THE DISMOUNTED INFANTRY AGGREGATION METHODOLOGY (DIAM) IN THE JIFFY GAME

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COMBAT DEVELOPMENT ACTIVITY
COMBINED ARMS STUDIES AND ANALYSIS ACTIVITY

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THE DISMOUNTED INFANTRY AGGREGATION METHODOLOGY (DIAM) IN THE JIFFY GAME

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ABSTRACT

Results from low resolution corps and division level war games and simulations have become increasingly important to decisions involving weapon system procurement and the force structuring process. In the past, dismounted units have been poorly represented in these models. Games such as Jiffy and the developmental CORDIVEM did not portray explicitly the attributes of dismounted squad and platoon. These games were usually oriented to the armor/antiarmor battle, with end of simulation occurring at about 500 meters. Consequently, the effects of dismounted units in the corps/division level combined arms battle were not accounted for satisfactorily. This report describes a method for representing such battles in division or corps level simulations by aggregating terrain effects and numbers of weapon systems in order to reduce setup and run requirements while explicitly representing dismounted tactics, weapon lethality, and target vulnerability. The method has general applicability in existing war games. It has been implemented as a computerized combat model in the Jiffy war game and used in gaming support for the High Technology Light Division study.
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CHAPTER I
MODEL METHODOLOGY

1-1. BACKGROUND AND PURPOSE.

a. The role of the Combined Arms Studies and Analysis Activity (CASAA) in the hierarchy of Army analysis requires the study of corps and division level problems. Analyses at this level, including results from corps and division level war game simulations, have become increasingly important to decisions involving weapon system procurements, force structuring, and scenario generation for the TRADOC community.

b. The armor-antiarmor battle is generally well represented in most corps/division models, as are other combined arms aspects such as indirect fire, tactical air, close air support, air defense, and minefields. However, the contributions of small infantry units—especially those involving dismounted operations—have not been adequately represented. Most corps/division level simulations represent closure of the forces to ranges of 1000 to 500 meters. At this point the simulated battles are terminated without regard to the closure, assault, and withdrawal phases.

c. Analysis conducted with these models often fails to give decisionmakers a basis for evaluating the effectiveness of dismounted infantry. Consequently, in February 1980 CASAA was tasked by Commander, Combined Arms Center (CAC) to develop methods for simulating the effectiveness of dismounted infantry in a combined arms corps/division environment. A two-phased effort was initiated to address this problem.

(1) The first phase consisted of the basic research necessary for any combat model development. During this phase the critical battle activities impacting on division effectiveness were defined through the use of mission profiles supplied by the US Army Infantry Center (USAIC) and through informal discussions with USAIC personnel. A review of the ability of currently running combat models to represent these activities was also conducted. The first phase of the study was completed by developing a methodology for representing these activities in a low resolution division model. The methodology included identification of the basic infantry units that must be modeled, algorithms describing the effectiveness of these units in various activities, and data sources to support these algorithms. A complete report on this phase of the study effort is contained in CASAA TR 6-81, Dismounted Infantry Aggregation Methodology Study (DIAMS), August 1981.

(2) The second phase of the effort was implementation of the methodology; i.e., building the model (the Dismounted Infantry Aggregation Model--DIAM), constructing the data bases, validating the model, and exercising it in support of several CAC studies. Model construction was completed in September 1981, and interface with the corps/division level Jiffy War Game took place in October 1981. Although DIAM is currently in use as a
submodule of Jiffy, it can also be used alone to analyze the effectiveness of a combined arms force as it closes on dismounted infantry positions from ranges of 1000 meters.

d. The purpose of this report is to provide a documented reference for DIAM. The report is designed to serve two types of readers.

(1) Chapter 1 describes the overall methodology used in developing the computer code. It contains a general discussion of the algorithms used to represent the dismounted battle and is provided for the use of those readers interested in "What's going on inside the model."

(2) Chapters 2 and 3 were developed for those readers who are interested in executing the model. Chapter 2 describes the model data base. Chapter 3 contains a listing of the model code. DIAM is written in FORTRAN 77 using a modular design dictated by standard software engineering practices. The code listed in chapter 3 represents the current Jiffy application of DIAM in subroutine form. The code could easily be modified for use in stand-alone form.

1-2. THE DIAM DATA/INFORMATION FLOW STRUCTURE. DIAM is a time-stepped, expected value simulation. During each minute of battle, the movement of both forces, their ammunition expenditures, and losses to both forces are calculated. The model requires an extensive data base to represent the lethality, vulnerability, and mobility of a dismounted force in a combined arms battle. Figure 1-1 shows the various types of data bases required by the DIAM attrition model. The figure shows that the model requires data inputs from two sources, a host and its own internal data base.

a. Data Input From Host. Host inputs are used by DIAM to establish a battle scenario. In essence they describe who is fighting, what type of battle the user wishes to model, and where (type of terrain) the fight will occur. They represent a simplified version of the type of scenario data required for a high resolution model. The host may be either a larger model using DIAM as a submodule, such as Jiffy, or an analyst/gamer using DIAM in the stand-alone version. The following data are required from the host:

(1) Weapon lists. Complete lists of all weapons to be represented in the DIAM battle must be provided by the host. DIAM currently has a library of 25 different weapon types (e.g., Viper, Dragon, IMAWS, M-1, IFV) for Blue and 25 types for Red. The user is allowed to select a maximum of 10 Blue types and 10 Red types for each battle. The number of weapons of each type (e.g., 75 Viper, 5 Dragon, 10 M-1) must also be provided by the user. The model automatically positions these weapons on the terrain in response to the user's selection of battle scenario (see para b(2), Terrain effects, below).

(2) Artillery firing rates. Artillery firing rates and loss rates to each weapon type are also required from the host. The version of DIAM described in this report uses the Jiffy artillery module to assure consistency
### Figure 1-1. DIAM data and information flow.

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with other Jiffy results. However, DIAM is structured so that lethal area/target density artillery loss algorithms could easily be implemented in the module.

(3) Tactical scenario. Host selection of the tactical scenario is also required. The DIAM module currently has a library of six terrain areas available. The user is required to select a terrain location and denote either the Red or the Blue force as attacker. DIAM responds by accessing the proper terrain data base and arraying the user-defined forces on the terrain. The visibility condition (day, night, or obscured) is also required by the module. Two other host data elements are required to describe the DIAM battle framework. The initial condition of both forces is represented by the percent of basic load available to each weapon type and the opening ranges between the forces. The opening range must be less than 1000 meters. The host data element describing disengagement criteria is an optional requirement. The DIAM structure allows the host to specify attrition thresholds and range thresholds for each weapon type. These thresholds represent maximum loss levels and minimum closure distances to enemy force elements that will be sustained by a force prior to its withdrawal. Violation of these thresholds for either force will initiate its withdrawal. If the user does not specify these thresholds, they will be specified by the DIAM module.

b. Internal Data Base. The DIAM module also maintains an extensive internal data base. Referring again to figure 1-1, the model has access to a computerized library describing various terrains and weapon systems. These library entries are accessed by the module in response to host requirements. The libraries fall into the following categories:

(1) Weapon system configuration and performance. These data describe weapon system performance under various postures (attack or defend) and environmental conditions (day, night, obscured day). They are supplied by the US Army Materiel Systems Analysis Activity (USAMSAA) and the Night Vision and Electro-optics Laboratory (NV&EOL). The elements of this part of the data base are:

- Single shot kill probabilities for each ammunition against each platform type in both defensive and attack postures. Platforms are representative of both vehicles and personnel.
- Movement rates under day and night conditions by platform type.
- Time required by sensors to detect a target at various ranges. DIAM divides its sensors into four categories: unaided eye, optically aided eye, generic image intensifier, and generic thermal device.
- Time required to aim, fire, guide, and reload for each weapon system.
Principal armaments and basic loads for each platform. Weapon platforms (personnel, vehicles, crews) can carry multiple weapons in DIAM. For example, an infantry Dragon gunner can also engage personnel targets with a rifle.

(2) Terrain effects on vehicles and personnel.

(a) The terrain data base contains data representing an important tactical aspect of the DIAM battle. Each of the weapons selected by the DIAM user is assigned to one of four general groups:

- Personnel
- Heavy armor vehicles
- Light armor vehicles
- Systems offset from the battle by more than 1000 meters (e.g., mortars, TOW).

These categories are used by DIAM to establish movement locations and the tactical geometry of the force structures. The module considers the center of mass for each group for all calculations involving movement and range parameters. The tactical terrain data base contains initial locations for the center of mass of each DIAM group and is used by the module to deploy weapon systems in a representative tactical array at the beginning of each battle.

(b) The terrain effects data base is used by DIAM to determine the percent of each force visible to firers in the opposing force. This data base was developed using defensive positions and attacker approach routes resulting from a map analysis conducted by CASAA and the US Army Infantry School. The CASAA Battlefield Visualization Graphics computerized terrain system was used to analyze the area along the avenues of approach visible to each defensive position. This provided the percent of the attack corridor visible in range bands of 200-meter increments to each defensive position. As the DIAM attrition module moves the threat forces along the attack corridors, the percent of corridor visible is applied to the force, providing number of systems that can be targeted by the defenders. DIAM currently has a library of six different terrain tactical situations. Analytical procedures to develop data bases for new situations require approximately 2 man-days. A discussion of these procedures can be found in Chapter 2 of this report.

(3) Tactical decision criteria.

(a) The DIAM module simulates tactical responses of both individual weapon systems and the force to battle conditions. Individual tactical responses are limited to the following:

- Personnel riding in light armor vehicles may dismount for an assault.
- Dismounted personnel withdrawing from the battle may mount available light carriers.
- Light armored vehicles may take up overwatch positions.
These tactical responses are triggered by closure distances between the groups. For example, the Red commander may want 50 percent of all mounted personnel to dismount their carriers when they move within 300 meters of the Blue defender's dismounted Viper positions. The tactical data base contains the desired range at which the tactic must be executed, the percent of the group required to perform the tactic, and an identifier of the opposing group triggering the tactic. Under conditions requiring a DIAM group to operate in two tactical modes (in the example, 50 percent personnel mounted, 50 percent dismounted), the module splits the group to represent movement and location characteristics of both groups.

(b) Force tactical responses are centered around the decision to withdraw from the battle. As mentioned previously, the host can optionally provide criteria (percent of force lost, range between groups) to trigger withdrawal. If these are not provided by the host the module defaults to the values found in this data base. DIAM's current implementation in Jiffy allows the gamer to override the withdrawal criteria (either stay and fight or move out) following status reports, which are given at selected intervals during the DIAM battle.

1-3. ALGORITHMS USED IN DIAM.

a. Figure 1-2 presents a generalized logic flow of the processes occurring in the DIAM module. The purpose of this diagram is to provide a framework for consideration of the attrition algorithms used in the module. The DIAM module is a deterministic model using expected value techniques for calculating weapon losses to both forces. DIAM first selects the appropriate weapon system data and terrain data for the battle to be played, then locates the forces in their tactical positions on the terrain. For each battle minute, DIAM constructs a firing profile for each weapon system. This profile consists of the number of targets visible and within range that are detected by the system. On the basis of this profile, the model calculates the rounds fired by each system. Losses to each firer and target are then determined, and force levels are updated. The number of incoming rounds and the losses sustained by the force are used to calculate suppressive effects for the next minute of battle. Suppression affects rate of fire, movement, and vulnerability. After suppressive effects are calculated, movement rates are determined and force weapon positions are updated for the current minute. Tactical thresholds are then compared with current positions and force levels. If the disengagement criteria are satisfied, tactical requirements (for example, mounting of vehicles) are performed and a timer is set for the disengagement period. Individual tactics also may be altered (dismount, overwatch) in response to tactical thresholds. A new terrain data base is retrieved from the module library to represent reduced visibility conditions between forces during disengagement and pursuit, and the status of affected groups is updated. DIAM assumes that disengagement is completed after 10 minutes. A final battle report is printed following disengagement.
Figure 1-2. DIAM Logic Flow for Both Attackers and Defenders. 1-7
b. The following paragraphs provide a detailed description of the algorithms used for calculation of rounds fired, determination of losses, calculation of suppressive effects, and calculation of group movement. The remaining steps are primarily model bookkeeping and are documented in the DIAM computer code found in chapter 3.

(1) Calculation of rounds fired. The maximum number of rounds fired per minute by weapon i at target j is \( R_{ij} \), which is the reciprocal of the time required to fire one round at the given target; i.e., \( R_{ij} = 1/T_{ij} \).

\[
T_{ij} = (D_{ij}/F_{ij} + A_{ij} + L_i + M_{ij}) N_{ij}/N_i
\]

where:

- \( T_{ij} \) = expected time in minutes for a weapon of type i to fire at a target of type j, given a uniform distribution of fire at all targets available.
- \( D_{ij} \) = expected number of minutes for a weapon of type i to detect a weapon of type j.
- \( F_{ij} \) = number of rounds fired by i at j per detection.
- \( A_{ij} \) = expected number of minutes required to aim i at j.
- \( L_i \) = expected number of minutes to reload i.
- \( M_{ij} \) = expected number of minutes for projectile from i to reach j.
- \( N_{ij} \) = expected number of targets of type j visible to firer i.
- \( N_i \) = expected number of targets of all types visible to firer i.

(a) This firing rate assumes targets are of equal priority and are allocated uniformly across all targets visible and detected by the firer. If other types of allocations are desired, it is only necessary to change the fraction \( N_{ij}/N_i \) to the desired weighting method. The number of targets visible \( N_{ij} \) is calculated in the following manner:

\[
N_{ij} = n_j(1-v^*) v_{ij} (1 - \frac{S_j}{L})
\]
where:

\( n_j \) = the total number of target weapons of type \( j \) in the target force.

\( \bar{v} \) = the fraction of the terrain corridor containing target weapon system \( j \) not visible to any of the firing force containing system \( i \).

\( v_{ij} \) = the fraction of the terrain corridor containing target systems of category \( j \) visible to all firing weapons of category \( i \). Recall that all weapon systems fall into one of four categories (dismounted personnel, heavy vehicles, light vehicles, mortars). In this case \( J \) is the category containing the target system \( j \) and \( I \) is the category containing the firing system \( i \). These visibility fractions vary by 200-meter range bands as measured between weapon systems \( i \) and \( j \).

\( s_j \) = the fraction of targets of type \( j \) suppressed for this minute. The factor \( s_j \) represents DIAM's modeling of one-half of all suppressed personnel in a temporary covered position.

(b) This firing rate (\( R_{ij} \)) is for unsuppressed situations—suppression will reduce this rate as follows:

\[
R'_{ij} = R_{ij} s_{it}
\]

where:

\( R_{ij} \) = suppressed firing rate of weapons of type \( i \) at targets of type \( j \).

\( R'_{ij} \) = unsuppressed firing rate of weapons of type \( i \) at targets of type \( j \).

\( s_{it} \) = suppression factor for firing times of weapon \( i \) at time \( t \).

(2) Calculation of loss rates.

(a) The expected number of weapons (considered as targets) of type \( j \) killed by weapons in the opposing force of type \( i \) is determined from the following equation:

\[
K_{ij} = N_{ij} (1 - (1 - P_{ij}/N_j) R_{ij} s_{ij} c_{ij})
\]

where:

\( K_{ij} \) = the expected number of type \( j \) weapons killed by type \( i \) weapons.

\( N_{ij} \) = the expected number of type \( j \) weapons visible to weapons of type \( i \).
\( P_{ij} \) = the single shot kill probability of weapon \( i \) against weapon \( j \).

\( R_{ij} \) = suppressed firing rate of weapons of type \( i \) at targets of type \( j \) (from equation 1-3).

\( C_{ij} \) = number of weapons of type \( i \) firing at targets of type \( j \).

\( a_i \) = the fraction of aimed rounds fired by weapon system \( i \). For attackers, \( a_i = 0.30 \). For defenders \( a_i = 0.60 \).

(b) The number of weapons of type \( i \) firing at target type \( j \) is given by:

\[
C_{ij} = n_i \cdot v_{JI} \left( 1 - \frac{S_i}{2} \right)
\]  

(1-5)

where:

\( n_i \) = the total number of weapons of type \( i \) in the firing force.

\( v_{JI} \) = the fraction of firing positions of weapons in category \( I \) visible to target weapons in category \( J \). Note that the use of \( v_{IJ} \) in the computation of the number of targets and \( v_{JI} \) in computing the number of firing weapons causes the following representation in the model: the number of firers engaging targets \( j \) are only those that have physical line of sight to \( j \) (represented by \( v_{ji} \)). Likewise, the number of targets \( j \) engageable by \( i \) are only those that can be seen by \( i \) (represented by \( v_{ij} \)).

\( S_i \) = the fraction of firing systems of type \( i \) suppressed for this minute. \( S_i/2 \) indicates that one-half of all suppressed weapons in \( \text{ranM} \) do not fire.

(c) Equation 1-4 is consistent with the assumption that targets are selected at random with replacement. Bash and Inselmann (1979) derived the equation. Also developed there is the equation for determining the expected number of kills when more than one type of weapon is firing at one target type and all targets can be engaged by all weapons:

\[
L_j = (1 - \Pi \left( 1 - \frac{K_{ij}}{N_{ij}} \right) N_{ij})
\]  

(1-6)

where:

\( L_j \) = expected number of losses per minute of weapons of type \( j \).

\( K_{ij} \) = expected number of type \( j \) weapons killed by type \( i \) weapons (from equation 1-4).
\[ N_{ij} = \text{number of weapons of type j in force visible to weapons of type i.} \]

Equations 1-4 and 1-6 produce an approximation to the situation where different weapons see different subsets of targets.

(3) Calculation of suppressive effects. The DIAM suppression module was taken from the Jiffy war game. This module provides suppression of the firing rates and movement rates for both dismounted personnel and vehicular mounted armaments. The following four equations are used to calculate the suppressive effects in DIAM.

\[
\begin{align*}
Y_i &= W_i \left( \frac{2.06 X + 1.54}{100} \right) \quad (1-7) \\
Y_i &= W_i \left( \frac{1.06 X + 0.14}{100} \right) \quad (1-8) \\
Y_i &= W_i \left( \frac{8 X + 1.5 + 3.28}{100} \right) \quad (1-9) \\
Y_i &= W_i \left( \frac{2.5 X + 1.5 + 0.5}{100} \right) \quad (1-10)
\end{align*}
\]

where:

\[ Y_i = \text{fraction of weapons of type i that are suppressed.} \]

\[ X = \text{ratio of total losses suffered by weapons of type i from direct fire, artillery, and mines to total losses inflicted by weapons of type i.} \]

\[ W_i = 1 \text{ for category 4 (heavy) weapons and 2.86 for all other types of weapons (from Jiffy).} \]

Equation 1-7 is for defenders in the engagement phase, 1-8 is for defenders in the withdrawal phase, 1-9 is for attackers in the engagement phase, and 1-10 is for attackers in the withdrawal phase. The maximum suppression for firing is set at 0.8 and the maximum for movement is 0.9. Suppressed systems are less lethal and less vulnerable (see use of \( S_i \), \( S_j \) in equations 1-2, 1-3, and 1-5). Lethality and mobility are assumed to be reduced because systems being suppressed will seek available cover. This in turn is assumed to make the system less vulnerable.

