 10 x 9-26</td>
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<td>Hœurter Bn: 10 x 120mm</td>
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<tr>
<td>KS Bn: 122mm-110</td>
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<td>KS Bn: 10 x 80-34</td>
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### APPENDIX I: Combat Potential Scores (CPS) for Selected Units (continued)

#### NORTH KOREAN COMPANIES

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<td>16</td>
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<tr>
<td>Lt Inf Co</td>
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<td>8</td>
<td>32</td>
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<tr>
<td>Inf Co (Truck-mobile)</td>
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<tr>
<td>Mech Inf Co (BTR-60)</td>
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<tr>
<td>Mech Inf Co (BMP)</td>
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<td>61</td>
<td>57</td>
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<tr>
<td>AT Co (6 x AT-2, 6 x 9M-3)</td>
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<td>48</td>
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#### NORTH KOREAN TANK COMPANIES

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</thead>
<tbody>
<tr>
<td>Tank Co (T-72)</td>
<td>120</td>
<td>98</td>
<td>50</td>
<td>48</td>
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<td>Tank Co (T-62)</td>
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<td>74</td>
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<tr>
<td>Tank Co (T-55)</td>
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<td>32</td>
<td>30</td>
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<td>Tank Co (T-34)</td>
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<td>Tank Co (PY-76)</td>
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#### NORTH KOREAN RECON COMPANIES

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<tbody>
<tr>
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<td>Recce Co (BTR Div)</td>
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<td>Recce Co (BMP Div)</td>
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<td>Recce Co (Tr Div)</td>
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<td>Mortar Co (9 x 82mm)</td>
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<td>Art Lchr Btry</td>
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### APPENDIX J: Combat Potential Scores (CPS) for Selected Units (continued)

**TABLE A-5: British Force Values**

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<th>BRITISH DIVISIONS</th>
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<th>Forested</th>
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<tbody>
<tr>
<td>Infantry Division</td>
<td>1.914</td>
<td>1.425</td>
<td>3.495</td>
<td>2.884</td>
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<tr>
<td>Armoured Division (2 Bdes)</td>
<td>1.967</td>
<td>1.243</td>
<td>3.410</td>
<td>2.423</td>
<td>3.024</td>
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<tr>
<td>Armoured Division (2 Bdes) (+)</td>
<td>4.567</td>
<td>1.710</td>
<td>6.261</td>
<td>2.946</td>
<td>3.741</td>
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<td>Artillery Division</td>
<td>732</td>
<td>556</td>
<td>452</td>
<td>590</td>
<td>791</td>
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**NOTE A:** British Armoured Divisions may have two or three brigades: brigades could be mechanized-heavy, tank-heavy or balanced.

**NOTE B:** The British 1st Armoured Division that deployed during Desert Storm had two brigades and was augmented with a corps-level reconnaissance regiment, a heavy artillery regiment with howitzers, and a another heavy artillery regiment with MLRS.

### BRITISH BRIGADES

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<th>BRITISH BATTALIONS/REGIMENTS</th>
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<th>Mountain</th>
<th>Urban</th>
<th>Forested</th>
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<tbody>
<tr>
<td>Armoured Brigade (Warrior)</td>
<td>2.159</td>
<td>1.770</td>
<td>1.560</td>
<td>1.187</td>
<td>1.550</td>
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<tr>
<td>Armoured Brigade (Chieftain)</td>
<td>1.507</td>
<td>1.396</td>
<td>1.561</td>
<td>1.088</td>
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<td>354</td>
<td>1.050</td>
<td>601</td>
<td>804</td>
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<td>Infantry Brigade (Motorized)</td>
<td>702</td>
<td>553</td>
<td>1.363</td>
<td>999</td>
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### BRITISH COMPANIES

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<td>166</td>
<td>85</td>
<td>81</td>
<td>107</td>
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<td>Tank Squadron (14 Chieftain)</td>
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<td>121</td>
<td>62</td>
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<td>leck Company (Warrior)</td>
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<td>leck Company (Chieftain)</td>
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APPENDIX I: Combat Potential Scores (CPA for Selected Units) (continued)

TABLE A-6: French Force Values*  
FRENCH DIVISIONS

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<td>2.904</td>
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<td>6th Lt Armored Div</td>
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FRENCH REGIMENTS

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<td>454</td>
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<td>Armored Regt</td>
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<td>559</td>
<td>374</td>
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<td>Recon Regt (In Div, Lt Ar Div)</td>
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FRENCH BATTALIONS/COMPANIES

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APPENDIX: Combat Potential Scores (CPM for Selected Units (continued))

TABLE A-7: German Force Values

GERMAN DIVISIONS

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<tr>
<td>Panzer Grenadier</td>
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GERMAN BRIGADES/REGIMENTS

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<tr>
<td>Panzer Grenadier</td>
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<td>Brigade</td>
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<td>315</td>
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GERMAN BATTALIONS