(4) Calculation of movement rates and tactical locations.

(a) The movement rate for each weapon is calculated by reading the unsuppressed rate for this terrain and tactical scenario from the data base and then applying the suppression factor:

\[
M_{it} = M_i (1-V_{it}) \quad (1-11)
\]

where:

\[ M_{it} = \text{suppressed movement rate for weapon i at time t.} \]
\( M_i \) = unsuppressed movement rate from data base.

\( V_{it} \) = fraction of movement suppressed by previous incoming fire.

These rates are adjusted so that weapons in overwatch positions do not move and any vehicles with dismounted personnel will move at the dismounted rate in the meeting and engagement phase of the battle.

(b) Tactical geometry is represented by locating the components of each force about a central force reference point. Each weapon played in the model is categorized as belonging to one of four groups (dismounted personnel, heavy armor, light armor, or mortars). The initial locations of the center of each group with respect to the force reference point are maintained as part of the data base for each tactical scenario available for play in the DIAM submodel. Selection by the main program of a particular scenario causes the DIAM submodel to modify the position of each weapon group based on the following formula.

\[
\begin{align*}
LR_{j0} &= D + \Delta_j \\
LB_{i0} &= D + \Delta_i
\end{align*}
\]

where:

\( LR_{j0} \) = location of all Red weapons of type \( j \) at time zero.

\( LB_{i0} \) = location of all Blue weapons of type \( i \) at time zero.

\( D \) = range between center of mass of forces at start of the battle.

\( \Delta_i, \Delta_j \) = the offset distance of one of four weapon categories from the center mass of the force. \( \Delta_i \) is the offset for all Blue weapons of category \( i \). Likewise, \( \Delta_j \) is the offset for all Red weapons of category \( j \).

(c) Each weapon location is changed each minute based upon a suppressed movement rate such that the location at any time \( (t + 1) \) minutes into the battle is defined by:

\[
LR_{j,t+1} = M_{jt} + LR_{jt}
\]

where:

\( LR_{j,t+1} \) and \( LR_{jt} \) = the location at time \( t+1 \) and \( t \) respectively of weapon \( j \).
\[ M_{jt} = \text{the suppression of movement for weapons j during minute } t. \]

The DIAM battle begins with the attacking force moving toward the defensive positions. Losses are assessed to both forces until a tactical threshold is reached. At this point the withdrawal phase of the battle is begun. This is simulated by a change in the percent visible tables (representing a force minimizing intervisibility with the enemy as it breaks contact). The model moves the withdrawing forces out of firing range and then prints the losses to both Red and Blue forces.

1-4. REFERENCES.


CHAPTER 2
DIAM FILE STRUCTURES

2-1. DIAM INTERNAL DATA BASE.

a. The DIAM internal data bases are used by the model to describe weapon performance, the terrain effects on the surviving force, and the tactical disengagement criteria. The data are stored on five random access files as shown in figure 2-1.

(1) The Weapon Vulnerability file (Logical Unit 16) contains probabilities of kill for 25 Blue weapons and 25 Red weapons. The probabilities are stored in a range-dependent manner. Two files exist, one representing Blue in prepared defensive positions and the other representing Blue in an attack.

(2) The Terrain Effects file (Logical Unit 25) contains data describing the percentage of the opposing force visible to both attackers and defenders. The percentages are both weapon and range dependent. Six terrain sites (four in the Mideast and two in Europe) are currently available in the DIAM model.

(3) The Movement Rates file (Logical Unit 20) contains rates of advance for four weapon categories; i.e., dismounted personnel, heavy armored systems, light armored systems, and mortars. The movement rates are dependent on terrain type and visibility conditions.

(4) The Target Acquisition Rate file (Logical Unit 20) provides average acquisition times for four sensor types (optical systems $\mu=.7\mu$, image intensifier systems $\mu=1.1\mu$, far infrared systems $\mu=14\mu$, and the unaided eye) detecting four target types (vehicular target fully exposed or in hull defilade and personnel target fully exposed or in foxhole). The acquisition times are dependent on target range and atmospheric visibility.

(5) The Weapons Characteristics file (Logical Unit 15) is used to describe the primary sensor type, movement rate category, and basic load of the primary armament for each of the 25 Blue and 25 Red weapons found in the Weapon Vulnerability file. For several weapon systems the DIAM model considers both a primary and secondary armament. For dismounted personnel carrying a Dragon or Viper, the model also plays rifle fire against opposing personnel targets. The basic loads for secondary systems are updated by the DIAM model logic and are not contained in this data base.

b. It will be noted from figure 2-1 that DIAM uses the random access file in a read only mode. The random access structure provides the user with flexibility in selecting weapon systems, terrain type, and environmental conditions for play in the dismounted battle. The following paragraphs provide detailed descriptions of the file structures. To avoid classification of this report, example data bases are not included. However, example data bases can be obtained from the US Army Combined Arms Studies and Analysis Activity, Fort Leavenworth, KS upon submission of proper clearances.
Figure 2-1. DIAM internal data bases.
2-2. FILE STRUCTURE FOR TERRAIN EFFECTS.

a. The terrain effects data are used by the model to represent the percent of forces visible to both attacker and defender during the battle. This data base is developed using digitized terrain and military judgment in selecting the best approach routes and defensive positions for a particular terrain location. Figure 2-2 shows the first step in developing this data base. A piece of digitized terrain has been selected representing the battle site. The possible approach routes have also been noted on the map.

b. The second step in data base development is shown in figures 2-3 and 2-4. Defensive positions have been selected representing typical positions for two of the weapon categories. Line-of-sight fans representing the visible portions of the advance routes have also been drawn using the digitized terrain data base.

c. The final step in data base development is to calculate the percent of attacker corridor visible by range band for each of the defender positions. The resulting percents are used in the terrain effects data base.

d. The structure of the random access file is as follows:

Record 1

<table>
<thead>
<tr>
<th>Record</th>
<th>Data Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word</td>
<td>Alphanumeric</td>
<td>Each word contains four alpha characters. The record contains a description of the terrain; e.g., &quot;GERMANY BLUE ATTACK WOODED AREA&quot;.</td>
</tr>
</tbody>
</table>

Record 2

<table>
<thead>
<tr>
<th>Record</th>
<th>Data Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word</td>
<td>Real</td>
<td>Percent Red dismounted visible to Blue dismounted, range 0-200m.</td>
</tr>
<tr>
<td>2</td>
<td>Real</td>
<td>Percent Red mortars visible to Blue dismounted, range 0-200m.</td>
</tr>
<tr>
<td>3</td>
<td>Real</td>
<td>Percent Red light armor visible to Blue dismounted, range 0-200m.</td>
</tr>
</tbody>
</table>
Figure 2-2. ‘t’ site.
Figure 2-3. Line-of-sight fan for a TOW position.
Figure 2-4. Line-of-sight fan for a small arms positions.
<table>
<thead>
<tr>
<th>Record Word</th>
<th>Data Word</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td>Real</td>
<td>Percent Red heavy armor visible to Blue dismounted.</td>
</tr>
<tr>
<td>5-8</td>
<td></td>
<td>Real</td>
<td>Percent Red dismounted, mortars, light armor, heavy armor visible to Blue mortars.</td>
</tr>
<tr>
<td>9-12</td>
<td></td>
<td>Real</td>
<td>Percent Red dismounted, mortars, light armor, heavy armor visible to Blue light armor at 0-200m.</td>
</tr>
<tr>
<td>13-16</td>
<td></td>
<td>Real</td>
<td>Percent Red dismounted mortar, light armor, heavy armor visible to Blue heavy armor at 0-200m.</td>
</tr>
</tbody>
</table>

Records 3-6

Contain the same information for Red targets at ranges of 201-400, 401-600, 601-800, and 801-1000 meters.

Records 7-11

Contain the percent of Blue visible to Red during the engagement phase of the battle. The structure is similar to that used for records 2-6.

Records 12-21

Contain the percent of Red and Blue visible during Blue withdrawal. The structure is similar to that used for records 2-6.

Records 22-31

Contain the percent of Red and Blue visible during Red withdrawal. The structure is similar to that used for records 2-6.

Record 32

Contains the tactical offset distance of the centroids of the Blue weapons categories (dismounted personnel, mortars, light armor, heavy armor) from the Blue force centroid. It also contains similar Red tactical offset distances.

<table>
<thead>
<tr>
<th>Record Word</th>
<th>Data Word</th>
<th>Data Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Real</td>
<td>Tactical offset of Blue dismounted personnel from Blue force centroid (meters).</td>
</tr>
<tr>
<td>Record Word</td>
<td>Data Type</td>
<td>Data Description</td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------</td>
<td>------------------</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Real</td>
<td>Tactical offset of Blue mortars (meters).</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Real</td>
<td>Tactical offset of Blue light armor (meters).</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Real</td>
<td>Tactical offset of Blue heavy armor (meters).</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Real</td>
<td>Tactical offset of Red dismounted personnel from Red force centroid (meters).</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Real</td>
<td>Tactical offset of Red mortars from Red force centroid.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Real</td>
<td>Tactical offset of Red light armor from force centroid (meters).</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Real</td>
<td>Tactical offset of Red heavy armor from force centroid (meters).</td>
<td></td>
</tr>
</tbody>
</table>

**Record 33**
Contains the corridor width (meters) for the attacker.

<table>
<thead>
<tr>
<th>Record Word</th>
<th>Data Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Real</td>
<td>Corridor width in meters at ranges of 0-200m from force centroid. The corridor is for attacking dismounted personnel.</td>
</tr>
<tr>
<td>2-5</td>
<td>Real</td>
<td>Corridor widths for dismounted personnel at ranges of 201-400m, 401-600m, 601-800m, 801-1000m.</td>
</tr>
<tr>
<td>6-10</td>
<td>Real</td>
<td>Corridor widths for mortars at ranges of 0-200m, 201-400m, 601-800m, 801-1000m.</td>
</tr>
<tr>
<td>11-15</td>
<td>Real</td>
<td>Corridor widths for light armor at range of 0-200m, 201-400m, 601-800m, 801-1000m.</td>
</tr>
<tr>
<td>16-20</td>
<td>Real</td>
<td>Corridor widths for heavy armor at ranges of 0-200m, 201-400m, 601-800m, 801-1000m.</td>
</tr>
</tbody>
</table>

**Record 34**
Contains the corridor widths for the defender withdrawing. The structure is identical to record 33.
Record 35

Contains the corridor widths for the attacker withdrawal routes. The structure is identical to record 33.

Record 36

Contains the maximum percent of weapons that will be lost before withdrawal. The numbers represent tactical decision thresholds upon which the unit commander bases the withdrawal decision.

<table>
<thead>
<tr>
<th>Record Word</th>
<th>Data Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Real</td>
<td>Maximum percent of Blue dismounted lost before Blue withdrawal.</td>
</tr>
<tr>
<td>2</td>
<td>Real</td>
<td>Maximum percent of Blue mortars lost before Blue withdrawal.</td>
</tr>
<tr>
<td>3</td>
<td>Real</td>
<td>Maximum percent of Blue light armor lost before Blue withdrawal.</td>
</tr>
<tr>
<td>4</td>
<td>Real</td>
<td>Maximum percent of Blue heavy armor lost before Blue withdrawal.</td>
</tr>
<tr>
<td>5-8</td>
<td>Real</td>
<td>Maximum percent of Red dismounted, mortars, light armor, and heavy armor lost before Red withdrawal.</td>
</tr>
</tbody>
</table>
2-3. FILE STRUCTURE FOR WEAPON VULNERABILITY. The Weapon Vulnerability file is divided into two sections.

a. The first section contains 125 records describing the ability of 25 Blue weapons to kill 25 Red weapons in five range bands 0-200m, 201-400m, 401-600m, 601-800m, and 801-1000m. The records are structured as follows:

<table>
<thead>
<tr>
<th>Record</th>
<th>Data Word</th>
<th>Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alpha</td>
<td></td>
<td>Six-character name for Blue weapon 1.</td>
</tr>
<tr>
<td>2</td>
<td>Real</td>
<td></td>
<td>Probability of kill of Red weapon 1 by Blue weapon 1 at a range of 0-200m. (Probability of kill represents a catastrophic kill--both mobility and firepower).</td>
</tr>
<tr>
<td>3</td>
<td>Real</td>
<td></td>
<td>Probability of kill of Red weapon 2 by Blue weapon 1 at a range of 0-200m.</td>
</tr>
<tr>
<td>26</td>
<td>Real</td>
<td></td>
<td>Probability of kill of Red weapon 25 by Blue weapon 1 at a range of 0-200m.</td>
</tr>
</tbody>
</table>

Records 2-5

Describe the ability of Blue weapon 1 to kill 25 Red weapons in the remaining four range bands. The first 125 records on the file are required to describe all 25 Blue weapons.

b. The second section of this file, records 126 through 250, contains probabilities of kill for Red weapons firing against Blue targets. These records are structured the same as the Blue lethality records. This file is read in DIAM by subroutine PKIN.
2-4. FILE STRUCTURE FOR WEAPON MOVEMENT RATES.

a. Data in the Movement Rates file is used by DIAM to advance four attacker categories during the engagement phase of the battle and to move the withdrawing systems during the withdrawal phase of the battle. The rates represent rates of advance achievable under unsuppressed conditions. The rates are adjusted by DIAM to represent the suppressive effects of personnel and vehicular losses. The movement rate data must be described in meters per minute.

b. The file contains rates for four weapon categories (dismounted personnel, mortars, light armor, heavy armor) on two terrains (open and heavily vegetated). The file is structured into three sections keying on three visibility conditions (clear day, clear night, and heavily obscured day).

(1) The first section consists of two records describing Blue and Red movement rates on a clear day (visibility range greater than 15km). The records are structured as follows:

Record 1

<table>
<thead>
<tr>
<th>Record Word</th>
<th>Data Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Real</td>
<td>Movement rate of dismounted Blue in open terrain (meters/min).</td>
</tr>
<tr>
<td>2</td>
<td>Real</td>
<td>Movement rate of Blue mortars in open terrain (meters/min).</td>
</tr>
<tr>
<td>3</td>
<td>Real</td>
<td>Movement rate of Blue light armor in open terrain (meters/min).</td>
</tr>
<tr>
<td>4</td>
<td>Real</td>
<td>Movement rate of Blue heavy armor in open terrain (meters/min).</td>
</tr>
<tr>
<td>5-8</td>
<td>Real</td>
<td>Movement rate of Blue dismounted, mortars, light armor, and heavy armor in close, heavily vegetated terrain.</td>
</tr>
</tbody>
</table>

Record 2

Describes Red's movement in open and close terrain on a clear day.

(2) The second section contains two records describing Blue and Red movement rates at night. The form of records 3 and 4 is identical to records 1 and 2.

(3) The third section contains two records describing Blue and Red movement rates on a heavily obscured day (visibility range of 500 meters). The form of records 5 and 6 is identical to records 1 and 2.
2-5. FILE STRUCTURE FOR TARGET ACQUISITION RATES.

a. The Target Acquisition file data describe the ability of four generic sensor types to detect four types of targets at various ranges. The generic sensor types are unaided eye, optically aided eye, far infrared thermal imager, and image intensifier device. The targets being detected are personnel fully exposed, personnel in foxholes, armored vehicles fully exposed, and armored vehicles in hull defilade. The data represent average times for each sensor to detect each target at various ranges. The file is divided into three sections. Each section represents detection capabilities under conditions of clear day, clear night, and obscured night.

b. The first section, representing clear day, is structured as follows:

<table>
<thead>
<tr>
<th>Record</th>
<th>Data Word</th>
<th>Data Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Real</td>
<td></td>
<td>Average time for Blue eye to detect a fully exposed vehicle at 0-200m (min/target).</td>
</tr>
<tr>
<td>2-4</td>
<td>Real</td>
<td></td>
<td>Average time for Blue eye to detect a hull defilade vehicle, fully exposed soldier, or soldier in defilade at 0-200m.</td>
</tr>
<tr>
<td>5-8</td>
<td>Real</td>
<td></td>
<td>Average time for a Blue optical system to detect four target types at 0-200m.</td>
</tr>
<tr>
<td>9-12</td>
<td>Real</td>
<td></td>
<td>Average time for a Blue thermal imager to detect four target types at 0-200m.</td>
</tr>
<tr>
<td>13-16</td>
<td>Real</td>
<td></td>
<td>Average time for a Blue image intensifier device to detect four target types at 0-200m.</td>
</tr>
</tbody>
</table>

Records 2-5
Consider Blue's ability to detect four Red targets on a clear day at target ranges of 201-400m, 401-600m, 601-800m, and 801-1000m. Their structure is identical to record 1.

Records 6-10
Contain detection times for four generic Red sensors to acquire four Blue targets in five equal range bands from 0 to 1000m. The structure of these records is identical to records 1-5.
c. The second section contains records 11-20. These records describe Blue and Red ability to detect targets on a clear night. The structure of these records is identical to records 1-10.

d. The third section contains records 21-30. These records describe Blue and Red ability to detect targets on an obscure day (visibility range 500m). The structure of these records is identical to records 1-10.
2-6. FILE STRUCTURE FOR WEAPONS CHARACTERISTICS.

a. The Weapons Characteristics file contains data describing the physical characteristics of 25 Blue systems and 25 Red systems. The data on each weapon system are used by the DIAM model to construct firing rates for each weapon. The file also contains pointers to the Movement Rates file and Target Acquisition file for each system, allowing DIAM to retrieve the proper movement and detection rates for each system.

b. The file is structured into two sections. The first section contains 25 records describing Blue weapon characteristics. The second section contains 25 records describing 25 Red weapons. The records have the following structure:

<table>
<thead>
<tr>
<th>Record Word</th>
<th>Data Type</th>
<th>Data Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Alpha</td>
<td>Six-character weapon name.</td>
</tr>
<tr>
<td>2</td>
<td>Integer</td>
<td>The type of primary sensor contained on this weapon: 1=eye, 2=optic, 3=thermal, 4=image intensifier.</td>
</tr>
<tr>
<td>3</td>
<td>Real</td>
<td>Round flight time of primary armament (seconds/200 meters).</td>
</tr>
<tr>
<td>4</td>
<td>Real</td>
<td>Number of rounds (bursts for burst fire systems) carried by this weapon.</td>
</tr>
<tr>
<td>5</td>
<td>Integer</td>
<td>Weapon platform movement category: 1=dismounted personnel, 2=mortars, 3=light armor, 4=heavy armor.</td>
</tr>
<tr>
<td>6</td>
<td>Real</td>
<td>Weapon firing cycle time. This represents the average time to aim, fire, and reload the weapon (seconds). Munition guidance time should not be included in this value.</td>
</tr>
</tbody>
</table>

The Blue weapons described in this file must be in the same order as their probability of kill records appear on the Weapon Vulnerability file.
CHAPTER 3
DIAM PROGRAM CODE

3-1. INTRODUCTION.

a. This chapter contains information on the DIAM program code. This introductory paragraph discusses programming philosophy, concepts, and techniques used in constructing the code for DIAM. The second paragraph describes the functional areas of DIAM and presents a system flowchart. The third paragraph contains figures and tables that briefly explain the subroutines called from each functional area and the primary variables influenced by each subroutine. Paragraph 3-4 explains the self-documenting concept used in DIAM with examples. Paragraph 3-5 contains the DIAM code as a subroutine called by subroutine INFANT of Jiffy.

b. The following guidelines were used in developing the DIAM code to allow for easier understanding, maintenance, and modification of the DIAM model.

1) First, all subroutines are no longer than 150 lines and are functional in application. Efforts were made to keep the length around 50 lines, and only a few subprograms are over 80 lines. The biggest exception is the main DIAM subroutine, which is around 500 lines. However, this main subroutine consists of functional areas or separate procedures of less than 50 lines each.

2) Second, the DIAM structure is basically two-level. Only the main DIAM subroutine passes control to and from each subroutine in a top-down process. (A third level is occasionally used when subroutine INIT is called to initialize an array.) This design allows for easier understanding of structure flow than do higher level structures.

3) Third, the DIAM structure includes IF/THEN/ELSE statements, no common blocks, and self-documenting code. IF/THEN/ELSE programming avoids "GO TO" programming; with proper indentation this makes the structure flow easier to understand. No common blocks allows better control of debugging and testing. The self-documenting technique, explained in paragraph 3-4, was used to facilitate understanding, debugging, and future modification of the DIAM code. With this technique, each subroutine contains all information and only that information needed to understand the function of the subroutine.

3-2. DIAM FUNCTIONAL AREAS. This section contains a brief overview of the functional areas in DIAM. Figure 3-1 is a functional flow diagram of the model.

a. As shown in the figure, the low resolution data are loaded first. Since DIAM's first implementation was in conjunction with the Jiffy Model, the low resolution data are received from Jiffy. These data could be loaded by subroutine calls from the main DIAM subroutine if DIAM were used with other models or executed independently. The low resolution data include Blue and
Figure 3-1. Flow chart of DIAM module.

3-2
Red weapon systems and scenario information. Predetermined artillery losses from Jiffy are also included, but artillery could be modeled differently in DIAM for different applications.

b. After a gamer selects the type and number of weapon systems and a tactical scenario from the DIAM library, the DIAM model selects the appropriate high resolution data and weapon attributes.

(1) The high resolution data contain terrain information for both forces, including visibility factors, attacker corridor widths, and disengagement criteria. This information is contained in a library and is accessed by the type of tactical scenario. Currently, the library contains terrain data for only a few terrain types. These scenarios require minimal set-up time (approximately 2 days). In the future as many as 30 scenarios will be available for access.

(2) The weapon attributes selected are from a database developed for all possible weapons played in DIAM. DIAM allows a maximum of 10 weapons per side in a run. Weapon attributes include probability of kill, weapon characteristics, movement rates, and detection times for all Red and Blue weapon types selected for a given scenario.

c. The next two functional areas are initialization procedures. The first procedure initializes variables, arrays, indexes, and counters. The second procedure initializes ammunition loads, artillery losses per minute from Jiffy, and distances from the force centroid to its weapons for both Red and Blue forces. Defending minefields can then be entered, and the force visibility tables are initialized. Both forces are entered as dismounted forces. The attacking force then mounts its vehicles after the number of troops to mount is determined, and the attrition calculations are ready to begin.

d. The attrition loop starts by determining the distance between Red and Blue weapon types and their respective range bands. The range bands are then used to determine the visibility factors and the probability of kill between Red and Blue weapon types during the current minute.

e. Using this information, the next procedure calculates rounds fired by each Red and Blue weapon type. The results are calculated by a sequence of subroutines that first determines number of engageable targets, time to engage targets, rounds to kill targets, and time to kill targets. From this information, the projected rounds required to kill all engageable targets for each weapon type are calculated. These rounds are limited in the final subroutine to one-fourth the available ammunition to determine the actual rounds fired.

f. The next functional area calculates total Red and Blue weapon type losses during the minute. The primary attrition loss calculation occurs in the first two subroutines using the equations developed in chapter 1 where
initial losses, and then total expected losses, are calculated for all weapon types. Artillery and minefield losses are then determined before the mounted infantry personnel losses are calculated. Mounted personnel losses are determined from the losses of troop carriers and proportioned uniformly across the number of personnel inside the troop carriers. The Red and Blue losses are tallied, and the remaining Red and Blue weapon types are determined. The last subroutine of this procedure generates a killer/victim scoreboard for both Red and Blue weapon types.

g. New tactics are determined in the next procedure. Currently, DIAM plays two tactical modes: infantry personnel can dismount troop carriers at a chosen distance from the opposing force, and a percentage of armor vehicles can go into overwatch, also at a chosen distance. After new tactics are determined a killer/victim report is generated for the gamer at chosen minute intervals. The gamer then has the option of continuing the engagement or withdrawing one of the forces.

h. The next two procedures determine if Red or Blue forces disengage. As mentioned previously, the gamer can trigger a withdrawal. If not, attrition losses are checked every minute, and a force will disengage at a chosen attrition loss level. At this point, the gamer can again override the disengagement and continue the battle. Hence, in DIAM the gamer can have complete control of engaging and withdrawing forces or allow the battle to automatically disengage forces at chosen attrition levels.

i. New positions are calculated after disengagement is determined. The attacker moves forward if engaging or pursuing the withdrawing defender. The defender always remains stationary unless withdrawing.

j. One of the last procedures calculates fire and movement suppression for Red and Blue forces. This procedure is processed last since suppression is calculated as losses received divided by losses inflicted for each weapon type. During the first minute fire suppression is assumed to be 50 percent. Currently, suppression in DIAM is consistent with the method of suppression play in Jiffy where firepower ratios are used.

k. Finally, the last procedure determines if the attrition loop continues or ends. Currently, 1000 minutes is the limit during Red and Blue engagement. When either force is withdrawing the battle continues 10 minutes before ending.

3-3. SUBROUTINE SUMMARY. Table 3-1 provides a cross-referenced summary of the DIAM subroutines and their primary variables. Subroutines called by each functional area are shown, and the function of each subroutine is described. The primary variables for each subroutine are listed and described.

3-4. DIAM SELF-DOCUMENTATION CONCEPT. This paragraph explains the self-documenting technique and variable name convention used in DIAM.
<table>
<thead>
<tr>
<th>Functional Area</th>
<th>Subroutines Called</th>
<th>Subroutine Function</th>
<th>Primary Variables</th>
<th>Primary Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Low Resolution Data</td>
<td>LRDT</td>
<td>Initializes Blue and Red force types and tactics and defense posture.</td>
<td>BFRCTP</td>
<td>Blue force type index</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RFRCTP</td>
<td>Red force type index</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DPSTR</td>
<td>Defense posture index</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TACA</td>
<td>Tactics array</td>
</tr>
<tr>
<td>Load High Resolution Data</td>
<td>TERIN</td>
<td>Loads arrays containing visibility factors by weapon categories. Loads corridor widths of forces by weapon categories. Loads distance between force and force weapon categories.</td>
<td>PCRVBE</td>
<td>Percent Red visible to Blue during engagement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PCRVBW</td>
<td>Percent Red visible to Blue withdrawing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PCRVWB</td>
<td>Percent Red withdrawing visible to Blue</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PCRVRE</td>
<td>Percent Blue visible to Red during engagement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>PCBVWM</td>
<td>Percent Blue visible to Red withdrawing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DFCWC</td>
<td>Offset distance between force centroid and weapon category centroid</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*AWDTH</td>
<td>Corridor width for attacking force</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*BWDTW</td>
<td>Corridor width for withdrawing Blue force</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*RDWTH</td>
<td>Corridor width for withdrawing Red force</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DGMATT</td>
<td>Disengagement attrition levels for weapon categories</td>
</tr>
<tr>
<td>Load Weapon Attributes</td>
<td>PKIN</td>
<td>Loads array containing probability of kill for Blue and Red weapons. Loads Blue and Red weapon characteristics.</td>
<td>BRPK</td>
<td>SSPK for Blue vs Red Targets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RBPK</td>
<td>SSPK for Red vs Blue Targets</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BCHR</td>
<td>Blue weapon characteristic array</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RCHR</td>
<td>Red weapon characteristic array</td>
</tr>
<tr>
<td></td>
<td>MOVIN</td>
<td>Loads arrays containing Red and Blue movement rates and detection times.</td>
<td>BMVRT</td>
<td>Blue movement rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RMVRT</td>
<td>Red movement rate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BDTCT</td>
<td>Blue detection times</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RDTCT</td>
<td>Red detection times</td>
</tr>
</tbody>
</table>

*Currently not used
<table>
<thead>
<tr>
<th>Functional Area Called</th>
<th>Subroutine Function</th>
<th>Primary Variables</th>
<th>Primary Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initialize Arrays and Variables</td>
<td>INDX1</td>
<td>Initializes counters, flags, and variables used in attrition loop.</td>
<td>DFRC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BDFAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RDFAT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BDMNUM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RDMNUM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BDMV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RDMV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BOVWTH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>ROVWTH</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BMDRW</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RMDRW</td>
</tr>
<tr>
<td>INIT1</td>
<td>Initializes any 10x2 array.</td>
<td>ARRAY</td>
<td>Array to be initialized</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VAR</td>
<td>Value initialized for array</td>
</tr>
</tbody>
</table>
Table 3-1. (continued)

<table>
<thead>
<tr>
<th>Functional Area Called</th>
<th>Subroutine Function</th>
<th>Primary Variables</th>
<th>Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initialize Attrition Loop</td>
<td>Initialize ammunition loads for Blue weapons.</td>
<td>BAMO</td>
<td>Ammunition loads for Blue weapon types</td>
</tr>
<tr>
<td></td>
<td>Initialize ammunition loads for Red weapons.</td>
<td>RAMO</td>
<td>Ammunition loads for Red weapon types</td>
</tr>
<tr>
<td></td>
<td>Initialize artillery losses from Jiffy.</td>
<td>BARTJF</td>
<td>Blue artillery loss array from Jiffy</td>
</tr>
<tr>
<td></td>
<td>Initialize distances from force centroid to force weapon types.</td>
<td>RARTJF</td>
<td>Red artillery loss array from Jiffy</td>
</tr>
<tr>
<td></td>
<td>Initialize defending minefield parameters and loss rates.</td>
<td>DBFBWP</td>
<td>Distance from Blue force centroid to Blue weapon types</td>
</tr>
<tr>
<td>MINCHR</td>
<td></td>
<td>AMFLD</td>
<td>Minefield characteristic array</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMLSR</td>
<td>Minefield loss rates</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FMNFD</td>
<td>Location of front edge of minefield</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BMNFD</td>
<td>Location of rear edge of minefield</td>
</tr>
<tr>
<td></td>
<td>Choose two of the six available visibility tables based on force engagement or withdrawal.</td>
<td>PCBVRC</td>
<td>Percent of Blue weapon categories visible to Red weapon categories</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PCRVBC</td>
<td>Percent of Red weapon categories visible to Blue weapon categories</td>
</tr>
<tr>
<td>PCTBL</td>
<td></td>
<td>BDMRTO</td>
<td>Blue ratio of dismounted infantry to troop carriers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ROMRTO</td>
<td>Red ratio of dismounted infantry to troop carriers</td>
</tr>
<tr>
<td></td>
<td>Calculate ratio of dismounted troops to troop carriers.</td>
<td>BDVM</td>
<td>Red dismount index</td>
</tr>
<tr>
<td>DMRT0</td>
<td></td>
<td>RNUMDM</td>
<td>Number of Red troops mounted per carrier</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BDMV</td>
<td>Blue dismount index</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BNUMDM</td>
<td>Number of Blue troops mounted per carrier</td>
</tr>
<tr>
<td>Functional Area</td>
<td>Subroutines Called</td>
<td>Subroutine Function</td>
<td>Primary Variables</td>
</tr>
<tr>
<td>-----------------</td>
<td>-------------------</td>
<td>---------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Begin Attrition Loop</td>
<td>WPNDST</td>
<td>Determines distance from Blue weapon types to Red weapon types.</td>
<td>DBWRWP</td>
</tr>
<tr>
<td>RNGBN</td>
<td>Determines range bands from Blue weapon types to Red weapon types.</td>
<td>DRWBWP</td>
<td>Distance from Red weapon types to Blue weapon types</td>
</tr>
<tr>
<td>PCWPVS</td>
<td>Determines fraction of Red and Blue weapon types visible to Blue and Red weapon types.</td>
<td>DSTMIN</td>
<td>Minimum distance between Red and Blue weapon types</td>
</tr>
<tr>
<td>PKWP</td>
<td>Determines SSPK for Blue vs Red and Red vs Blue weapon types.</td>
<td>BRRGDB</td>
<td>Range band from Blue weapon type to Red weapon type</td>
</tr>
<tr>
<td>NUMTGT</td>
<td>Calculates total number of Red and Blue engageable target types.</td>
<td>BRRGDB</td>
<td>Range band from Red weapon type to Blue weapon type</td>
</tr>
<tr>
<td>TIMENG</td>
<td>Determines time to engage Red and Blue target types.</td>
<td>PCBVRZ</td>
<td>Percent of Blue weapon types visible to Red weapon types</td>
</tr>
<tr>
<td>RNDKLL</td>
<td>Calculates rounds to kill Red and Blue target types.</td>
<td>PCRVBZ</td>
<td>Percent of Red weapon types visible to Blue weapon types</td>
</tr>
<tr>
<td>TMLKL</td>
<td>Calculates time to kill Blue and Red target types.</td>
<td>BRPKW</td>
<td>SSPK for Blue firers vs Red target types</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTRTG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTRBG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BTMENG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RTMENG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BRDKL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RRDKLL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BTMRLL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RTRL</td>
</tr>
</tbody>
</table>

Table 3-1. (continued)
<table>
<thead>
<tr>
<th>Functional Area Called</th>
<th>Subroutine Function</th>
<th>Subroutine Function</th>
<th>Primary Variables</th>
<th>Primary Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculation of Rounds Fired (Cont)</td>
<td>RNDFRD</td>
<td>Calculates projected Blue and Red rounds fired.</td>
<td>BRFDR</td>
<td>Rounds fired by Blue weapon types</td>
</tr>
<tr>
<td></td>
<td>RNDCK</td>
<td>Calculates actual rounds fired based on remaining ammunition loads.</td>
<td>BRFDR, BAMO, BRRDSUM, RRDFR, RAMO, RRDSUM</td>
<td>Rounds fired by Blue weapon types, Ammunition loads of Blue weapon types, Sum of rounds of Blue weapon types, Rounds fired by Red weapon types, Ammunition loads of Red weapon types, Sum of rounds of Red weapon types</td>
</tr>
<tr>
<td>Calculation of Total Losses</td>
<td>ECLOSS</td>
<td>Calculates expected Blue and Red committee losses.</td>
<td>EBCLSS</td>
<td>Expected committee losses of Blue weapon types</td>
</tr>
<tr>
<td></td>
<td>ETLOSS</td>
<td>Calculates total expected Blue and Red losses</td>
<td>ETBLSS</td>
<td>Total expected losses of Blue weapon types</td>
</tr>
<tr>
<td></td>
<td>ARTLSS</td>
<td>Calculates artillery losses for Red and Blue weapon types.</td>
<td>BARTLS</td>
<td>Artillery losses for Blue weapon types</td>
</tr>
<tr>
<td></td>
<td>MNLSS</td>
<td>Calculates mine losses for Blue and Red weapon types.</td>
<td>BMNLSS</td>
<td>Mine losses for Blue weapon types</td>
</tr>
<tr>
<td></td>
<td>DMSLSS</td>
<td>Calculates Red and Blue dismounted losses.</td>
<td>EBTLSS</td>
<td>Mine losses for Red weapon types</td>
</tr>
<tr>
<td></td>
<td>TALLY</td>
<td>Cumulates total Red and Blue weapon type losses.</td>
<td>BDEAD</td>
<td>Total Blue weapon type losses</td>
</tr>
<tr>
<td></td>
<td>JFLSS</td>
<td>Calculates killer/victim scoreboard for Red and Blue weapon types for Jiffy gamers.</td>
<td>BRKVLSS</td>
<td>Blue killer/Red victim weapon type loss table</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RBKVLSS</td>
<td>Red killer/Blue victim weapon type loss table</td>
</tr>
<tr>
<td>Functional Area</td>
<td>Subroutines Called</td>
<td>Subroutine Function</td>
<td>Primary Variables</td>
<td>Primary Variable Description</td>
</tr>
<tr>
<td>-----------------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Determination of New Tactics</td>
<td>TACDSM</td>
<td>Determines if attacking force dismounts.</td>
<td>BDMV, RDMV</td>
<td>Blue force dismount index, Red force dismount index</td>
</tr>
<tr>
<td></td>
<td>TACOVW</td>
<td>Determines if attacking force goes into overwatch status.</td>
<td>BOVWTH, ROVWTH</td>
<td>Blue force overwatch index, Red force overwatch index</td>
</tr>
<tr>
<td></td>
<td>REPRT</td>
<td>Displays report to gamers. Includes killer/victim score-board, minimum distance between forces, and asks gamer to continue or withdraw forces.</td>
<td>BDSNG, RDSNG</td>
<td>Blue force disengage index, Red force disengage index</td>
</tr>
<tr>
<td>Determination of Blue Force Disengagement</td>
<td>DSNG</td>
<td>Determines if Blue force disengages based on attrition losses. If Blue force is to disengage, then subroutines PCTBL, DMRTO, REMNT are called (See Initialize Attrition Loop functional area).</td>
<td>BWDRW, BHOIDS</td>
<td>Blue force withdrawal index, Blue hold position index</td>
</tr>
<tr>
<td>Determination of Red Force Disengagement</td>
<td>DSNG</td>
<td>Determines if Red force disengages based on attrition losses. If Red force is to disengage, then subroutines PCTBL, DMRTO, REMNT are called. (See Initialize Attrition Loop functional area).</td>
<td>RWDRW, RHOIDS</td>
<td>Red force withdrawal index, Red hold position index</td>
</tr>
<tr>
<td>Determination of Movement Rates and Positions</td>
<td>MVRT</td>
<td>Determines movement rates for Red and Blue weapon types.</td>
<td>BWPMVR, RWPMVR</td>
<td>Blue weapon type movement rate, Red weapon type movement rate</td>
</tr>
<tr>
<td></td>
<td>NDISI</td>
<td>Calculates new distances between a force and its weapon types.</td>
<td>DBFBWP, DFRWBP</td>
<td>Distance between Blue force centroid and Blue weapon types, Distance between Red force centroid and Red weapon types</td>
</tr>
</tbody>
</table>
### Table 3-1. (concluded)