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<td>Panzergrenadier Br (IFV)</td>
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<td>Panzer Battalion (Lyo Z)</td>
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<td>Panzer Battalion (W-44St)</td>
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<td>Artillery Br (Pz heavy)</td>
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<td>Airborne Battalion</td>
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<td>51</td>
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<td>Jaeger Battalion</td>
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<td>Security Battalion</td>
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<td>439</td>
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<td>Recon Battalion (Hrd)</td>
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GERMAN COMPANIES

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<th>Forested</th>
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<td>AT Co (Hrd)</td>
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<td>76</td>
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<td>44</td>
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### TABLE A-8: South Korean Force Values

#### SOUTH KOREAN DIVISIONS

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<th>Urban</th>
<th>Forested</th>
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<td>4,506</td>
<td>8,342</td>
<td>6,786</td>
<td>8,466</td>
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<td>1,233</td>
<td>1,243</td>
<td>2,521</td>
<td>2,810</td>
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<tr>
<td>Infantry Division (K-4845)</td>
<td>1,660</td>
<td>1,245</td>
<td>3,190</td>
<td>2,470</td>
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<td>1,200</td>
<td>1,775</td>
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<td>1,156</td>
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#### SOUTH KOREAN BRIGADES

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<td>1,416</td>
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<td>914</td>
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<td>Mechanized Brigade</td>
<td>1,215</td>
<td>863</td>
<td>2,105</td>
<td>1,425</td>
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<tr>
<td>Artillery Brigade (Corps)</td>
<td>232</td>
<td>170</td>
<td>513</td>
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#### SOUTH KOREAN REGIMENTS

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<td>758</td>
<td>597</td>
<td>630</td>
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<tr>
<td>Artillery Rgt (Mech Div)</td>
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<td>228</td>
<td>690</td>
<td>448</td>
<td>598</td>
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<tr>
<td>Artillery Rgt (Inf Div)</td>
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<td>177</td>
<td>535</td>
<td>346</td>
<td>465</td>
</tr>
<tr>
<td>Recon Rgt (Corps)</td>
<td>322</td>
<td>233</td>
<td>758</td>
<td>597</td>
<td>630</td>
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#### Battalions

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<th>Forested</th>
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<td>Armored (36 E-1)</td>
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<td>356</td>
<td>141</td>
<td>173</td>
<td>229</td>
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<tr>
<td>Armored (36 H-4845)</td>
<td>368</td>
<td>286</td>
<td>136</td>
<td>150</td>
<td>171</td>
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<tr>
<td>Armored (36 H-4843)</td>
<td>270</td>
<td>221</td>
<td>113</td>
<td>108</td>
<td>143</td>
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<tr>
<td>Armored (36 H-47)</td>
<td>236</td>
<td>177</td>
<td>91</td>
<td>86</td>
<td>114</td>
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<tr>
<td>Mechanized (Motorized)</td>
<td>243</td>
<td>160</td>
<td>441</td>
<td>365</td>
<td>447</td>
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<tr>
<td>Infantry</td>
<td>74</td>
<td>53</td>
<td>177</td>
<td>143</td>
<td>150</td>
</tr>
<tr>
<td>Recon Rgt (Mech Div)</td>
<td>44</td>
<td>67</td>
<td>158</td>
<td>95</td>
<td>117</td>
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<tr>
<td>Recon Rgt (Inf Div)</td>
<td>75</td>
<td>48</td>
<td>116</td>
<td>180</td>
<td>183</td>
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<tr>
<td>Artillery (8&quot; 9)</td>
<td>67</td>
<td>51</td>
<td>155</td>
<td>101</td>
<td>115</td>
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<tr>
<td>Artillery (155mm)</td>
<td>63</td>
<td>49</td>
<td>144</td>
<td>96</td>
<td>116</td>
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<td>Artillery (155 59)</td>
<td>74</td>
<td>57</td>
<td>172</td>
<td>112</td>
<td>150</td>
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<tr>
<td>Artillery (155 77)</td>
<td>59</td>
<td>45</td>
<td>130</td>
<td>90</td>
<td>120</td>
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<td>Artillery (105 7)</td>
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<td>40</td>
<td>121</td>
<td>78</td>
<td>105</td>
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<tr>
<td>AT Rgt (Corps) (127 85)</td>
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<td>90</td>
<td>110</td>
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<td>58</td>
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<tr>
<td>AR Rgt (Corps) (112 95-500)</td>
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<td>115</td>
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## APPENDIX I: Combat Potential Scores (CPS) for Selected Units (continued)

### SOUTH KOREAN COMPANIES

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<th>Urban</th>
<th>Forested</th>
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</thead>
<tbody>
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<td>132</td>
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<td>53</td>
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<td>Tank Company (11 H-4015)</td>
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<td>60</td>
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<td>54</td>
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<td>12</td>
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<td>124</td>
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<tr>
<td>Infantry Company</td>
<td>18</td>
<td>12</td>
<td>46</td>
<td>01</td>
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</tbody>
</table>
APPENDIX 1: Weapon Value (VV) Tables*

INSTRUCTIONS: The unit Combat Power Scores (CPS) in Appendix 1 were calculated using the Weapon Values (VV) and Category Weights (CW) in this appendix. This study can be employed without referring to this appendix; however, the tables are included in case the reader must generate a CPS for a unique unit, or in case the reader chooses to alter the numbers based upon a disagreement with the figures used in this study. The methodology is shown in the following calculation. In this example, the CPS for a US tank-heavy brigade (M-1A1 and M-2, in rolling terrain) with US artillery is determined.