<table>
<thead>
<tr>
<th>Functional Area</th>
<th>Subroutines Called</th>
<th>Subroutine Function</th>
<th>Primary Variables</th>
<th>Primary Variable Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calculation of Fire and Movement</td>
<td>ARTSP</td>
<td>Calculates Blue and Red artillery losses for suppression only.</td>
<td>BARTSP</td>
<td>Blue weapon type artillery losses used only for suppression calculation</td>
</tr>
<tr>
<td>Suppression</td>
<td></td>
<td></td>
<td>RARTSP</td>
<td>Red weapon type artillery losses used only for suppression calculation</td>
</tr>
<tr>
<td></td>
<td>SPDG</td>
<td>Calculates Blue and Red fire and movement suppression</td>
<td>BSPFDG</td>
<td>Blue weapon type fire suppression degradation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>degradation factors.</td>
<td>RSPFDG</td>
<td>Red weapon type fire suppression degradation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>BSPMDG</td>
<td>Blue weapon type movement suppression degradation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>RSPMDG</td>
<td>Red weapon type movement suppression degradation</td>
</tr>
<tr>
<td>Check for End of Module Run</td>
<td>REPRT</td>
<td>This procedure checks and adds minute counters and returns control to Jiffy after a force has withdrawn 10 minutes (See Determination of New Tactics Functional Area).</td>
<td>KWMNT</td>
<td>Minute counter for withdrawal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>KNTMNT</td>
<td>Minute counter for engagement</td>
</tr>
</tbody>
</table>
a. The main program is sectioned into functional areas or procedures and, with comment statements, is self-explanatory. The main program's primary function is to call subroutines. Each subroutine begins with a brief description of the purpose. When a subroutine is called from the main program, the parameters in the calling statement are listed so that returning variables are at the end of the argument list. All parameters are explained in the subroutine called.

b. The following variable name convention was adopted for single and dual purpose subroutines. Single purpose subroutines are those that receive only one set of parameters from the call statements of the main program. For single purpose subroutines, the parameters match the calling parameters of the main program. Dual purpose subroutines are those that receive two sets of parameters from the main program. In the first case, the set of parameters will be Blue force variables that contain Blue force information in relation to Red. In the second case, the set of parameters will be Red force variables that contain Red force information in relation to Blue. To represent both cases the variable name convention in the subroutines results in "X" force variables that contain "X" force information in relation to "Y" force information.

c. Figures 3-2 and 3-3 show subroutines INDX2 and RNDKLL, a single purpose subroutine and a dual purpose subroutine, respectively, being called from the main program. The dual purpose subroutine RNDKLL is called twice, once to determine Blue rounds to kill Red targets and again to determine Red rounds to kill Blue targets. The first time the main program passes Blue and Red arrays to interpret "X" force for Blue force and "Y" force for Red force variables. The second time the main program passes Blue and Red arrays to interpret "X" force for Red force and "Y" force for Blue force variables.

d. A knowledge of the tactics currently played in DIAM is required to understand most variable names and array variables. All weapons played in DIAM are categorized in one of four groups: dismounted infantry, mortars, light armor, and heavy armor. Two tactical modes are played by the weapons: mounted/dismounted for troops and carriers, and heavy ammo in overwatch. Table 3-2 shows the tactical modes for weapons in each weapon category.
INITIALIZE ARRAYS AND VARIABLES

DETERMINE INDEXES FOR BLUE AND RED FORCES
CALL INDX1(DFC, BDFA1, RDFAT, BFRCTP, BDMMAX, RDMMAX,  
  1  BDWRW, RDWRW, BDNV, RDNV, BDOWTH, RDOWTH)
CALL INDX2(KNTMNT, KWDMNT, FPFTM, BDSNG, RDSNG, AMFLD,  
  1  BDFA1, BFLSFR, RFLSFR, BHOLDS, RHOLDS)

SUBROUTINE INDX2(KNTMNT, KWDMNT, FPFTM, BDSNG, RDSNG, AMFLD,  
  1  BDFA1, BFLSFR, RFLSFR, BHOLDS, RHOLDS)

THIS SUBROUTINE Initializes the FOLLOWING VARIABLES AND
INDEXES

KNTMNT  MINUTE COUNTER FOR DIAM BATTLE
KWDMNT  MINUTE COUNTER DURING WITHDRAWAL IN DIAM
FPFTM   MINUTE COUNTER FOR FINAL PROTECTIVE FIRES
BDSNG  INDEX FOR X FORCE: 1=ENGAGING, 2=DISENGAGING
RDSNG  INDEX FOR Y FORCE: 1=ENGAGING, 2=DISENGAGING
AMFLD(I) INDEX FOR MINES IN USE: 0=NO, 1=YES
AMFLD(2) MINEFIELD WIDTH
AMFLD(3) MINEFIELD FRACTION NOT BYPASSED
AMFLD(4) FRACTION OF ATTACKING FORCE ENTERING MINEFIELD
BFLSFR FALSE FIRING FACTOR FOR BLUE FORCE
RFLSFR FALSE FIRING FACTOR FOR RED FORCE
BDFA1 INDEX FOR BLUE FORCE: 1=DEFENDING, 2=ATTACKING
BHOLDS INDEX FOR BLUE FORCE: 1=BLUE FORCE HOLDS POSITION,
  2=BLUE IS ALLOWED TO WITHDRAW
RHOLDS INDEX FOR RED FORCE: 1=RED FORCE HOLDS POSITION,
  2=RED IS ALLOWED TO WITHDRAW

DIMENSION AMFLD(4)

INITIALIZE VARIABLES:
  KNTMNT=1
  KWDMNT=0
  FPFTM=0
  BDSNG=1
  RDSNG=1
  BHOLDS=2
  RHOLDS=2

DO 10 I=1,4
   AMFLD(I) = 0
10 CONTINUE

IF(BDFA1.EQ.1.)THEN
   BFLSFR = 0.8
   RFLSFR = 0.4
ELSE
   BFLSFR = 0.4
   RFLSFR = 0.8
ENDIF

RETURN

Figure 3-2. Single purpose subroutine
C CALCULATE ROUNDS TO KILL RED TARGET TYPES
C FOR BLUE WEAPON TYPES
CALL RNDKLL(0BPKW,RDKLL)
C
C CALCULATE ROUNDS TO KILL BLUE TARGET TYPES
C FOR RED WEAPON TYPES
CALL RNDKLL(1BPKW,RDKLL)

C******************** SUBROUTINE RNDKLL ***************
C
C SUBROUTINE RNDKLL (XYPKW,RDKLL)
C
C THIS SUBROUTINE CALCULATES RDKLL(I,M,J), ROUNDS TO KILL
C FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2
C AGAINST Y FORCE TARGET TYPES M OF WHICH M=11,20
C ARE IN TACTICAL MODE 2
C
C XYPKW(I,K,J) PROBABILITY OF KILL (SSPK) FOR X FORCE
C WEAPON TYPES I IN TACTICAL MODE J=1,2
C AGAINST Y FORCE TARGET TYPE M OF
C WHICH M=11,20 ARE IN TACTICAL MODE 2
C
C DIMENSION XYPKW(10,20,2),RDKLL(10,20,2)
C
C 100 DO J=1,2
C 200 DO I=1,16
C 300 DO 40 L=1,30
C 400 DO 10 K=1,16
C
C PK=XYPKW(I,K*(L-1)+J,J)
C IF(PK,.GT.0) THEN
C RDKLL(I,J)=PK
C ELSE
C RDKLL(I,J)=0
C END IF
C RDKLL(I,K*(L-1)+J,J) = RDKLL
C
C 40 CONTINUE
C 30 CONTINUE
C 20 CONTINUE
C 10 CONTINUE
C
C RETURN
C DEBUG SUBCHA
C AT 100
C END

Figure 3-3. Dual purpose subroutine

3-14
Table 3-2. Tactical modes for each weapon category

<table>
<thead>
<tr>
<th>Weapon Category</th>
<th>Tactical Mode (1)</th>
<th>Tactical Mode (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dismounted Infantry</td>
<td>Mounted in troop carriers</td>
<td>Not in troop carriers</td>
</tr>
<tr>
<td>Light/Troop Carriers</td>
<td>Troop carriers mounted</td>
<td>Troop carriers dismounted</td>
</tr>
<tr>
<td>Light/Non-Troop Carriers</td>
<td>(Engaging)</td>
<td>-999 as non-troop carrier flag</td>
</tr>
<tr>
<td>Heavy</td>
<td>Not in overwatch</td>
<td>In overwatch</td>
</tr>
<tr>
<td>Mortars</td>
<td>(Engaging)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

3-5. DIAM CODE. This section contains the DIAM code interfaced with Jiffy. Some features of this DIAM version are unique to Jiffy. For example, most of the low resolution data or gamer input for DIAM is implemented by the subroutine Jiffy before DIAM is called by INFANT. Blue and Red weapons from the Jiffy element array are chosen. The arrays IBNFID and IRDFID contain the Jiffy weapon pointers, a mounted or dismounted flag, a non-carrier flag, and a secondary weapon flag for each of the weapon types chosen. Artillery losses from Jiffy are added back to the weapons played in DIAM. Then DIAM reapportions the artillery losses each minute of battle. The DIAM code as shown has been tested and is currently being used to support war game studies with good results.
DIAMPUBLISH, DIAMMAIN

R1

DIMENSION BWP(10,3), RWP(10,3), UGMA(4,2), BARTJF(10,4)

COMMON DECO, BAY, XIN(4), ICARD(20), IHY, IHN, IBY, IYES, IENO

CALL I.3D1, IFRCP, IFRCTP, TBSRT, TACAJ.

LOAD LOW RESOLUTION DATA

INITIALIZE THE REST OF LOW RESOLUTION DATA
CALL LAC PDIFR, FRCP, OPSTR, TACAJ

LOAD HIGH RESOLUTION DATA

LOAD PERCENT VISIBLE TABLES, DISTANCES, AND CORRIDOR WIDTHS
CALL IRHISTAT, K25, PCRVBE, PCRVBW, PCRVB, PCRV, PCBVRE, PCBVW

LOAD HIGH RESOLUTION DATA
LOAD WEAPON ATTRIBUTES

LOAD PROBABILITY OF KILL AND WEAPON CHARACTERISTICS TABLES

CALL PKINPBRPK,RPBRK,RCHR,RCHR,IBM,IRD,K15,K16,NUMP,NUMR,

LOAD BLUE AND RED MOVEMENT RATES AND DETECTION DATA

CALL MOVINIT(0'S,ITRNP,K27,K26,BMVRT,RMVRT,BDTCT,DTCT)

INITIALIZE ARRAYS AND VARIABLES

DETERMINE INDEXES FOR BLUE AND RED FORCES

CALL INDX1(BFRC,BDMAX,DMAX,ROVWH1)

CALL INDX2(KNTMNT,KDMNT,PPFTM,RDSNG,ROSNG,AMFLD)

ZERO-OUT CUMULATIVE KILLS FOR BLUE WEAPON TYPES

CALL INITI(BDEAD,VARI)

ZERO-OUT CUMULATIVE KILLS FOR RED WEAPON TYPES

CALL INITI(RDEAD,VARI)

ZERO-OUT BLUE ARTILLERY LOSSES

CALL INITI(BARTLS,VARI)

ZERO-OUT RED ARTILLERY LOSSES

CALL INITI(RARTLS,VARI)

ZERO-OUT BLUE ROUNDS FIRED SUMMATION

CALL INITI(BRDSUM,VARI)

ZERO-OUT RED ROUNDS FIRED SUMMATION

CALL INITI(RRDSUM,VARI)

ZERO-OUT BLUE SUPPRESSION FIRE DEGRADATION

CALL INITI(BSFDG,VARI)

ZERO-OUT RED SUPPRESSION FIRE DEGRADATION

CALL INITI(RSFDG,VARI)

ZERO-OUT BLUE SUPPRESSION MOVEMENT DEGRADATION

CALL INITI(BSPMDG,VARI)

ZERO-OUT RED SUPPRESSION MOVEMENT DEGRADATION

CALL INITI(RSPMDG,VARI)

INITIALIZE ATTRITION LOOP

INITIALIZE AMMUNITION LOADS FOR BLUE WEAPONS
SIFIED

1450. BSLD=1.0
1460. BSLDR=1.0
1470. CALL BSETLD1BNUM,IBU,BSLD,BSLDR,BCHR,IBNFD1,BAMO
1490. C
1500. C INITIALIZE AMMUNITION LOADS FOR RED WEAPONS
1510. C CALL RSETLD1BNUM,IRD,BSLD,BSLDR,BCHR,IRNFD1,RAMO
1530. C
1540. C INITIALIZE ARTILLERY LOSSES FROM JIFFY
1550. C CALL INTART1ARPM,BARTJF,RARTJF
1560. C
1570. C INITIALIZE DISTANCE FROM BLUE FORCE CENTROID
1580. C TO BLUE WEAPON TYPES
1590. C IFRC=1
1600. C CALL INTDIST1IFRC,BCHR,BWPN,DFCWC,DFBFWP1
1610. C
1620. C INITIALIZE DISTANCE FROM RED FORCE CENTROID
1630. C TO RED WEAPON TYPES
1640. C IFRC=2
1650. C CALL INTDIST1IFRC,RCHR,RWPN,DFCWC,DFRWP1
1660. C
1670. C DETERMINE MINEFIELD CHARACTERISTICS
1680. C CALL MINCHR1AMFLD,FMNFLD,BMNFLD,DFCWC,DFRC,AMLSR1
1690. C
1700. C DETERMINE THE VISIBILITY TABLES TO USE IN LOOP
1710. C CALL PCTBL1BWDRW,RWDRT,DFRCPWC,PCRWB1,PCRWV1,PCRVBC,PCBRCC1
1720. 1 PCBVRE,PCBVW,PCBWV,PCBVBC,PCBVRC
1730. C
1740. C DETERMINE NUMBER OF TROOPS TO MOUNT FOR ATTACKING FORCE
1750. C IF IDFAT.EQ.2 AND DMV.EQ.21 THEN
1760. C CALL DMRT01BCHR,BWPN,DMRTO1
1770. C CALL REMNT1BCHR,BWPN,DMMAX,DMV,DMRTO1,BNUMDM1
1780. 1 DBBFWP1
1790. C ELSE IF IDFAT.EQ.2 AND DMV.EQ.21 THEN
1800. C CALL DMRT01RCHR,RWPN,DMRTO1
1810. C CALL REMNT1RCHR,RWPN,DMMAX,DMV,DMRTO1,ANUMDM1
1820. 1 DFRWP1
1830. C ELSE
1840. C END IF
1850. C
1890. C
1970. C
1980. C
1990. C
2000. C
2100. C
2710. C DETERMINE DISTANCE FROM BLUE WEAPON TYPES
2720. C TO RED WEAPON TYPES
2730. C CALL WPNDST1DBBFWP,DFRWP,DSTBR,BWPN,RWPN,DBWRWP,DSTMN1
2740. C
2750. C DETERMINE RANGE BANDS FOR BLUE WEAPON TYPES
2760. C TO RED WEAPON TYPES
2770. C CALL RNGBD1DBWRWP,BRRGBD1
2780. C
2790. C DETERMINE DISTANCE AND RANGE BANDS FOR RED WEAPON
2820. C TYPES TO BLUE WEAPON TYPES
2830. C CALL RNGDST1BRRGBD,ABRGBD,OBWFP,DRWBRP1
2840. C
2850. C DETERMINE FRACTION OF BLUE WEAPON TYPES VISIBLE
2860. C TO RED WEAPON TYPES
2870. C CALL PCWPVS1BCHR,RCHR,PCBVWC,BRBGBD,PCBVRC1
2880. C
2890. C DETERMINE FRACTION OF RED WEAPON TYPES VISIBLE
2900. C TO BLUE WEAPON TYPES

SIFIED
CALL PCWPSVRCHK, BCHR, PCRVBC, RBRGBD, PCRVBZ

DETERMINE SINGLE SHOT PROBABILITY OF KILL FOR BLUE WEAPONS AGAINST RED TARGETS
CALL PKWP(BRPK, BRRGBD, BRPKW)

DETERMINE SINGLE SHOT PROBABILITY OF KILL FOR RED WEAPONS AGAINST BLUE TARGETS
CALL PKWP(BRPK, BRRGBD, BRPKW)

CALCULATION OF ROUNDS FIRED BY WEAPON TYPE

CALCULATE TOTAL NUMBER OF ENGAGABLE RL Targets TYPES
FOR BLUE WEAPON TYPES CALL INITI11(TOTRTG, VAR)
CALL NUMTOTBPKW, RWPN, PCRVBZ, RSPFDG, TOTRTG

CALCULATE TOTAL NUMBER OF ENGAGABLE BLUE TARGET Types
FOR RED WEAPON TYPES CALL INITI11(TOTRTG, VAR)
CALL NUMTOTBPKW, RWPN, PCRVBZ, RSPFDG, TOTRTG

CALCULATE TIME TO ENGAGE ALL RED TARGET TYPES
FOR BLUE WEAPON TYPES
CALL TIMENG BDWPTH, BRPKW, BRRGDB, BCHR, RCHR, BDFAT, BDTCT, 1, BTMENG

CALCULATE TIME TO ENGAGE ALL BLUE TARGET TYPES
FOR RED WEAPON TYPES
CALL TIMENG BDWPTH, BRPKW, BRRGDB, RCHR, BCHR, RDFAT, RDTCT, 1, RTMENG

CALCULATE ROUNDS TO KILL RL Targets TYPES
FOR BLUE WEAPON TYPES
CALL RNDKLL(BRPKW, BDKL1)

CALCULATE ROUNDS TO KILL BLUE TARGET Types
FOR RED WEAPON TYPES
CALL RNDKLL(BRPKW, BDKL1)

CALCULATE TIME TO KILL ALL RED TARGET TYPES
FOR BLUE WEAPON TYPES
CALL TMKLL(BTMENG, BCHR, BDKL1, BRRGDB, BTKL1)

CALCULATE TIME TO KILL BLUE TARGET Types
FOR RED WEAPON TYPES
CALL TMKLL(RTMENG, RCHR, BDKL1, BRRGDB, BTKL1)

CALCULATE PROJECTED ROUNDS TO FIRE BY BLUE WEAPONS AGAINST RED TARGET Types
CALL RNDFRD(BMKL1, TOTRTG, RWPN, RWPN, PCRVBZ, PCRVBZ, 1, BDFAT, BWRDFW, BDKL1, BRSFDG, BRSFDG, BRDFR)

CALCULATE PROJECTED ROUNDS TO FIRE BY RED WEAPONS AGAINST BLUE TARGET Types
CALL RNDFRD(1MKL1, TOTRTG, RWPN, RWPN, PCRVBZ, PCRVBZ, 1, RDFAT, BWRDFW, BDKL1, BRSFDG, BRSFDG, BRDFR)

CALCULATE ACTUAL ROUNDS FIRED BY BLUE WEAPONS
CALL RNDCK (BWPnP, BCHR, RCH, RNUM, RNUM, BRDFR, BANO, BRDSUM)

CALL RNDCK (BWPnP, RCHR, BCHR, RNUM, RNUM, RRDFR, RANO, RRDSUM)

CALCULATE ACTUAL ROUNDS FIRED BY RED WEAPONS

CALCULATION OF TOTAL LOSSES

CALCULATE EXPECTED BLUE COMMITTEE LOSSES

CALL ECLOSS (RPKW, BWPnP, PCRVBZ, RRDFR, RFLSFR, RSPFD, ECLKSS)

CALL ECLOSS (RPKW, RWPnP, PCRVBZ, BRDFR, BFLSFR, RSPFD, ERCSS)

CALL ETLOSS (BWPnP, ECLKSS, EBLSS)

CALCULATE TOTAL EXPECTED DIRECT FIRE BLUE LOSSES

CALL ETLOSS (RWPnP, ERCSS, ERTLSS)

CALCULATE TOTAL EXPECTED DIRECT FIRE RED LOSSES

CALCULATE TOTAL LOSSES FOR BLUE WEAPON TYPES

CALCULATE BLUE ARTILLERY LOSSES

CALL ARTLSS (KNTMNT, ARPAM, BARTJF, BWPnP, BCHR, BARTLS)

CALL ARTLSS (KNTMNT, ARPAM, BARTJF, RWPnP, RCHR, RARTLS)

CALL ARTLSS (KNTMNT, ARPAM, BARTJF, RWPnP, RCHR, RARTLS)

CALCULATE EXPECTED RED COMMITTEE LOSSES

CALL ETLOSS (RWPnP, ECLKSS, ERTLSS)

CALL ETLOSS (RWPnP, ECLKSS, ERTLSS)

CALCULATE BLUE ARMY LOSSES

CALL AMLSS (RNUMD, RWPN, RCHR, ERTLS)

CALL AMLSS (RNUMD, RWPnP, RCHR, RARTLS)

CALL AMLSS (RNUMD, RWPnP, RCHR, RARTLS)

CALCULATE BLUE COMMITTEE LOSSES

CALL ECLOSS (RPKW, BWPnP, PCRVBZ, RRDFR, RFLSFR, RSPFD, ECLKSS)

CALL ECLOSS (RPKW, RWPnP, PCRVBZ, BRDFR, BFLSFR, RSPFD, ERCSS)

CALL ETLOSS (BWPnP, ECLKSS, EBLSS)

CALCULATE TOTAL LOSSES FOR BLUE WEAPON TYPES

CALL TALLY (BWPnP, EBLSS, BARTLS, BMNLSS, BDEAD)

CALL TALLY (BWPnP, EBLSS, BARTLS, BMNLSS, BDEAD)

CALCULATE BLUE TO RED KILLER VICTIM SCOREBOARD

CALL JFLSS (RCHR, RWPnP, ERCSS, ERTLS, RARTLS, RMNLSS, PHKVS)

CALL JFLSS (RCHR, RWPnP, ERCSS, ERTLS, RARTLS, RMNLSS, PHKVS)

CALCULATE RED TO BLUE KILLER VICTIM SCOREBOARD

CALL JFLSS (BCHR, BWPnP, ECLKSS, EBLSS, BARTLS, BMNLSS, PBKVS)

CALL JFLSS (BCHR, BWPnP, ECLKSS, EBLSS, BARTLS, BMNLSS, PBKVS)

CALCULATE ATTACKER MINE LOSSES

IF (BDMV .EQ. 0) THEN

CALL MNLSS (BFP, EBMNLD, RMLSR, WROTH, DSTM, FMNLD, BMNLD)

CALL MNLSS (BFP, EBMNLD, RMLSR, WROTH, DSTM, FMNLD, BMNLD)

CALL MNLSS (BFP, EBMNLD, RMLSR, WROTH, DSTM, FMNLD, BMNLD)

CALL MNLSS (BFP, EBMNLD, RMLSR, WROTH, DSTM, FMNLD, BMNLD)

END IF

CALL MNLSS (BFP, EBMNLD, RMLSR, WROTH, DSTM, FMNLD, BMNLD)

CALL MNLSS (BFP, EBMNLD, RMLSR, WROTH, DSTM, FMNLD, BMNLD)

END IF

CALCULATE MOUNTED INFANTRY LOSSES

IF (BDMV .EQ. 1) THEN

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

END IF

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

END IF

CUMULATE TOTAL LOSSES FOR BLUE WEAPON TYPES

CALCULATE MOUNTED INFANTRY LOSSES

IF (BDMV .EQ. 1) THEN

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

END IF

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

CALL DMLSS (BNUMD, BWPnP, BCHR, EBLSS)

END IF

CUMULATE TOTAL LOSSES FOR RED WEAPON TYPES

CALCULATE BLUE TO RED KILLER VICTIM SCOREBOARD

CALL JFLSS (RCHR, RWPnP, ERCSS, ERTLS, RARTLS, RMNLSS, PHKVS)

CALL JFLSS (RCHR, RWPnP, ERCSS, ERTLS, RARTLS, RMNLSS, PHKVS)

CALL JFLSS (BCHR, BWPnP, ECLKSS, EBLSS, BARTLS, BMNLSS, PBKVS)

CALL JFLSS (BCHR, BWPnP, ECLKSS, EBLSS, BARTLS, BMNLSS, PBKVS)

3-20
DETERMINE NEW TACTICS

DETERMINE NEW TACTICAL MODE FOR BLUE FORCE

DETERMINE NEW TACTICAL MODE FOR RED FORCE

DISPLAY REPORT FOR GAMERS

DETERMINE IF BLUE FORCE DISENGAGES

CHECK FOR BLUE DISENGAGEMENT

WHEN BLUE WITHDRAWS, THEN INITIALIZE NEW VISIBILITY TABLES, REMOUNT FORCE, AND RELEASE OVERWATCH STATUS

DETERMINE IF RED FORCE DISENGAGES

EXECUTION
SIFIED

412C. \textbf{IF} (BOWTH \textbf{EQ} 2) \textbf{THEN}
        BOWTH = 1
        \textbf{END IF}

415C. ELSE
        BHOLES = 1
        BWDW = 1
        BNSNG = 1
        \textbf{END IF}

420C. END IF

421C. C

426C. C DETERMINE IF RED FORCE DISENGAGES

428C. C CHECK FOR RED DISENGAGEMENT

429C. \textbf{IF} (BWDW \textbf{EQ} 1) \textbf{AND} RWDW \textbf{EQ} 1 \textbf{THEN}

430C. \textbf{IF} RWDW \textbf{EQ} 2 \textbf{THEN}

431C. CALL DSNGLHRHOLES, RDSNG, RWP, RCHR, RDEAD, IFRC, UGMATT, RWDW

432C. C

433C. WHEN RED WITHDRAWNS, THEN INITIALIZE NEW VISIBILITY

434C. C TABLES, REMOUNT FORCE, AND RELEASE OVERWATCH STATUS

435C. \textbf{IF} RWDW \textbf{EQ} 0 \textbf{THEN}

436C. PRINT "RED TO WITHDRAW AT \textbf{"}KNTMNT, \textbf{"} MINUTES\textbf{"}

437C. PRINT "MINIMUM DISTANCE TO BLUE FORCE IS \textbf{"}DS1MIN\textbf{"}

438C. PRINT "DO YOU WISH TO WITHDRAW RED FORCES?"

439C. CALL FEEDAINTS

440C. \textbf{IF} (IFANS \textbf{EQ} 1) THEN

441C. \textbf{END IF}

442C. C

443C. C DETERMINE MOVEMENT RATES AND NEW POSITIONS

446C. CALL MVRT1 (BOWTH, BDFAT, BWDW, TRNTP, BCHR, RWP, 1 BMVTR, BWPMVR)

447C. C

448C. C DETERMINE MOVEMENT RATES FOR EACH BLU WEAPON TYPE

449C. CALL MVRT1 (BOWTH, BDFAT, BWDW, TRNTP, BCHR, RWP, 1 BMVTR, BWPMVR)

450C. C

451C. C CALCULATE NEW DISTANCE FROM BLUE FORCE CENTROID

452C. C \textbf{FOR} BLUE WEAPON TYPES

453C. CALL NDIST1 (DSTK, RWP, BCHR, BWPMVR, BSMPUG, DBF BW)

454C. C

455C. C DETERMINE MOVEMENT RATES FOR EACH RED WEAPON TYPE

456C. CALL MVRT1 (BOWTH, BDFAT, RWDW, TRNTP, RCHR, RWP, 1
SIFIED

476C. 1 RMVRT,KWP MWK
4771. C
4771. C CALCULATE NEW DISTANCE FROM RED FORCE CENTROID
479C. C 10 RED WEAPON TYPES
480C. CALL NOIST(DSTBR,KWP,RCR,KWP MWK,RSP MDG,DFR WP)
481C. C
481C. C CALCULATION OF FIRE AND MOVEMENT SUPPRESSION
486C. C
489C. C CALCULATE BLUE ARTILLERY LOSSES FOR SUPPRESSION
490C. C CALL ARTSP(KNTMT,FPFTM,OBWR,BARTF,ARPAM,BWP,)
490C. C 1 BCHR,BDFAT,BRTSP)
492C. C
492C. C CALCULATE RED ARTILLERY LOSSES FOR SUPPRESSION
493C. C CALL ARTSP(KNTMT,FPFTM,OBWR,BARTF,ARPAM,BWP,)
494C. C 1 FCHR,ROFAT,RARTSP)
495C. C
495C. C CALCULATE BLUE FIRE AND MOVEMENT SUPPRESSION DEGRADATION
497C. C CALL SPDOE(BWDR,BWDR,BFAT,BCHR,RGCLLS,ERCLEE)
498C. C 1 BARTSP,RMNLS,RSPFDG,RSP MDG)
499C. C
500C. C CALCULATE RED FIRE AND MOVEMENT SUPPRESSION DEGRADATION
501C. C CALL SPDOE(BWDR,BWDR,BFAT,RCHR,ERCLEE,EBCLLS,)
502C. C 1 RARTSP,RMNLS,RSPFDG,RSP MDG)
503C. C
503C. C CHECK FOR END OF MODULE RUN
504C. C
511C. IF(BWDR=.EQ.2.OR.RWDR=.EQ.3) THEN
512C. IF(KRMTN.LT.NUMN1.AND.KRMTN.LT.101) THEN
513C. 1 KRMN = KRMN + 1
514C. KRMN = KRMN + 1
516C. GO TO 10
517C. ELSE
518C. CALL KEPT(KRMN,REWLS,REWLS,NUMN,BNUM,NUMN,BDEAD,)
519C. 1 FDEAD,KWP,RPW,BSNG,BSNG,BWDR,BWDR,BDUM,)
520C. 2 RDUM,RSUM,RSUM,)
521C. PRINT *,"END OF MAIN RUN"
522C. END IF
523C. ELSE IF(KRMTN.LT.1000) THEN
524C. 1 KRMN = KRMN + 1
526C. GO TO 10
527C. ELSE IF(KRMN.LT.1000) THEN
528C. END IF
531C. DIBUC SUBCHR
532C. AT }
533C. END

NG 2608 DUMMY ARGUMENT 'AFRC' IS NEVER REFERENCED
NG 2608 DUMMY ARGUMENT 'PREP' APPEARS IN A DECLARATION BUT IS NEVER REFERENCED
NG 2608 DUMMY ARGUMENT 'SHOTS1' IS NEVER REFERENCED

4 3 WARNINGS 765 1BANK 10668 DBANK 3L COMMON
SUBROUTINE ARTLSS(KNTMNT, ARPAM, XARTJF, XWPN, XCHR, XARTLS)

This subroutine determines XARTLS(I,J); the artillery losses for X force weapon type 1 in tactical mode J=1,2.

KNTMNT = minute counter for diam battle.
ARPAM(I) = estimated battle time for artillery.
XARTJF(I,3) = loss rate per minute for X force weapon type 1 in tactical mode J=1,2.
XWPN(I,J+1) = number of X force weapon type 1 in tactical mode J=1,2.
XCHR(I,4) = weapon category of X force weapon type 1; dismounted=1, mortars=2, light=3, heavy=4.

DIMENSION XARTJF(10,4), XWPN(10,3), XCHR(10,5), XARTLS(10,2), ARPAM(8)

IF(KNTMNT.LE.ARPAM(I)) THEN

DO 10 I=1,10
DO 20 J=1,2

IF(XWPN(I,J+1).GT.0) THEN
IF(XCHR(I,4).EQ.1 .AND. J.EQ.1) THEN
XARTLS(I,J) = 0
ELSE IF(XWPN(I,J+1).LT.0) THEN
XARTLS(I,J) = XARTJF(I,3)
ELSE
XARTLS(I,J) = XARTJF(I,3) * XWPN(I,J+1) / (XWPN(I,2) + XWPN(I,3))

END IF
END IF

CONTINUE

ELSE
DO 30 I=1,10
DO 40 J=1,2
XARTLS(I,J) = 0

CONTINUE

CONTINUE

CONTINUE

CONTINUE

CONTINUE

END IF
RETURN
DEBUG SUBCHK
END
SUBROUTINE ARTSP

IMPLICIT DOUBLE PRECISION (A-Z)

COMMON X, Y, Z

COMMON X, Y, Z

DIMENSION X(10), Y(10), Z(10)

SUBROUTINE ARTSP(KNTMNT, FPFTM, FDX, XARTJF, ARPA, XWP)

I = XCHR, XDFAT, XARTSP)

17. C

THIS SUBROUTINE DETECTS XARTSP(1, J), ARTILLERY LOSSES

18. C

USED ONLY IN SUPPRESSION FOR X FORCE WEAPON TYPE I IN

19. C

TACTICAL MODE J=1, 2

20. C

21. C

KNTMNT MINUTE COUNTER FOR DIAM BATTLE

22. C

FPFTM FINAL PROTECTIVE FIRE COUNTER FOR DIAM BATTLE

23. C

DFXWYP(1, M, J) DISTANCE FROM X FORCE WEAPON TYPE I IN TACTICAL

24. C

MODE J=1, 2 TO Y FORCE WEAPON TYPE M OF WHICH ONLY

25. C

M=11, 20 ARE IN TACTICAL MODE 2

26. C

XARTJF(I, J) X FORCE ARTILLERY LOSSES FOR WEAPON TYPE

27. C

I DURING MINUTE

27. C

TACTICAL MODE J=1, 2

29. C

ARPA(I) NUMBER OF MINUTES COUNTERPREP

30. C

ARPA(I) NUMBER OF MINUTES FINAL PROTECTIVE FIRE

31. C

ARPA(I) PREP MINUTES FIRED IN DIAM

32. C

XDFAT INDEX FOR X FORCE: DEFENDING=1, ATTACKING=2

33. C

XWP(I, J, I) NUMBER OF X FORCE WEAPON TYPE I IN TACTICAL

34. C

MODE J=1, 2

35. C

36. C

37. C

38. C

39. C

40. C

41. C

VAR = 1

42. C

IF(AWDFAT, EQ, 1) THEN

43. C

PREPTM = ARPA(I)

44. C

ELSE IF(AWDFAT, GT, 0) THEN

45. C

PREPTM = ARPA(I) * 2/3

46. C

ELSE

47. C

ENDIF

48. C

IF(AWDFAT, LE, PREPTM) THEN

49. C

VAR = 2

50. C

ENDIF

51. C

52. C

DO 10 J=1, 10

53. C

DO 20 K=1, 20

54. C

DO 30 J=1, 2

55. C

DIST = ABS(DFXWYP(1, M, J))

56. C

IF(DIST, LT, 200) THEN

57. C

IF(FPFTM, LT, ARPA(I)) THEN

58. C

VAR = 2

59. C

FPFTM = FPFTM + 1

60. C

GO TO 35

61. C

62. C

ENDIF

63. C

ENDIF

64. C

30 CONTINUE

65. C

20 CONTINUE

66. C

10 CONTINUE

67. C

68. C

35 DO 40 I=1, 10

3-25
SIFIED

DO 50 J=1,2
  IF(XWPNI,J+1).GT.0) THEN
    IF(XCHR(I,J).EQ.1 .AND. J.EQ.1) THEN
      XARTSP(I,J) = 0
    ELSE IF(XWPNI,J+1).LT.0) THEN
      XARTSP(I,J) = XARTJF(I,J)
    ELSE
      XARTSP(I,J) = XARTSP(I,J+1) / (XWPNI,J+1) + XWPNI,J+1)
    END IF
  ELSE
    ELSE
      XARTSP(I,J) = 0
    END IF
  END IF

CONTINUE

RETURN

DEBUG SUBCHK
AT 1
END
SUBROUTINE BSEILD (BNUM, IBU, BSLD, BSLDR, BCHR, IBNFD, IBMO)