Tank-heavy Brigade CPS (Rolling Terrain)

<table>
<thead>
<tr>
<th>Weapon System</th>
<th>Quantity</th>
<th>VV</th>
<th>Category Weight</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1 Tank</td>
<td>116</td>
<td>1.50</td>
<td>10.00</td>
<td>1,740</td>
</tr>
<tr>
<td>M-2 IFV</td>
<td>54</td>
<td>1.30</td>
<td>4.02</td>
<td>282</td>
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<tr>
<td>M-1 CTV</td>
<td>18</td>
<td>1.30</td>
<td>2.96</td>
<td>69</td>
</tr>
<tr>
<td>H-113</td>
<td>28</td>
<td>.50</td>
<td>2.76</td>
<td>39</td>
</tr>
<tr>
<td>M-901 IFV</td>
<td>18</td>
<td>1.15</td>
<td>4.56</td>
<td>103</td>
</tr>
<tr>
<td>105mm Mortar (SP)</td>
<td>18</td>
<td>1.10</td>
<td>3.10</td>
<td>57</td>
</tr>
<tr>
<td>H-109 155mm (SP)</td>
<td>24</td>
<td>1.00</td>
<td>4.18</td>
<td>99</td>
</tr>
</tbody>
</table>

Brigade CPS = 2,389

The following calculations show the alterations that would be required if a tank-heavy brigade were equipped with the M-1A1, under desert conditions.

Tank-heavy Brigade CPS (Desert Terrain)

<table>
<thead>
<tr>
<th>Weapon System</th>
<th>Quantity</th>
<th>VV</th>
<th>Category Weight</th>
<th>Subtotal</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1 Tank</td>
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<td>1.50</td>
<td>10.00</td>
<td>1,476</td>
</tr>
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<td>M-2 IFV</td>
<td>54</td>
<td>1.30</td>
<td>2.89</td>
<td>201</td>
</tr>
<tr>
<td>M-1 CTV</td>
<td>18</td>
<td>1.30</td>
<td>2.70</td>
<td>54</td>
</tr>
<tr>
<td>H-113</td>
<td>28</td>
<td>.50</td>
<td>1.95</td>
<td>27</td>
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<tr>
<td>M-901 IFV</td>
<td>18</td>
<td>1.15</td>
<td>4.62</td>
<td>91</td>
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<tr>
<td>105mm Mortar (SP)</td>
<td>18</td>
<td>1.10</td>
<td>2.15</td>
<td>43</td>
</tr>
<tr>
<td>H-109 155mm (SP)</td>
<td>24</td>
<td>1.00</td>
<td>3.16</td>
<td>75</td>
</tr>
</tbody>
</table>

Brigade CPS = 1,967

Calculations such as those above could be simplified by multiplying a weapon system's quantity by its Individual System Value (ISV), which is simply \((VV \times CW)\); these totals are also included in the attached tables. The ISV is particularly useful to update a unit's CPS after attrition; for example, if the brigade in the first example lost five tanks (ISV = 15.00 from the table), its new CPS would be: \(2,389 - (5 \times 15.00) = 2,314\).
### APPENDIX B: Weapon Values (VV) Tables (continued)

#### TABLE P-1: Tanks

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<td>M-1</td>
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<td>Leopard 2</td>
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<td>15.00</td>
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<td>6.00</td>
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<td>5.00</td>
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<td>9.43</td>
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#### TABLE P-2: Armored Personnel Carriers

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<tr>
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### APPENDIX C: Weapon Value (VW) Tables (continued)

#### TABLE C-3: Infantry Fighting Vehicles

<table>
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<tr>
<th>VW</th>
<th>(Rolling)</th>
<th>(Desert)</th>
<th>(Mountain)</th>
<th>(Urban)</th>
<th>(Forested)</th>
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<tr>
<td></td>
<td>CY=4.82</td>
<td>CY=4.83</td>
<td>CY=5.77</td>
<td>CY=6.35</td>
<td>CY=7.83</td>
</tr>
<tr>
<td>H-2 Bradley</td>
<td>1.30</td>
<td>5.23</td>
<td>3.76</td>
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<td>8.26</td>
</tr>
<tr>
<td>Warrior</td>
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<td>3.12</td>
<td>7.79</td>
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<td>Diesel</td>
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<td>3.32</td>
<td>7.79</td>
<td>7.30</td>
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<tr>
<td>K-200</td>
<td>1.00</td>
<td>4.02</td>
<td>2.89</td>
<td>6.77</td>
<td>6.35</td>
</tr>
<tr>
<td>Marin</td>
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<td>4.02</td>
<td>2.89</td>
<td>6.77</td>
<td>6.35</td>
</tr>
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</tr>
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<td>5.08</td>
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</tr>
<tr>
<td>TPF-765</td>
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<td>3.02</td>
<td>2.17</td>
<td>5.08</td>
<td>4.76</td>
</tr>
</tbody>
</table>