THIS SUBROUTINE LOADS THE AMOUNT OF AMMUNITION AVAILABLE FOR
A PARTICULAR WEAPON TYPE INTO IBMO

BAMO(I,J) ARRAY FOR AMMUNITION LOAD FOR WEAPON TYPE I
OF WHICH J=1 IS THE PRINCIPAL WEAPON AND J=2

BNUM NUMBER OF BLUE FORCE WEAPON SYSTEMS

IBUI(I) ARRAY POINTING TO PROPER ENTRY IN ARRAY IBNFD

BSLD FRACTION OF BASIC LOAD AVAILABLE FOR PRIMARY

BSLDR FRACTION OF BASIC LOAD AVAILABLE FOR SECONDARY

BCHRI(I,3) BASIC LOAD FOR BLUE FORCE WEAPON TYPE I

IBNFD(I,J) ARRAY HOLDING PRINCIPAL JIFFY WEAPON DESCRIPTORS
FOR I=1,25 JIFFY WEAPONS PLAYED IN DIAM. J=1,2 ARE
PRINCIPAL WEAPONS ON PLATFORM, AND J=3 CONTAINS A 6
WHEN THE WEAPON HAS A SECONDARY SYSTEM

DIMENSION BAMO(10,21),IBNFID(25,41),BCHR(10,51),IBU(10)

SET LOAD FOR SECONDARY ROUNDS
RRNDS = 300.0

INITIALIZE ARRAYS AND VARIABLES
VAR = 0
CALL INITIAMO,VARI
I NUM = BNUM

LOAD PRIMARY AND SECONDARY ROUNDS
DO 10 = 1,IBNUM
2BAM0(I,1) = BSLD * BCHR(I,3)
IF(IBNFID(I,IBU(I),3)) .EQ. 61 THEN
BAMO(I,2) = BSLDR * RRNDS
END IF
IF(IBNFID(I,IBU(I),3) .EQ. 26) THEN
BAMO(I,2) = BSLDR * 180
END IF
10 CONTINUE

RETURN
DEBUG SUBCHK
AT 0
END
SUBROUTINE DMRT0(XCHR,XWPN,XTOTDM)

THIS SUBROUTINE CALCULATES XDMRT0, THE RATIO OF X FORCE
DISMOUNTED TROOPS TO X FORCE TROOP CARRIERS

XCHR(1,4) CATEGORY OF X FORCE WEAPON TYPE I:
XWPN(1,3) NUMBER OF WEAPON TYPE I IN TACTICAL MODE 2
XTOTDM TOTAL NUMBER OF X FORCE DISMOUNTED TROOPS
XTOTMC TOTAL NUMBER OF X FORCE MOUNTED CARRIERS

DIMENSION XCHR(10,5),XWPN(10,3)

XTOTDM=0
DO IC I=1,10
IF(XCHR(I,4),EQ,1) THEN
IF(XWPN(I,3),GT,0) THEN
XTOTDM = XTOTDM * XWPN(I,3)
END IF
END IF
CONTINUE

TOTAL NUMBER OF DISMOUNTED TROOPS

XTOTMC=0
DO IC I=1,10
IF(XCHR(I,4),EQ,3) THEN
IF(XWPN(I,3),GT,0) THEN
XTOTMC = XTOTMC * XWPN(I,3)
END IF
END IF
CONTINUE

TOTAL NUMBER OF TROOP CARRIERS

IF(XTOTMC,GT,0) THEN
XTOTMC = -99999
PRINT 1000
1000 FORMATALHO,2,9M NO EMPTY TROOP CARRIERS)
END IF
IF(XTOTDM,GT,0) THEN
PRINT 1010
1010 FORMATALHO,2,1M NO DISMOUNTED TROOPS)
END IF

RETURN

SUBCHP #3C.12E IBANK 55 DBANK

3-28
SUBROUTINE DSMLSS(INUMDM,XWPN,XCHR,EXTLSS)

THIS SUBROUTINE DETERMINES THE NUMBER OF DISMOUNTED LOSSES
WHILE BEING CARRIED IN TROOP CARRIERS

XNUMDM NUMBER OF X FORCE TROOPS THAT DISMOUNT A
XWPN(i,j) NUMBER OF X FORCE WEAPON TYPE I IN TACTICAL
XCHR(i,j) CATEGORY OF X FORCE WEAPON TYPE I:
EXTLSS(i,j) EXPECTED TOTAL LOSSES OF X FORCE WEAPON

DIMENSION XWPN(10,5),XCHR(10,5),EXTLSS(10,2)

TOTAL ALL MOUNTED TROOPS
TOTOM = 0
DO 10 I=1,10
   IF(XCHR(I,4).EQ.1) THEN
      IF(XWPN(I,2).LT.6) THEN
         TOTOM = XWPN(I,2) + TOTOM
      END IF
   END IF
   CONTINUE

IF(TOTOM.LE.0) THEN
   RETURN
END IF

SEARCH FOR MOUNTED CARRIERS WITH LOSSES
DO 20 I=1,10
   IF(XCHR(I,4).EQ.1) THEN
      IF(XWPN(I,2).GT.4) THEN
         IF(XWPN(I,3).LE.4) THEN
            IF(EXTLSS(I,1).GT.0) THEN
               TOTOM = XNUMDM*XWPN(I,2)*TCLSS/TOTDM + EXTLSS(I,1)
            END IF
         END IF
      END IF
   END IF
   CONTINUE

END IF

END IF

END IF

END IF

CONTINUE

CONTINUE

CONTINUE

CONTINUE

CONTINUE

END IF

END IF

END IF

CONTINUE

CONTINUE

END IF

END IF

END IF

CONTINUE
SIFIED

670. RETURN
680. DEBUG SUB CHK
690. AT 1
700. END

N 209 IBANK 41 DBANK

3-30
SUBROUTINE ULSNG

THIS SUBROUTINE DETERMINES IF THE X FORCE WILL WITHDRAW BASED ON CUMULATIVE WEAPON CATEGORY KILLS

SUBROUTINE DSNGIXHOLDSXWSNGXWPNIEXCHRXXDEADF,IFRC,DGMMAT1,

DIMENSION XWPNI10,31,XCHR11C,51,XDEAf10,21,DGMMAT14,21

1.

DO 1 1=1,12
DO 4C 1=1,1C
IF (XCHR11C Audit, then
DO 3C J=1,2
DO 5C 1=1,1C
IF (XWPNI10,31, Audit, then
CDEADF111 = CDEADF111 + XDEADF11,11
CDEADF111 = CDEADF111 + XWPNI10,31
END IF
END IF
CONTINUE
CONTINUE
CONTINUE
DO 50 ICAT=1,14
DO 30 J=1,2
DO 4C 1=1,1C
IF (XCHR11C Audit, then
CDEADF111 = CDEADF111 + XDEADF11,11
CDEADF111 = CDEADF111 + XWPNI10,31
END IF
END IF
CONTINUE
CONTINUE
CONTINUE
DO 50 ICAT=1,14

SIFIED

690. IF (CDEAD(I1CAT) + CALIVE(I1CAT) .GT. 0) THEN
700. FRCT = CDEAD(I1CAT) / (CDEAD(I1CAT) + CALIVE(I1CAT))
710. IF (FRCT .GE. DSMATT(I1CAT,1FRC)) THEN
720. XWDRW = 2
730. END IF
740. END IF
750. 50 CONTINUE
760. C
770. RETURN
780. DEBUG SUBCHK
790. AT 1
800. END

N 229 I BANK 75 DBANK
SUBROUTINE ECLOSS(YXPKW,YXPN,PCXVY2,YYDFR,YFLSFR,
YSPFDG,EXCLSS)
1.C.

THIS SUBROUTINE CALCULATES EXCLSS(I,M,J), THE EXPECTED
COMMITTEE LOSSES FOR X FORCE TARGET TYPES I IN TACTICAL
MODE J=1,2 FROM Y FORCE WEAPON M OF WHICH M=11,20 ARE IN
TACTICAL MODE 2
.

YXPKW(K,N,L) SSPK FOR Y FORCE WEAPON K IN TACTICAL MODE

L=1,2 AGAINST X FORCE TARGET N OF WHICH

ARE IN TACTICAL MODE 2

YXPN(I,J+1) NUMBER OF X FORCE WEAPON TYPE I IN

TACTICAL MODE J=1,2

CXVY2(I,I',J) PERCENT VISIBLE OF X FORCE WEAPON TYPE I

IN TACTICAL MODE J=1,2 TO Y FORCE

WEAPON TYPE M OF WHICH M=11,20 ARE IN

TACTICAL MODE 2

YYDFR(K,N,L) ROUND FIRED BY Y FORCE WEAPON TYPE K

IN TACTICAL MODE L=1,2 AGAINST X FORCE

TARGET TYPE N OF WHICH N=11,20 ARE IN

TACTICAL MODE 2

YFLSFR FAULSL FIRE FACTOR FOR Y FORCE: INABILITY

TO DISTINGUISH TARGETS

YSPFDG(I,J) FIRE SUPPRESSION FOR X FORCE WEAPON

TYPE I IN TACTICAL MODE J=1,2

DIMENSION YXPKW(10,20,21),YXPN(10,31),PCXVY2(10,20,21)

YDFR(10,20,21),EXCLSS(10,20,21),YSPFDG(10,21)

DO 10 J=1,2

LO 20 I=1,10

LO 30 L=1,2

DO 40 K=1,10

PCVIS = PCXVY2(I,K*(L-1)*10,J) = (1 - YSPFDG(I,J)*0.33)

PK = YXPKW(I,1+J-1)*10,L1

XNTG = YXPN(I,J+1)

RDFR = YYDFR(K,1+J-1)*10,L1 = YFLSFR

CMMT1 = XNTG * PCVIS

ACMHTT - AMAX(I,CMMTT)

EXCLSS(I,K*(L-1)*10,J) = CMMT1 * (1-(1-PK/ACMHTT)**RDFR)

CONTINUE

CONTINUE

CONTINUE

CONTINUE

CONTINUE

C

RETURN

DEBUG SUBCHK

AT 100

LND
SUBROUTINE ETLOSS(XWPN, EXCLSS, EXTLSS)

THIS SUBROUTINE CALCULATES EXTLSS(I,J), THE TOTAL EXPECTED
DIRECT FIRE LOSSES OF X FORCE TARGET TYPE I IN TACTICAL
MODE J=1,2

XWPN(I,J+1) NUMBER OF X FORCE WEAPON TYPE I IN TACTICAL
MODE J=1,2

EXCLSS(I,M,J) EXPECTED COMMITTEE LOSSES FOR X FORCE TARGET
TYPE I IN TACTICAL MODE J=1,2 AGAINST Y FORCE
WEAPON TYPE M OF WHICH M=11,20 ARE IN TACTICAL
MODE J.

DIMENSION XWPN(IO,31,EXCLSS(IO,20,21,EXTLSS(1G,2))

DO 10 J=1,2

DO 20 I=1,10

SRV = 1

DO 30 L=1,2

DO 40 K=1,10

AXWPN = AMAX1(1,AMAX1(XWPN(I,J+1))

SRV = SRV * (1 - EXCLSS(I,M*(L-1)*10,J) / AXWPN)

CONTINUE

DO 30

CONTINUE

DO 40

CONTINUE

RETURN

DEBUG SUBCHK

END

3-34
SUBROUTINE INDEX1

SUBROUTINE INDEX1 (DFRC, BDFAT, RDFAT, BFRCTP, BUMMAX, ROMMAX, BWRW, RWRW, BDMV, RDMV, WOFTWARE, ROWWARE)

THIS SUBROUTINE PASSES THE FOLLOWING INDEXES FOR BLUE AND RED FORCES:

DFRC = 1 = BLUE FORCE DEFENDS
       2 = RED FORCE DEFENDS
BDFAT = 1 = BLUE FORCE DEFENDS
       2 = RED FORCE DEFENDS
RDFAT = 1 = BLUE FORCE ATTACKS
       2 = RED FORCE ATTACKS
BFRCTP = 1 = LIGHT FORCE
       2 = HEAVY FORCE
BUMMAX = MAXIMUM NUMBER OF BLUE TROOPS PER CARRIER
ROMMAX = MAXIMUM NUMBER OF RED TROOPS PER CARRIER
BWRW = 1 = BLUE FORCE ENGAGES
       2 = BLUE FORCE WITHDRAWS
RWRW = 1 = RED FORCE ENGAGES
       2 = RED FORCE WITHDRAWS
BDMV = 1 = BLUE FORCE IS MOUNTED
       2 = BLUE FORCE IS DISMOUNTED
RDMV = 1 = RED FORCE IS MOUNTED
       2 = RED FORCE IS DISMOUNTED
WOFTWARE = 1 = BLUE FORCE IS NOT IN OVERWATCH
           2 = BLUE FORCE IS IN OVERWATCH
ROWWARE = 1 = RED FORCE IS NOT IN OVERWATCH
           2 = RED FORCE IS IN OVERWATCH

DETERMINE IF RED OR BLUE FORCES ARE ATTACKING OR DEFENDING
IF (DFRC, .EQ. 1) THEN
   BDFAT=1
   RDFAT=2
   ELSE
      BDFAT=2
      RDFAT=1
   END IF

DETERMINE MAXIMUM NUMBER OF TROOPS PER RED AND BLUE CARRIERS
IF (BFRCTP, .EQ. 1) THEN
   BUMMAX=5
   ELSE
   BUMMAX=7
      END IF

SET WITHDRAWAL INDEXES:
   BWRW=1
   RWRW=1

SET DISMOUNT INDEXES
   BDMV=2
   RDMV=2

3-35
SET OVERWATCH INDEXE

C

690. C

60VTH=1

700.

710.

720.

730.

740.

750.

760.

RETURN

DEBUG SUBCHK

AT 1

END
DIMENSION AMFLD(4)

C INITIALIZE VARIABLES:
100 C KNTMNT=1
110 KWDKNT=1
120 FPFTM=0
130 BDSNG=1
140 RDSNG=1
150 BHOLDS=2
160 RHOLDS=2

DO 10 J=1,4
10 AMFLD(J)=0

CONTINUE

IF (BDFAT.EQ.1) THEN
BFLSFR = 0.8
FFLSFR = 0.4
ELSE
BFLSFR = 0.4
FFLSFR = 0.8
END IF

RETURN

END
SUBROUTINE INIT1JARRAY, VAR)

This subroutine initializes array11,ji to equal Var

DIMENSION ARRAY(10,2)

DO 10 J=1,2

DO 20 I=1,10

ARRAY11,JI=VAR

CONTINUE

CONTINUE

RETURN

END
SUBROUTINE INTART

THIS SUBROUTINE DETERMINES ARTILLERY LOSS RATES TO USE IN DIAM.

DIMENSION BARTJF(10,4), RARTJF(10,4), ARPAM(18)

DO 10 I = 1, 10
    BARTJF(I, 3) = BARTJF(I, 4) / ARPAM(I, 7)
    RARTJF(I, 3) = RARTJF(I, 4) / ARPAM(I, 7)
10 CONTINUE

RETURN
DEBUG SUBCK
A1
LNL

I$ 1 BANK ?1 $BANK
DIAMPUBLISH,INTDST

R1  C

100.  C*********** SUBROUTINE INTDST ***********
110.  C
120.  C
130.  C
140.  C
150.  C
160.  C
170.  C
180.  C
190.  C
200.  C
210.  C
220.  C
230.  C
240.  C
250.  C
260.  C
270.  C
280.  C
290.  C
300.  C
310.  C
320.  C
330.  C
340.  C
350.  C
360.  C
370.  C
380.  C
390.  C
400.  C
410.  C
420.  C
430.  C
440.  C
450.  C
460.  C
470.  C
480.  C
490.  C
500.  C
510.  C

SUBROUTINE INTDST(IFRC,XCHR,XWPN,DFCWC,DXFWP)

THIS SUBROUTINE INITIALIZES DXFWP(I,J), THE DISTANCE FROM X FORCE CENTROID TO X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2

IFRC INDEX: 1=BLUE FORCE, 2=RED FORCE
XCHR(I,J) WEAPON CATEGORY FOR X FORCE WEAPON TYPE I:
1 = DISMOUNTED, 2 = MORTARS, 3 = LIGHT, 4 = HEAVY
XWPN(I,J) NUMBER OF X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2
DFCWC(I,J,IFRC) DISTANCE FROM IFRC CENTROID TO WEAPON CATEGORY CENTROID B

DIMENSION XCHR(10,2),XWPN(10,3),DFCWC(4,2),DXFWP(10,2)

DO 10 J=1,2,10
     DO 20 I=1,10

       IF(XWPN(I,J) .GT. 0) THEN
          IF(XCHR(I,J) .EQ. 1 .AND. IJ.EQ.11) THEN
              DXFWP(I,J) = 5999999
          ELSE
              DXFWP(I,J) = DFCWC(XCHR(I,J),IFRC)
          END IF
       ELSE
          DXFWP(I,J) = 5999999
       END IF

       CONTINUE
20    CONTINUE
10    CONTINUE

RETURN
N 153  IBANK 47  DBANK

3-40
SUBROUTINE JFLSS(YCHR,YWPN,XYKVLSS,ROTLS,YARTLS,YMNLS,XYKVLSS)
	\textbf{THIS SUBROUTINE CALCULATES XYKVLSS(I,J), THE KILLER VICTIM}
	\textbf{SCOREBOARD FOR Y FORCE KILLER WEAPON TYPE M AGAINST Y}
	\textbf{FORCE VICTIM WEAPON TYPE I. THE LOSSES ARE UPDATED AND}
	\textbf{CUMULATED EVERY MINUTE.}

\textbf{EYCLSS(I,M,J)} \textbf{THE EXPECTED COMMITTEE LOSSES FOR Y FORCE}
\textbf{TARGET TYPE I IN TACTICAL MODE J FROM THE}
\textbf{OPPOSING FORCE WEAPON TYPE, M OF WHICH}
\textbf{ARE TACTICAL MODE 2}

\textbf{EYTLSS(I,J)} \textbf{THE TOTAL EXPECTED LOSSES FOR Y FORCE}
\textbf{WEAPON TYPE I IN TACTICAL MODE J=1,2}

\textbf{A-KILL} \textbf{LOCAL ARRAY HOLDING NUMBER OF WEAPONS}
\textbf{KILLED BY WEAPON TYPE M}

\textbf{CLOSS} \textbf{TOTAL NUMBER OF VICTIMS BY COMMITTEE LOSSES}
\textbf{KILLED BY WEAPON TYPE M}

\textbf{YARTLS(I,J)} \textbf{ARTILLERY LOSSES FOR Y FORCE WEAPON TYPE}
\textbf{IN TACTICAL MODE J=1,2}

\textbf{YMNLS(I,J)} \textbf{MINE LOSSES FOR Y FORCE WEAPON TYPE I IN}
\textbf{TACTICAL MODE J=1,2}

\textbf{DIMENSION} EYCLSS(1G,2G,2),EYTLSS(1G,2),XYKVLSS(12,13)

1, \textbf{AKILL(I,1),YARTLS(I,2),YMNLS(10,2),YWPN(1C,3)}

2, \textbf{AKILL(1,1),EYTLSS(10,2),YCHR(10,51)}

\textbf{COPY EXPECTED LOSSES DURING MINUTE}
\textbf{DO 1: J=1,2}
\textbf{DO 2C I=1,10}
\textbf{EYTLSS(I,J) = EYTLSS(I,J)}
\textbf{CONTINUE}
\textbf{CONTINUE}

\textbf{EXCLUDE MOUNTED INFANTRY LOSSES}
\textbf{DO 30 I=1,10}
\textbf{IF(YCHR(1,4)=0) AND. EYTLSS(I,11) GT.0 THEN}
\textbf{EYTLSS(I,11) = L}
\textbf{END IF}
\textbf{CONTINUE}
\textbf{CONTINUE}

\textbf{CALCULATE ARTILLERY AND MINE LOSSES AGAINST VICTIMS}
\textbf{DO 40 I=1,10}
\textbf{XYKVLSS(I,11) = YARTLS(I,11) + YARTLS(I,12) + XYKVLSS(11,1)}
\textbf{XYKVLSS(I,12) = YMNLS(I,11) + YMNLS(I,2) + XYKVLSS(12,1)}
\textbf{CONTINUE}

\textbf{CALCULATE MILLER/VICTIM SCOREBOARD EXCLUDING MOUNTED INFANTRY}
\textbf{DO 70 I=1,10}
\textbf{CLOSS = C}
\textbf{DO SC M=1,10}
\textbf{AKILL(M) = EYCLSS(I,M,11) + EYCLSS(I,M,12)}
\textbf{AKILL(M) = AKILL(M) + EYCLSS(I,M+10,11) + EYCLSS(I,M+10,2)}
\textbf{CLOSS = CLOSS + AKILL(M)}

SIFIEL
SIFIED

CONTINUE
720. 50

COMPUTE FRACTION OF VICTIM I KILLED BY WEAPON M
730. C

DO 6 M=1,10
740. 