| MP-2 | 1.10 | 4.42 | 3.10 | 7.45 | 6.99 | 3.61 |
| MP-1 | 1.00 | 4.02 | 2.89 | 6.77 | 6.35 | 7.83 |
| NER | 0.65 | 3.61 | 1.48 | 4.40 | 4.13 | 5.09 |

#### TABLE C-4: Anti-Tank Weapons

<table>
<thead>
<tr>
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<th>(Desert)</th>
<th>(Mountain)</th>
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<th>(Forested)</th>
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<tbody>
<tr>
<td></td>
<td>CY=4.96</td>
<td>CY=4.83</td>
<td>CY=5.16</td>
<td>CY=6.18</td>
<td>CY=7.85</td>
</tr>
<tr>
<td>ITT</td>
<td>1.15</td>
<td>5.70</td>
<td>5.08</td>
<td>6.62</td>
<td>2.51</td>
</tr>
<tr>
<td>Jpcv TOW</td>
<td>1.10</td>
<td>5.46</td>
<td>4.86</td>
<td>6.34</td>
<td>2.40</td>
</tr>
<tr>
<td>Swingfire</td>
<td>1.10</td>
<td>5.46</td>
<td>4.86</td>
<td>6.34</td>
<td>2.40</td>
</tr>
<tr>
<td>TOW/APC, HMT/APC</td>
<td>1.00</td>
<td>4.96</td>
<td>4.42</td>
<td>5.76</td>
<td>2.28</td>
</tr>
<tr>
<td>HOT/Jav</td>
<td>0.85</td>
<td>4.22</td>
<td>3.76</td>
<td>4.90</td>
<td>1.45</td>
</tr>
<tr>
<td>TOW/Jep</td>
<td>0.85</td>
<td>4.22</td>
<td>3.76</td>
<td>4.90</td>
<td>1.45</td>
</tr>
<tr>
<td>SU-11/Jav</td>
<td>0.80</td>
<td>3.97</td>
<td>3.54</td>
<td>4.61</td>
<td>1.74</td>
</tr>
<tr>
<td>HOT/Jep</td>
<td>0.75</td>
<td>3.72</td>
<td>3.32</td>
<td>4.32</td>
<td>1.64</td>
</tr>
<tr>
<td>Milga/Jep, Hmt/Jep</td>
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<td>2.73</td>
<td>2.43</td>
<td>3.17</td>
<td>1.20</td>
</tr>
<tr>
<td>Milga/Bst</td>
<td>0.60</td>
<td>1.98</td>
<td>1.77</td>
<td>2.30</td>
<td>0.87</td>
</tr>
<tr>
<td>T60mm/Jep</td>
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<td>1.98</td>
<td>1.77</td>
<td>2.30</td>
<td>0.87</td>
</tr>
<tr>
<td>Dragon: 20cm RR</td>
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<td>0.99</td>
<td>0.80</td>
<td>1.15</td>
<td>0.64</td>
</tr>
<tr>
<td>BHK/AT-5</td>
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<td>5.46</td>
<td>4.86</td>
<td>6.34</td>
<td>2.40</td>
</tr>
<tr>
<td>BHK/AT-1</td>
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<td>5.46</td>
<td>3.90</td>
<td>5.10</td>
<td>1.96</td>
</tr>
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<td>BHK/AT-2</td>
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<td>4.97</td>
<td>3.54</td>
<td>6.46</td>
<td>1.74</td>
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<tr>
<td>AT-1/Jep</td>
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<td>2.98</td>
<td>2.65</td>
<td>3.46</td>
<td>1.31</td>
</tr>
<tr>
<td>AT-1 Bst</td>
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<td>2.98</td>
<td>2.65</td>
<td>3.46</td>
<td>1.31</td>
</tr>
<tr>
<td>T-12 100mm</td>
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<tr>
<td>D31 H1944 100mm</td>
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<td>1.77</td>
<td>2.30</td>
<td>0.87</td>
</tr>
<tr>
<td>D-11 107mm RR</td>
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<td>1.77</td>
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<td>0.87</td>
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<tr>
<td>AT-4</td>
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<td>1.77</td>
<td>2.30</td>
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<td>S6-9 75mm</td>
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<td>1.24</td>
<td>1.11</td>
<td>1.64</td>
<td>0.55</td>
</tr>
<tr>
<td>D10 42mm</td>
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<td>0.99</td>
<td>0.84</td>
<td>1.15</td>
<td>0.44</td>
</tr>
<tr>
<td>D64 65mm</td>
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<td>0.99</td>
<td>0.84</td>
<td>1.15</td>
<td>0.44</td>
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### APPENDIX 2: Weapon Value (VV) Tables (continued)

#### TABLE D-5: Armored Reconnaissance Vehicles

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<th>Type</th>
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<th>(Mountain) CT=1.10</th>
<th>(Urban) CT=1.10</th>
<th>(Forest) CT=1.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>M-1 Bradley</td>
<td>1.30</td>
<td>3.15</td>
<td>2.99</td>
<td>4.70</td>
<td>3.23</td>
</tr>
<tr>
<td>LEX-109C</td>
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<td>3.26</td>
<td>2.53</td>
<td>4.05</td>
<td>2.77</td>
</tr>
<tr>
<td>Scorpion. Scimitar. ERC-90</td>
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<td>2.96</td>
<td>2.30</td>
<td>1.64</td>
<td>2.52</td>
</tr>
<tr>
<td>Luchs. YBC 90</td>
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<td>2.96</td>
<td>2.30</td>
<td>1.64</td>
<td>2.52</td>
</tr>
<tr>
<td>Grizzly.AEL.SPZ.KILLER.BTR</td>
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<td>2.37</td>
<td>1.44</td>
<td>2.94</td>
<td>2.02</td>
</tr>
<tr>
<td>Fox.Conor.Lynx.H-113</td>
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<td>1.78</td>
<td>1.34</td>
<td>2.21</td>
<td>1.51</td>
</tr>
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<td>Ferret. RKNV</td>
<td>.60</td>
<td>1.18</td>
<td>.92</td>
<td>1.47</td>
<td>1.01</td>
</tr>
<tr>
<td>Jeep</td>
<td>.30</td>
<td>.49</td>
<td>.69</td>
<td>.90</td>
<td>.76</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>(Rolling) CT=1.65</th>
<th>(Desert) CT=1.65</th>
<th>(Mountain) CT=1.65</th>
<th>(Urban) CT=1.65</th>
<th>(Forest) CT=1.65</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A</td>
<td>1.10</td>
<td>6.25</td>
<td>1.99</td>
<td>15.50</td>
<td>15.08</td>
</tr>
<tr>
<td>Type B</td>
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<td>5.11</td>
<td>3.27</td>
<td>12.74</td>
<td>12.34</td>
</tr>
<tr>
<td>Type C</td>
<td>.80</td>
<td>4.54</td>
<td>2.90</td>
<td>11.33</td>
<td>10.97</td>
</tr>
<tr>
<td>Type D</td>
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<td>2.18</td>
<td>8.50</td>
<td>8.23</td>
</tr>
<tr>
<td>Type E</td>
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<td>1.09</td>
<td>4.25</td>
<td>4.11</td>
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#### TABLE D-6: Light Infantry Platoons

<table>
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<th>(Desert) CT=1.65</th>
<th>(Mountain) CT=1.65</th>
<th>(Urban) CT=1.65</th>
<th>(Forest) CT=1.65</th>
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<tbody>
<tr>
<td>Type A</td>
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<td>7.18</td>
<td>7.72</td>
<td>18.41</td>
<td>17.62</td>
</tr>
<tr>
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<td>6.25</td>
<td>1.99</td>
<td>15.50</td>
<td>15.08</td>
</tr>
<tr>
<td>Type C</td>
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<td>5.44</td>
<td>2.90</td>
<td>14.16</td>
<td>13.71</td>
</tr>
<tr>
<td>Type D</td>
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<td>4.54</td>
<td>2.18</td>
<td>11.33</td>
<td>10.97</td>
</tr>
<tr>
<td>Type E</td>
<td>.50</td>
<td>1.70</td>
<td>1.09</td>
<td>4.25</td>
<td>4.11</td>
</tr>
</tbody>
</table>

**Type A**: approx. 35 troops. Light and medium AT weapons. no vision devices.

**Type B**: approx. 35 troops. Light and medium AT weapons.

**Type C**: approx. 35 troops. Light AT weapons.

**Type D**: approx. 35 troops. no AT weapons.

**Type E**: platoon-sized group of non-infantry soldiers.

---

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### APPENDIX 2: Weapon Value (WV) Tables (continued)