IF(CLSS.GT.3) THEN
750. 

 BKILL(M,I) = AKILL(M)*(EVTLS(I,1)+EVTLS(I,2))/CLSS
760. 

 XYKVL(M,I) = XYKVL(M,I) + BKILL(M,I)
770. 

END IF
780. 

END IF
790. 60  

CONTINUE
800. 70  

CONTINUE

810. C

820. C  TOTAL KILLER/VICTIM TROOP CARRIERS LOSSES

830. 

TOTCKL = 0
840. 

DO 80 M=1,10
850. 

DO 90 I=1,1C
860. 

IF(YCHR(I,4).EQ.3 .AND. WPNI(I,1).NE.-999) THEN
870. 

TOTCKL = TOTCKL + BKILL(M,I)
880. 

END IF
890. 90  

CONTINUE
900. 80  

CONTINUE

910. C

920. C  CALCULATE KILLER/VICTIM SCOREBOARD FOR MOUNTED INFANTRY

930. 

DO 100 M=1,1G
940. 

DO 110 I=1,1D
950. 

IF(YCHR(I,4).EQ.3 .AND. WPNI(I,1).NE.-999) THEN
960. 

CARR = BKILL(M,I)
970. 

DO 120 J=1,1C
980. 

IF(YCHR(J,4).EQ.1 .AND. EVTLS(J,1).GT.3) THEN
990. 

IF(TOTCKL.GT.0) THEN

1010. XYKVL(M,J) = XYKVL(M,J) + (CARR/TOTCKL)

1020. 

END IF

1030. 

END IF

1040. 120  

CONTINUE
1050. 

END IF

1060. 110  

CONTINUE

1070. C

1080. C

1090. 

RETURN

1100. 

DEBUG SUBCHM

1110. 

END

N 557 IBANK 227 LBANK

3-42

SIFIED
THE FOLLOWING EXPLAIN THE SUBSCRIPTS FOR  \( TAC(A(I, J) \):

- 1:1 \( TAC(1, 1) \): Attacking Light Category Weapon
- 1:2 \( TAC(1, 2) \): Attacking Heavy Category Weapon
- J:1 \( TAC(J, 1) \): Pointer to defender weapon category who initiates tactical mode change for I
- J:2 \( TAC(J, 2) \): Distance from defender to attacker at which tactical mode change occurs.
- J:3 \( TAC(J, 3) \): Percentage of I:2 type weapons that goes into tactical mode change, for I:1 type weapons all troop carriers will dismount troops.

```
DIMENSION TAC(2, 3)
```

```
SUBROUTINE LRDT(BFRCTP, RFHCTP, DPSTR, TAC)
```

```
THIS SUBROUTINE Initializes THE FOLLOWING VARIABLES AND THE TACTICS ARRAY. TACTICS PERTAIN TO ATTACKER:
```

- Light and Heavy category weapons only.
- Systems which are troop carriers can dismount infantry, and heavy systems can go into Overwatch.

```
SUBROUTINE INITIALIZES THE FOLLOWING VARIABLES AND THE TACTICS ARRAY. TACTICS PERTAIN TO ATTACKER:
```

- Light systems which are troop carriers can dismount infantry, and heavy systems can go into Overwatch.

```
6FRCTP INDEX FOR BLUE FORCE: LIGHT=1, HEAVY=2
```

```
RFHCTP INDEX FOR RED FORCE: LIGHT=1, HEAVY=2
```

```
DPSTR INDEX FOR DEFENSE POSTURE: PREPARED=1, AMBUSHED=3
```

```
BLUE FORCE CENTROID (MAX IS 1000 METERS)
```

```
THE FOLLOWING EXPLAIN THE SUBSCRIPTS FOR TAC(A(I, J)):
```

```
1:1 \( TAC(1, 1) \): Attacking Light Category Weapon
```

```
1:2 \( TAC(1, 2) \): Attacking Heavy Category Weapon
```

```
J:1 \( TAC(J, 1) \): Pointer to defender weapon category who initiates tactical mode change for I
```

```
J:2 \( TAC(J, 2) \): Distance from defender to attacker at which tactical mode change occurs.
```

```
J:3 \( TAC(J, 3) \): Percentage of I:2 type weapons that goes into tactical mode change. For I:1 type weapons all troop carriers will dismount troops
```

```
56 CONTINUE
```

```
57 RETURN
```

```
58 END
```

```
N 63 IBANK = 1 UBank
```

3-43
SUBROUTINE MINCHR

INDEX FOR PLAYING MINEFIELDS: NO=0, YES=1

INDEX FOR MINEFIELD WIDTH

MINEFIELD FRACTION NOT BYPASSED

FRACTION OF ATTACKING FORCE ENTERING MINEFIELD

LOCATION OF FRONT EDGE OF MINEFIELD

LOCATION OF BACK EDGE OF MINEFIELD

MINEFIELD LOSS RATES FOR ATTACKING WEAPON

CATEGORY TYPE 1=1,4:

DISMOUNTED=1, MORTARS=2, LIGHT=3, HEAVY=4

DISTANCE FROM FORCE CENTROID J=1,2 TO WEAPON

CATEGORY J=1,4:

DISMOUNTED=1, MORTARS=2, LIGHT=3, HEAVY=4

INDEX FOR DEFENDING FORCE:

DEFENDING FORCE LOSS RATES FOR ATTACKING WEAPON

CATEGORY TYPE 1=1,4:

DISMOUNTED=1, MORTARS=2, LIGHT=3, HEAVY=4

COMMON/REED/IDAY1,XIN(4),ICARD(26),IHY,IHN,IHYES,IHNO

DIMENSION AMFLD(4),DFCW(4,2),AMLRS(4)

INITIALIZE MINEFIELD LOSS RATES

AMLRS(11) = 0.10

AMLRS(12) = 0.14

AMLRS(13) = 0.14

AMLRS(14) = 0.14

PRINT 1000

'IS THE DEFENDER USING MINES IN THE 200-400 METER RANGE BAND? '

CALL REED4(IANS)

IF(IANS.GT.1HY) THEN

AMFLD(11) = 1.0

ELSE IF(IANS.NE.1HY.AND. IANS.NE.1HN) THEN

GO TO 10

ELSE

RETURN

ENDIF

PRINT 1010

'ENTER WIDTH OF MINEFIELD IN METERS'

CALL REED4

AMFLD(12) = XIN(11)

IF(AFLD(12).LE.0 .OR. AMFLD(12).GT.5999) THEN

GO TO 20

ENDIF

PRINT 1020

'ENTER FRACTION OF MINEFIELD NOT BYPASSED BY'

1' ATTACKER '

CALL REED4
655. AMFLD(3) = XJNX(1)
660. IF(AMFLD(3).LT.C .OR. AMFLD(3).GT.1.0) THEN
665. GO TO 30
670. END IF
675. C
700. PRINT 1030
710. 1030 FORMAT(1x,'WHAT FRACTION OF THE ATTACKING FORCE ENTERS *'
720. 1'THE MINEFIELD?')
730. CALL FELDY
735. AMFLD(4) = XINX(1)
740. IF(AMFLD(4).LT.C .OR. AMFLD(4).GT.1.0) THEN
745. GO TO 40
750. END IF
770. C
780. PRINT 1040
790. 1040 FORMAT(1x,'DO YOU WISH TO CHANGE INPUTS?'
800. C
810. IF(IANS.EQ.1 .HY) THEN
820. GO TO 1C
830. END IF
850. C
860. FIX FRONT AND REAR EDGES OF THE MINEFIELD
865. FMINFLD = 400 + DF^DC(1,DFRC)
870. BMINFLD = 200 + DFDC(1,DFRC)
880. C
890. RETURN
5. C
8. DEBUG SUBCHK
*1 A1
92. END

N 27" IBANK 145 DBANK 36 COMMON
SUBROUTINE MNLESS

THIS SUBROUTINE COMPUTES ATTACKER LOSSES FROM DEFENDER MINEFIELDS

AWIDTH(I,J) CORRIDOR WIDTH FOR ATTACKER FOR WEAPON CATEGORY
I=1,4 AND IN RANGE BAND J=1,5:
DISTRIBUTED=1, MORTARS=2, LIGHT=3, HEAVY=4;
0-200=1, 200-400=2, 400-600=3, 600-800=4,
800-1000=5

INDEX FOR DEFENDER PLAYING MINE: NO=1, YES=2

INDEX FOR MINEFIELD WIDTH

MINEFIELD FRACTION NOT BYPASSED

FRACTION OF ATTACKING FORCE ENTERING MINEFIELD

MINE LOSSES TO WEAPON TYPE 1 IN TACTICAL MODE J=1,2

ATTACKER POSITION RELATIVE TO THE FRONT EDGE OF THE MINEFIELD

ATTACKER POSITION RELATIVE TO THE REAR EDGE OF THE MINEFIELD

PERCENT TERRAIN COVERAGE OF THE MINEFIELD

DISTANCE BETWEEN RED AND BLUE FORCE CENTROIDS

DISTANCE FROM X FORCE CENTROID TO X FORCE WEAPON TYPE 1 IN TACTICAL MODE J=1,2

WEAPON CATEGORY FOR X FORCE WEAPON TYPE 1:
DISTRIBUTED=1, MORTARS=2, LIGHT=3, HEAVY=4

LOCATION OF FRONT EDGE OF MINEFIELD

LOCATION OF BACK EDGE OF MINEFIELD

DIMENSION AMFLD(4),AMLSR(4),AWIDTH(4),51,XMNLESS(10),2),

DXFUXL(16,2),XCHR(10,5),XWPN(10,3)

CHECK FOR MINEFIELD PARAMETERS

IF AMFLD(1).EQ.0 .OR. AMFLD(4).EQ.0 THEN
RETURN
END IF

ZERO-OUT PAST MINEFIELD LOSSES

CALL INITI(XMNLESS,VAR)

CHECK FOR ENTRANCE INTO MINEFIELD

DO 30 J=1,10
DO 40 J=1,2
IF (XWPN(11,J+1).GT.0) THEN
DXWFM = DXSTBR = DXFUXL(11,J) - FMNFLD
DXWBM = DXSTBR = DXFUXL(11,J) - BMNFLD
IF (DXWFM.LE.0) AND (DXWBM.LE.0) THEN
CALCULATE MINE LOSSES
IF (AWIDTH(XCHR(11,J+1),11).GT.0) THEN
PCV = AMFLD(2) * AMFLD(3) / AWIDTH(XCHR(11,J+1))
SIFIED

650. XMNLSS(I,J) = XWPNI(I,J+1) * PCV * AMFLD(I,1)
700. 1
710.   END IF
720.   END IF
730.   END IF
740.  4C    CONTINUE
750.  35    CONTINUE
760. C
770. RETURN
780. DEBUG SUB CHK
790. AT 1
800. END

M 273 I BANK 78 DBANK
SUBROUTINE MOVIN(IOPS, IOPN, KK27, KK20, BMVRT, RMVRT, BUTCT, ROTCT)

THIS SUBROUTINE LOADS BLUE MOVEMENT RATES AND DETECTION DATA AND RED MOVEMENT RATES AND DETECTION DATA FROM RANDOM ACCESS FILES 27 AND 20.

IOPS POINTS TO THE DAY TYPE: 1=CLEAR, 2=NIGHT.
IOPN POINTS TO TERRAIN TYPE 1=OPEN, 2=CLOSED.
KK27 POINTERS FROM MOVEMENT RATE FILE
KK20 POINTERS FROM DETECTION FILE.
BMVRT(A,B) MOVEMENT RATE FOR BLUE FORCE BASED ON WEAPON CATEGORY A (1=DISMOUNTED, 2=MORTARS, 3=LIGHT, 4=HEAVY) AND TERRAIN TYPE B (1=OPEN, 2=CLOSED).
RMVRT(A,B) MOVEMENT RATE FOR RED FORCE BASED ON WEAPON CATEGORY A (SEE ABOVE).

BDICT(I,J,K) BLUE WEAPON DETECT TIMES AGAINST RED TARGETS BASED ON TARGET EXPOSURE I.

SIGHT, 3=TELESCOPIC SIGHT, 4=IMAGE INTENSIFIER, AND RANGE BAND K (0=1-200, 1=400-600, 2=600-800).

RED WEAPON DETECT TIMES AGAINST BLUE TARGETS BASED ON TARGET EXPOSURE I.

SELECT POINTER TO PROPER MOVEMENT RATE.
SELECT POINTER TO PROPER DETECTION FILE.

DIMENSION BMVRT(4,21), RMVRT(4,21), BUTCT(4,4,5), ROTCT(4,4,5)
650  MM20 = K20
700  RETURN
71  DEBUG SUBCHK
72  11 1
73  END

N 99 1BANK 215 DBANK
SUBROUTINE MVRT (Xovwth, Xdfat, Xwdrw, Trntp, Xchr, Xwpn, Xmvr, Xwpmr)

This subroutine determines Xwpmr[I, J], the movement rates for X Force weapon type I in tactical mode J=1,2.

DIMENSION Xchr[10, 5], Xwpn[10, 3], Xmvr[14, 2], Xwpmr[11, 4]

IF (Xwdrw EQ .7) THEN
  VAR = -1
ELSE IF (Xdfat EQ .1) THEN
  VAR = 0
ELSE
  VAR = 1
END IF

DO 10 J=1,2
  DO 20 I=1,10
    IF (Xwpn[I, J] GT 0) THEN
      Xwpmr[I, J] = Xmvr[I, Xchr[I, 4], Trntp] * VAR
    ELSE
      Xwpmr[I, J] = 0
    END IF
  20 CONTINUE
10 CONTINUE

LO 30 I=1,10
  IF (Xchr[I, 4] EQ .4) THEN
    IF (Xwpn[I, 1] GT 0) THEN
      Xwpmr[I, 1] = 0
    END IF
  ELSE IF (Xchr[I, 4] EQ .1) THEN
    IF (Xwpn[I, 2] GT 0) THEN
      Xwpmr[I, 1] = 0
    END IF
  ELSE
    Xwpmr[I, 1] = 0
  END IF
30 CONTINUE

END
$IFIED$

69G. C
70G. RETURN
71' DEBUG SUBCHK
72' AT 1
73' END

N 223 IBANK 55 DBANK
SUBROUTINE NDIST

DISTANCE BETWEEN RED AND BLUE CENTROIDS)

DISTANCE BETWEEN RED AND BLUE CENTROIDS

NUMBER OF X FORCE TYPE WEAPON TYPE I IN

MOVEMENT RATE FOR X FORCE WEAPON TYPE I IN

MOVEMENT SUPPRESSION DEGRADATION FOR

X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2

X FORCE WEAPON TYPE I CATEGORIES:

DIMENSION XWPN(10,3),XWPMVR(10,2),XSPMDG(10,2),

CALCULATE MINIMUM (SUPPRESSION X MOVEMENT RATE)

ZMIN = 1000

DO 10 J=1,2

DO 20 I=1,10

IF(XWPN(I,J+1).GT.C) THEN

IF(XCHR(I,J+1),NE.1,.OR. JNE.1) THEN

IF(XWPMVR(I,J+1).NE.0) THEN

ZMIN = AMIN1(ZMIN,XWPMVR(I,J)*1-XSPMDG(I,J))

END IF

END IF

END IF

20 CONTINUE

10 CONTINUE

CALCULATE NEW DISTANCES

IF(ZMIN.EQ.1000) THEN

RETURN

END IF

CALCULATE NEW DISTANCES

DO 30 J=1,2

DO 40 I=1,10

IF(XWPN(I,J+1).GT.C) THEN

IF(XCHR(I,J+1).NE.1,.OR. JNE.1) THEN

IF(XWPMVR(I,J+1).NE.0) THEN

DXFYP(I,J) = DXFYP(I,J) + ZMIN

END IF

ELSE

DXFYP(I,J) = -9999999

END IF

40 CONTINUE

END IF

30 CONTINUE
680. C CHECK FOR OVERRUNNING OPPONENTS
690. C
700. DO 50 J=1,2
710. DO 60 I=1,10
720. IF(DXFJP(I,J),GE,DSTBR) THEN
730. DXJJP(I,J) = DSTBR - 10.0
740. END IF
750. 60 CONTINUE
760. 50 CONTINUE
780. C
790. RETURN
800. DEBUG SUBCHK
810. AT 1
820. END

N 295 IBANK 61 DBANK
SUBROUTINE NUMTGT(XYPKW,YWPN,PCVXZ,YSFPDG,TOTYTG)