<table>
<thead>
<tr>
<th>FT</th>
<th>(Rolling)</th>
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<th>(Mountain)</th>
<th>(Urban)</th>
<th>(Forest)</th>
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<tbody>
<tr>
<td></td>
<td>CP=1:12</td>
<td>CP=1:14</td>
<td>CP=1:15</td>
<td>CP=1:24</td>
<td>CP=1:14</td>
</tr>
<tr>
<td>AK-64</td>
<td>1.30</td>
<td>21.72</td>
<td>17.15</td>
<td>20.45</td>
<td>10.71</td>
</tr>
<tr>
<td>AK-1</td>
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<td>16.71</td>
<td>13.19</td>
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</tr>
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<td>FAL-1-Gazelle-Dashin</td>
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<td>12.53</td>
<td>9.89</td>
<td>12.03</td>
<td>3.06</td>
</tr>
<tr>
<td>Lynx-Alliance</td>
<td>0.75</td>
<td>12.53</td>
<td>9.89</td>
<td>12.03</td>
<td>3.06</td>
</tr>
<tr>
<td>M-1600</td>
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<td>10.03</td>
<td>7.51</td>
<td>9.62</td>
<td>3.94</td>
</tr>
<tr>
<td>HI-26 HAPOC</td>
<td>1.20</td>
<td>20.05</td>
<td>15.63</td>
<td>19.25</td>
<td>9.49</td>
</tr>
<tr>
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<td>14.30</td>
<td>14.51</td>
<td>17.64</td>
<td>9.06</td>
</tr>
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<td>12.53</td>
<td>9.89</td>
<td>12.03</td>
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<td>HI-2 HOPlite</td>
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<td>8.16</td>
<td>6.60</td>
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</table>

### TABLE B-4: Artillery

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<th>(Mountain)</th>
<th>(Urban)</th>
<th>(Forest)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CP=1:12</td>
<td>CP=1:14</td>
<td>CP=1:15</td>
<td>CP=1:24</td>
<td>CP=1:14</td>
</tr>
<tr>
<td>4&quot; SP</td>
<td>1.15</td>
<td>4.75</td>
<td>3.61</td>
<td>11.32</td>
<td>7.15</td>
</tr>
<tr>
<td>155mm SP</td>
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<td>4.13</td>
<td>3.34</td>
<td>9.58</td>
<td>3.22</td>
</tr>
<tr>
<td>8&quot; T</td>
<td>0.95</td>
<td>3.72</td>
<td>2.63</td>
<td>6.62</td>
<td>5.00</td>
</tr>
<tr>
<td>155mm T. Abbott 105mm SP</td>
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<td>3.30</td>
<td>2.51</td>
<td>7.66</td>
<td>4.98</td>
</tr>
<tr>
<td>105mm T</td>
<td>0.70</td>
<td>2.49</td>
<td>2.20</td>
<td>6.71</td>
<td>4.35</td>
</tr>
<tr>
<td>4&quot; 19 AGS</td>
<td>0.25</td>
<td>1.07</td>
<td>0.82</td>
<td>2.49</td>
<td>1.61</td>
</tr>
<tr>
<td>257/203mm SP (1975)</td>
<td>1.20</td>
<td>4.56</td>
<td>3.77</td>
<td>11.50</td>
<td>7.46</td>
</tr>
<tr>
<td>365/152mm SP (1961)</td>
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<td>4.13</td>
<td>3.34</td>
<td>9.58</td>
<td>3.22</td>
</tr>
<tr>
<td>283/152mm SP (1973)</td>
<td>0.95</td>
<td>3.72</td>
<td>2.63</td>
<td>6.62</td>
<td>5.00</td>
</tr>
<tr>
<td>281/122mm SP (1974)</td>
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<td>3.51</td>
<td>2.67</td>
<td>6.14</td>
<td>5.29</td>
</tr>
<tr>
<td>259/120mm SP</td>
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<td>3.10</td>
<td>2.36</td>
<td>7.19</td>
<td>4.67</td>
</tr>
<tr>
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<td>4.13</td>
<td>3.14</td>
<td>9.58</td>
<td>4.35</td>
</tr>
<tr>
<td>259/120mm T</td>
<td>0.80</td>
<td>3.30</td>
<td>2.51</td>
<td>7.66</td>
<td>4.98</td>
</tr>
<tr>
<td>238/152mm T (1976)</td>
<td>1.15</td>
<td>4.75</td>
<td>3.61</td>
<td>11.32</td>
<td>7.15</td>
</tr>
<tr>
<td>261/152mm T (1943)</td>
<td>0.70</td>
<td>2.49</td>
<td>2.20</td>
<td>6.71</td>
<td>4.98</td>
</tr>
<tr>
<td>8-6 130mm T</td>
<td>0.70</td>
<td>2.49</td>
<td>2.20</td>
<td>6.71</td>
<td>4.98</td>
</tr>
<tr>
<td>8-76 132mm T</td>
<td>0.70</td>
<td>2.49</td>
<td>2.20</td>
<td>6.71</td>
<td>4.98</td>
</tr>
<tr>
<td>8-30 132mm T</td>
<td>0.75</td>
<td>3.10</td>
<td>2.36</td>
<td>7.19</td>
<td>4.67</td>
</tr>
<tr>
<td>8-30 132mm H (1938)</td>
<td>0.65</td>
<td>2.68</td>
<td>2.04</td>
<td>6.23</td>
<td>4.04</td>
</tr>
<tr>
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<td>1.26</td>
<td>3.83</td>
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<td>210/3 76mm T (1932)</td>
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<td>1.45</td>
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</tr>
<tr>
<td>165/17 AGS</td>
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<td>1.07</td>
<td>0.82</td>
<td>2.49</td>
<td>1.61</td>
</tr>
</tbody>
</table>

**Note:** Automatic grenade launchers belong in a separate category; however, a category of this type was not included in the original survey. They are included under the "Artillery" category for convenience; the Weapon Value of .26 was determined by comparing Dupuy's Operational Lethality Index for an automatic grenade launcher (58) to his OLI for an M-109 howitzer (223).
### APPENDIX B: Weapon Value (WV) Tables (continued)

#### Table B-9: Bacteria

<table>
<thead>
<tr>
<th>WV</th>
<th>NDV</th>
<th>DV</th>
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<th>CD-2</th>
<th>CD-3</th>
<th>CD-4</th>
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<td>4.2&quot;/APC, KRX 120</td>
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<td>3.15</td>
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<td>1.08</td>
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<td>1.10</td>
<td>3.15</td>
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<td>2V 82mm/10000</td>
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<td>2.06</td>
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#### Table B-10: Multiple Rocket Launchers and Surface-to-Surface Missiles

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<td>12.06</td>
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<td>9.45</td>
<td>7.19</td>
<td>6.82</td>
<td>6.31</td>
<td>6.44</td>
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<tr>
<td>BR-16</td>
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<td>9.45</td>
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<td>6.76</td>
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<td>6.82</td>
<td>6.31</td>
<td>6.44</td>
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<tr>
<td>BR-14 (M26)</td>
<td>.60</td>
<td>8.10</td>
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<td>7.56</td>
<td>5.41</td>
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<td>6.69</td>
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<td>8.10</td>
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<td>1.00</td>
<td>11.50</td>
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<td>25.10</td>
<td>18.02</td>
<td>24.12</td>
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</table>


6For example, a realistic game situation might be the destruction of a key bridge over a major route. This event may or may not occur during the actual operation.

7The 3:1 ratio is a matter of dispute. On the one hand, it has been cited as a reasonably accurate "rule of thumb" by numerous sources: see B. H. Liddell Hart in *The German Generals Talk* (New York: Quill, 1979), 216; John J. Nearsheimer "Why The Soviets Can't Win Quickly in Central Europe" in *Conventional Forces and American Defense Policy* ed. Steven E. Miller (Princeton, NJ: Princeton University Press, 1986), 133; US Army Command and General Staff College *ST 100-9 Techniques and Procedures for Tactical Decisionmaking* (Fort Leavenworth, KS: USACGSC, 1991), page 4-2 (which states that a battalion in the defense should be able to defeat a regiment). Others, however, argue either that the accepted ratio underestimates the defender's advantage (see discussion in Liddell Hart, cited above) or overestimates it. For a thorough appreciation of the arguments concerning the validity of the 3:1 ratio, see the debate between Nearsheimer and Joshua Epstein that appeared in the Spring 1988 and Spring 1989 issues of *International Security*.

8Weiss, 23-24. See also Charles Grant, *The War Game* (New York, NY: St. Martin's Press, 1971), 13, for a brief historical summary of war gaming from ancient China and India, through the nineteenth-century Prussian General Staff, to the present day.

9A 1975 GAO report identified over 450 models then being used by the Department of Defense alone. Callahan, 5.

Epstein, 2.

Ibid.

Despite the plethora of equations in Dupuy’s works, at any point it is unclear (1) Which numbers are being used? or (2) Where did the numbers come from? The reader can seldom confirm that Dupuy’s values were actually calculated with the equations he so painstakingly develops.


Ibid., 50-51 and 185-207.


ST 100-9 Techniques and Procedures for Tactical Decisionmaking, page 3-2.

Epstein, 21-25.

Ibid., 4-13.


Ibid., 156-170.


Elaine Simmons, "Description of DEF Methodology," unpublished briefing memorandum, nd.
Tanks, for example, were divided into three generations: "old" (VEI = .85); "current" (VEI = 1.00); and "new" (VEI = 1.25).


Dwight Raymond, Terrain-Dependent Division Equivalents: A Methodology for Calculating Strengths of Land Forces (unpublished master's thesis for the University of Maryland School of Public Affairs, 1987).

The "Delphi technique" is a method to "quantify the unquantifiable". It bases its measurements upon a survey of subject matter experts who are asked to estimate such measurements. For example, a sample of experts might be asked "What are the chances of a nuclear war before the year 2000?"

Raymond, 15-16 and 19. Since the survey generated 127 histograms, these will not be reproduced here. The following histograms, however, are representative of the patterns that appeared (pages D-1 through D-10 and F-1 through F-5):

```

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<td>5:1</td>
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<td>1:1  <em><strong><strong><strong>/</strong></strong></strong></em>**</td>
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<td>1:1  *****<strong>/</strong>*******</td>
</tr>
</tbody>
</table>

IPVs: Tanks
(Neiling)
2.49 IPVs = 1 Tank

IPVs: Tanks
(Forrested)
1 IPV = 1.44 Tanks

IPVs: Tanks
(Mountaintous)
1 IPV = 1.61 Tanks

* = 1 Count
0 = Chronic Outlier (based upon pattern of responses--removed from data base)
**Ibid.**, 21. The category weights in the OSD/University of Maryland study used 59.5 as the baseline value for a tank in rolling terrain, to be consistent with the WEI/WUV category weights. In this study, 10.00 is used; consequently, while the relative values of the different category weights are the same, the absolute values when comparing the two sets are different.

**31** *ST 100-9 Techniques and Procedures for Tactical Decisionmaking*, page 4-1.

**32** These methods are not to be confused with the "avenue-in-depth," "belt," and "box" techniques described in *ST 100-9*, pages 4-2 and 4-3.


**34** See note 6.

**35** See, for example, Chapter 2 "Combat Service Support Planning and Consumption Data" in Command and General Staff College, *ST 101-6 G-4 Battle Book* (Fort Leavenworth, KS: USACGSC, 1991), pages 2-1 and 2-5. This source contains the following attrition rates:

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<th>Equipment</th>
<th>Percent Losses of Equipment and Personnel</th>
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<td></td>
<td><strong>1st Day</strong></td>
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<tr>
<td>Tank</td>
<td>20</td>
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<tr>
<td>APC</td>
<td>20</td>
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<td>155mm How</td>
<td>10</td>
</tr>
<tr>
<td>81mm How</td>
<td>10</td>
</tr>
<tr>
<td>30mm How</td>
<td>30</td>
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<tr>
<td>Division Troops</td>
<td>3.5</td>
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<tr>
<td>Corps Troops</td>
<td>.7</td>
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</table>

*Use a loss rate of 17.4% for the actual units in the covering force.

**36** *ST 100-9 Techniques and Procedures for Tactical Decisionmaking*, page 3-3.

**37** Organizational data used to calculate the figures in this section were obtained primarily from Command and General Staff College, *ST 100-3 Battle Book* (Fort Leavenworth, KS: USACGSC, 1991) and *ST 101-1 Organizational and Tactical Reference Data for the Army in the Field* (1987).


40 Ibid.

41 Ibid., 15.


46 MRB mortar batteries are being reduced from eight to six mortars. "Soviet Army Restructuring Update," 15.

47 Organizational data used in this section are based primarily upon The S-3, 177th Armored Brigade, *NTC Handbook 100-91 The Iraqi Army: Organization and Tactics* (Fort Irwin, CA: National Training Center, 1991) and upon Frank Chadwick, *Desert Shield Fact Book* (Bloomington, IL: Game Designer's Workshop, 1991).

48 Organizational data used in this section are from Battle Command Training Program, *North Korean Peoples Army Order of Battle* (Fort Leavenworth, KS: USABCTP, 1991).

49 Corps organization is as follows (Ibid.):

- Infantry Corps: 6 Inf Div; 1 Track-mobile Div; 1 Ar Div; 1 Lt Inf Div; 1 Sniper Div; 1 Arty Bde; 1 Bkt Lchr Bde.
- Reserve Corps: 6 Arty Div; 1 Arty Bde; 1 Gun Div; 1 Bkt Lchr Bde.
- Armor Corps: 4 Ar Div; 1 Arty Bde.
- Mech Inf Corps: 6 Mech Bde; 1 Arty Bde.
Division structures are as follows *(Ibid.)*:

Infantry Division: 3 Inf Regts; 1 Arty Regt; 1 Btr Bn; 1 AF Bn; 1 Lt Inf Bn; 1 Rcn Co.
Inf Div (Ftr-mobile): Same, but with no Lt Inf Bn.
Infantry Division (Reserve): 3 Regts; 1 Arty Regt; 1 AF Bn; 1 Rcn Co.
Rocket Launcher Division: 3 Btr Lahr Divs (total 100 BR-24s, 116 BR-21s).

51The figures in this section are based upon organizational data in David C. Isby and Charlse Kamps, Jr., *Armies of NATO's Central Front* (London: Jane's Publishing Company Limited, 1985), 245-258 and Chadwick, 22.

52Isby and Kamps, 250.

53Chadwick, 22.

54Figures based upon Isby and Camps, 118-130.


56I am indebted to Lieutenant Colonel Cho Chung Kun and Major Jang Kyung Wook for providing the organizational data used to develop the figures in this section.

57The Weapon Values (WV) used in these tables are the author's estimates based primarily upon the original Concepts Analysis Agency (CIA/CIA) study. This study, eventually declassified, was periodically updated; the latest of these, however, remain classified and, in any event, the updates are no longer published by CIA. For the WV's assigned to newer weapons systems, the author's estimates were based upon: an analysis of the capabilities of these systems; the Operational Lethality Indices Dupuy's *How to Defeat Saddam Hussein*, pages 156-170; and the judgements of the author as well as other Army officers. Users of this study in classified settings may wish to obtain one of the cancelled CIA Weapons Effectiveness Indices/Weighted Unit Values (WVI/WVV) Updates.
BIBLIOGRAPHY

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