THIS SUBROUTINE CALCULATES TOTYTG(I,J), TOTAL Y TARGETS
FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2

YWPN(K,L+1) CONTAINS NUMBER OF Y FORCE WEAPON TYPE K
IN TACTICAL MODE L=1,2
PCVXZ(K,N,L) PERCENT OF Y FORCE WEAPON TYPE K IN TACTICAL
MODE L=1,2 VISIBLE TO X FORCE WEAPON TYPE N
OF WHICH N=11,20 ARE IN TACTICAL MODE 2
XYPKW(I,M,J) SINGLE SHOT PROBABILITY OF KILL(YSPPK)
OF X FORCE WEAPON TYPE I IN TACTICAL
MODE J=1,2 AGAINST Y FORCE TARGET TYPE M
OF WHICH M=11,20 ARE IN TACTICAL MODE 2
YSFPDG(K,L) FIRE SUPPRESSION AGAINST Y FORCE
WEAPON TYPE K IN TACTICAL MODE L=1,2

DIMENSION XYPKW(10,20,2),YWPN(10,31),PCVXZ(10,20,2)

DO 10 J=1,2
   DO 20 I=1,10
      DO 30 L=1,2
         DO 40 K=1,10
            IF(XYPKW(I,K*(L-1)+10,J).GT.0) THEN
               TOTYTG(I,J) = PCVXZ(K,I*(J-1)+10,L) * YWPN(K,L+1)
               TOTYTG(I,J) = TOTYTG(I,J) * (1-YSFPDG(K,L)*0.33) + TOTYTG(I,J)
            END IF
20 CONTINUE
10 CONTINUE
20 CONTINUE
30 CONTINUE
40 CONTINUE
50 RETURN
60 DEBUG SUBCHK
70 END
SUBROUTINE PCTBL

THIS SUBROUTINE DETERMINES WHICH TWO OF THE SIX VISIBILITY TABLES TO USE IN THE ATIRITION LOOP BASED ON THE VALUE OF XWITHDR AND YWITHDR

INDEX FOR BLUE FORCE: 1=ENGAGE, 2=WITHDRAW
INDEX FOR RED FORCE: 1=ENGAGE, 2=WITHDRAW
INDEX: 1=BLUE DEFENDS, 2=RED DEFENDS
FRACTION OF RED FORCE WEAPON CATEGORY I IN THE KTH RANGE BAND DURING ENGAGEMENT
FRACTION OF RED FORCE WEAPON CATEGORY I IN THE KTH RANGE BAND DURING BLUE FORCE WITHDRAWAL
FRACTION OF BLUE FORCE WEAPON CATEGORY I IN THE KTH RANGE BAND DURING RED FORCE WITHDRAWAL
FRACTION OF BLUE FORCE WEAPON CATEGORY I IN THE KTH RANGE BAND DURING BLUE FORCE WITHDRAWAL
FRACTION OF RED FORCE WEAPON CATEGORY I IN THE KTH RANGE BAND DURING RED FORCE WITHDRAWAL
FRACTION OF RED FORCE WEAPON CATEGORY I IN THE KTH RANGE BAND DURING BLUE FORCE WITHDRAWAL

DIMENSION PCRVBE(4,4,5),PCRBVW(4,4,5),PCRWVB(4,4,5)
PBRVRE(4,4,5),PCBVRE(4,4,5)

IF(BWDRW.EQ.2 .AND. RWDW.EQ.2) THEN
IF(DFRC.EQ.1) THEN
RWDW=1
ELSE
BWDRW=1
END IF
END IF

IF(BWDRW.EQ.1 .AND. RWDW.EQ.1) THEN
DO 10 I=1,4
DO 20 J=1,4
DU =0.5
PCRBVRE(I,J,K)=PCRBVRE(I,J,K)
PBRVRE(I,J,K)=PBRVRE(I,J,K)
CONTINUE
CONTINUE

3-55
CONTINUE
CONTINUE
CONTINUE
CONTINUE
CONTINUE
CONTINUE
CONTINUE
END IF
RETURN
DEBUG SUBCHK
END

N 344 IBANK 87 DBANK
DIAMPUBLISH.PCPVS

SUBROUTINE PCWPVS

THIS SUBROUTINE DETERMINES PCXVYZ(I,M,J), THE FRACTION OF X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 VISIBLE TO Y FORCE WEAPON TYPE M OF WHICH M=11,20 ARE IN TACTICAL MODE 2

WEAPON CATEGORY OF X FORCE WEAPON TYPE I:
DIsmounted=1, Mortars=2, Light=3, Heavy=4

WEAPON CATEGORY OF Y FORCE WEAPON TYPE K:
DIsmounted=1, Mortars=2, Light=3, Heavy=4

FRACTION OF X FORCE WEAPON CATEGORY A VISIBLE TO Y FORCE WEAPON CATEGORY B

RANGE BANDS FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 AGAINST Y FORCE WEAPON TYPE M OF WHICH M=11,20 ARE IN TACTICAL MODE 2

DIMENSION XCHR(10,5),YCHR(10,5),PCXVYC(4,4,5),XYRBD(10,20,21)

DO 10 J=1,2
DO 20 I=1,10
DO 30 L=1,2
DO 40 K=1,10

IF (XYRBD(I,K*(L-1)*10,J) .EQ. 6) THEN
PCXVYZ(I,K*(L-1)*10,J) = 0
ELSE
PCXVYZ(I,K*(L-1)*10,J) = 1
END IF

CONTINUE
CONTINUE
CONTINUE
CONTINUE
RETURN

DEBUG SUBCKM
A 1
E 0

N 27 1 DBANK 61 DBANK
DIAMPUTLISH,PKIN
R1 04/01/82-10:33(0,)

100. SUBROUTINE PKIN(BRPK, RBPK, IBU, IRD, KK15, KK16, NUMB, 
110. NUMR, IU)
120. DIMENSION IBU(10), IRD(10), PREC(25), BRPK(10, 10, 5), RBPK(10, 10, 5)
130. 1, BCHR(16, 5), RCHR(10, 5), BNAME(10), RNAME(10)
140. C
150. C ZERO PK ARRAYS
160. C
170. C DEFINE FILE 15, 300, 26, U, K15, 16, 1300, 26, U, K16
180. C PRINT 2002, IU
190. C 2002 FORMAT(1X, * IU * .15)
200. I DO 30 I = 1, 10
210. DO 20 J = 1, 10
220. GO TO 10 K = 1, 5
230. BRPK(I, J, K) = -1.0
240. RBPK(I, J, K) = 1.0
250. 10 CONTINUE
260. 20 CONTINUE
270. 30 CONTINUE
280. C
290. C FILL ARRAY BRPK WITH BLUE VS RED PK
300. C
310. C 60 I = 1, NUMB
320. C
330. C FIND PROPER BLUE WEAPON ON PK FILE
340. C
350. K15 = 51 * (IBU(I) - 1) * 5
360. K16 = K15
370. C
380. C READ IN BLUE RECORDS FOR 5 RANGES
390. C
400. C 50 K = 1, 5
410. IF (IU.EQ.1) GO TO 35
420. READ(15, K15)IAM1, (PREC(I), L = 1, 25)
430. GO TO 37
440. 35 READ(16, K16)IAM1, (PREC(I), L = 1, 25)
450. C
460. C SELECT PROPER RED WEAPON VULNERABILITIES
470. C
480. C PRINT 2001, IAM1, (PREC(I), L = 1, 14)
490. C 2001 FORMAT(1X, A4, 14F5.2)
500. C 37 DO 40 J = 1, NUMR
510. IPT = IRD(J)
520. IF (PREC(IPT).NE.0.01) BRPK(I, J, K) = PREC(IPT)
530. 40 CONTINUE
540. 50 CONTINUE
550. 60 CONTINUE
560. C
570. C FILL ARRAY RBPK WITH RED VS BLUE
580. C
590. C 90 I = 1, NUMR
600. C
610. C FIND PROPER RED WEAPON ON PK FILE
620. C
630. K15 = 176 * (IBU(I) - 1) * 5
640. K16 = K15
650. C
660. C READ IN RED RECORDS FOR 5 RANGES
670. DO 80 K = 1, 5
680. IF (IU.EQ.1) GO TO 65

SIFIED
SUBROUTINE PKWP (XYPK, XYRGBD, XYPKWP)

This subroutine determines XYPKWP(I, M, J), the SSPK for X force weapon type I in tactical mode J=1,2 against Y force target type M of which M=[1,20] are in tactical mode 2.

DIMENSION XYPK(10,10,5), XYRGBD(10,20,2), XYPKWP(10,20,2)

DO 10 J=1,2
   DO 20 I=1,10
      DO 30 L=1,2
         DO 40 K=1,10
            IF (XYRGBD(I,K+(L-1)*10,J).EQ.0) THEN
               XYPKWP(I,K+(L-1)*10,J) = 0
            ELSE
               XYPKWP(I,K+(L-1)*10,J) = XYPK(I,K, XYRGBD(I,K+(L-1)*10,J))
            END IF
         CONTINUE
      CONTINUE
   CONTINUE
10 CONTINUE

RETURN

END
SUBROUTINE REMNT

**DESCRIPTION**

This subroutine mounts dismounted troops for a force. It handles the following parameters:

- **TOTDM**: Total number of dismounted troops.
- **TOTMC**: Total number of troop carriers.
- **CHR(I,4)**: Category of the force weapon type I.
- **WPN(I,J)**: Number of force weapon type I in tactical mode J.
- **DMMAX**: Maximum number of troops allowed in a troop carrier.
- **DNUMR**: Ratio of dismounted troops to carriers.
- **NUMDM**: Number of troops that mount per carrier.
- **DFXWPI(I,J)**: Distance from the force centroid to the force.

**DIMENSION**

- **XCHR(10,51)**
- **DFXWPI(10,21)**
- **WPN(10,3)**

**OPERATION**

1. If **DMRTO**.LE.0 THEN
   - DO 10 I=1,10
     - IF **CHR(I,4)**.EQ.1 THEN
       - IF **WPN(I,3)**.GT.0 THEN
         - **XPNI1,1** = **XPNI1,3**
         - **XPNI1,3** = 0
         - **DFXWPI1,1** = -99999999
         - **DFXWPI1,2** = -99999999
         - END IF
     - END IF
   - END IF
10 CONTINUE

2. ELSE IF **DMRTO**.LE.**DMMAX** THEN
   - DO 10 I=1,10
     - IF **CHR(I,4)**.EQ.1 THEN
       - IF **WPN(I,3)**.GT.0 THEN
         - **XPNI1,2** = **XPNI1,3** * **DMMAX**/**DMRTO**
         - **XPNI1,3** = **XPNI1,3** - **XPNI1,2**
         - **DFXWPI1,1** = -99999999
         - **DFXWPI1,2** = -99999999
         - END IF
     - END IF
10 CONTINUE

ELSE
   - DO 20 I=1,10
     - IF **CHR(I,4)**.EQ.1 THEN
       - IF **WPN(I,3)**.GT.0 THEN
         - **XPNI1,2** = **XPNI1,3** * **DMMAX**/**DMRTO**
         - **XPNI1,3** = **XPNI1,3** - **XPNI1,2**
         - **DFXWPI1,1** = -99999999
         - **DFXWPI1,2** = -99999999
         - END IF
     - END IF
20 CONTINUE

ELSE
   - **CHANGE TROOP CARRIER MODE**
   - DO 30 I=1,10
     - IF **CHR(I,4)**.EQ.3 THEN
   30 CONTINUE
SIFIED

690. IF (XWPN(I,3),GE,0) THEN
700. XWPN(I,2) = XWPN(I,3)
710. XWPN(I,3) = 0
720. DXFXWP(I,1) = DXFXWP(I,3)
730. DXFXWP(I,3) = -9999999
740. END IF
750. END IF
760. 30 CONTINUE
770. C
780. XDMV = 1
790. C
800. RETURN
810. DEBUG SUB CHK
820. AT 1
830. END

N 321 IBANK 43 DBANK
**DIAM PUBLISH, REPORT**

100 C ****************************************** SUBROUTINE REPORT ******************************************
110 C
120 C
130 C
140 C SUBROUTINE REPORT (IGAMTM, RBKVLs, BRKVLs, BNUM, RNUM, BREAD, 150 C 1 READ, BWPN, RWPN, BOSNG, RDSNG, BWDRW, RWDRW, 160 C 1 BRDSUM, RRDUM, DSIMIN)
170 C
180 C THIS SUBROUTINE PRINTS A DIAM BATTLE STATUS REPORT. THE REPORT LISTS THE KILLER VICTIM SCOREBOARDS AND ALLOWS THE GAMER TO STOP THE GAME. THE FOLLOWING VARIABLES ARE INPUT
210 C
220 C
230 C IGAMTM GAME TIME IN MINUTES
240 C RBKVL (I,J) LOSSES OF BLUE WEAPON TYPE J FROM RED WEAPON TYPE I
250 C BRKVL (I,J) LOSSES OF RED WEAPON TYPE J FROM BLUE WEAPON TYPE I
260 C BNUM NUMBER OF BLUE WEAPON SYSTEM TYPES
270 C RNUM NUMBER OF RED WEAPON SYSTEM TYPES
280 C BREAD (I,J) TOTAL NUMBER OF BLUE WEAPON TYPE I IN TACTICAL MODE J = 1, 2
290 C RREAD (I,J) TOTAL NUMBER OF RED WEAPON TYPE I IN TACTICAL MODE J = 1, 2
300 C BOSNG BLUE FORCE INDEX: ENGAGING = 1, DISENGAGE = 2
310 C RDSNG RED FORCE INDEX: ENGAGING = 1, DISENGAGE = 2
320 C BWPN (I,J) NUMBER OF BLUE FORCE WEAPON TYPE I IN TACTICAL_MODE J = 1, 2
330 C RWPN (I,J) NUMBER OF RED FORCE WEAPON TYPE I IN TACTICAL_MODE J = 1, 2
340 C BWDRW INDEX FOR BLUE FORCE: ENGAGING = 1, WITHDRAWING = 2
350 C RWDRW INDEX FOR RED FORCE: ENGAGING = 1, WITHDRAWING = 2
360 C DSIMIN MINIMUM DISTANCE BETWEEN OPPOSING WEAPONS
370 C
380 C COMMON /RED/ JDAY1, XINC (14), ICARD (20), IHY, IHN, IHB, IHVES, IHWO
390 C
400 C DIMENSION RBKVLs (12, 13), BRKVLs (12, 13), BREAD (10, 21), RREAD (10, 21), 410 C 1 READ (10), IAM (2), BWPN (10, 31), RWPN (10, 31), IBH (10), 420 C 1 IRH (10), BRDSUM (10, 21), RRDUM (10, 21)
430 C
440 C
450 C PRINT 1000, IGAMTM
460 C PRINT 1010, DSIMIN
470 C IBNUM = BNUM
480 C IRNUM = RNUM
490 C IAM (1) = 'ARTY'
500 C IAM (2) = 'MINE'
510 C
520 C INTEGERIZE BLUE JIFFY POINTERS
530 C DO 10 I = 1, IBNUM
540 C IBH (I) = BWPN (I, 1)
550 C 10 CONTINUE
560 C
570 C INTEGERIZE RED JIFFY POINTERS
580 C DO 20 I = 1, IRNUM
590 C IRH (I) = RWPN (I, 1)
600 C 20 CONTINUE
610 C
620 C
630 C
640 C
650 C
660 C
670 C
680 C

LAST
SIF
I
ED
65cl.
C
PRINT BLUE KILLER/RED VICTIM INFORMATION
77c.
C
PRINT HEADINGS
77c.
C
PRINT 2000
77c.
C
PRINT 3000, {IRH(I),I=1,1RNUM}
77c.
C
PRINT RED DIRECT FIRE LOSSES AND ROUNDS FIRED
77c.
C
DU 1C I=1,1RNUM
77c.
C
PRINT 4000, IRH(I),{BRKVLs(I,J),J=1,1RNUM}
77c.
C
PRINT 4005, {BROSUM(I,K),K=1,2}
77c.
C
3D
CONTINUE
78c.
C
PRINT RED ARTILLERY AND MINE LOSSES
79c.
C
DO 40 J=1,2
80c.
C
PRINT 4010, IAM(I),{BRKVLs(I+10,J),J=1,1RNUM}
81c.
C
4D
CONTINUE
82c.
C
SUM DEAD REDS AND PRINT SUM
83c.
C
DO 50 I=1,1RNUM
84c.
C
DEAD(I) = READ(I-1) * RDEAd(I,2)
85c.
C
5C
CONTINUE
86c.
C
PRINT 5000, {DEAD(I),I=1,1RNUM}
87c.
C
6D
PRINT RED KILLER/BLUE VICTIM INFORMATION
88c.
C
PRINT HEADINGS
89c.
C
PRINT 6000
90c.
C
PRINT 3000, {IRH(I),I=1,1RNUM}
91c.
C
PRINT BLUE DIRECT FIRE LOSSES AND ROUNDS FIRED
92c.
C
DO 60 I=1,1RNUM
93c.
C
PRINT 4000, IRH(I),{BRKVLs(I,J),J=1,1RNUM}
94c.
C
PRINT 4005, {BROSUM(I,K),K=1,2}
95c.
C
6D
CONTINUE
96c.
C
PRINT BLUE ARTILLERY AND MINE LOSSES
97c.
C
DO 70 I=1,2
98c.
C
PRINT 4010, IAM(I),{BRKVLs(I+10,J),J=1,1RNUM}
99c.
C
7D
CONTINUE
100c.
C
SUM DEAD BLUES AND PRINT SUM
101c.
C
DO 80 I=1,1RNUM
102c.
C
DEAD(I) = BDEAD(I,1) + BDEad(I,2)
103c.
C
80
CONTINUE
104c.
C
PRINT 5000, {DEAD(I),I=1,1RNUM}
105c.
C
1D
QUESTION GAMER FOR DISENGAGEMENT
106c.
C
IF(BWDRW.EQ.1 .AND. RWDw.EQ.1) THEN
107c.
C
9L
PRINT 7000
108c.
C
9L
CALL "LED4"
109c.
C
IOUT XINX(11)
110c.
C
IF(IOUT.I.T.LT.1 .OR. IOUT.GT.31 THEN
111c.
C
GO TO 90
112c.
C
ELSE IF(IOUT.EQ.2) THEN
113c.
C
BDSNSG = 2
114c.
C
ELSE IF(IOUT.EQ.3) THEN
115c.
C
BDSNSG = 1
116c.
C
ELSE
117c.
C
RNSNG = 1
118c.
C
END IF
119c.
C
END IF
120c.
C
BDSNSG = 2
121c.
C
END IF
122c.
C
1DOO FORMAT(*'DIAM INFANTRY STATUS REPORT',IOX,1)
123c.
C
1DOO FORMAT(*'BATTLE TIME IS',IOX,'MINUTES')
124c.
C
1DOO FORMAT(*'MINIMUM DISTANCE BETWEEN OPPOSING WEAPONS IS',1F6.1,'METERS')
125c.
C
1DOO FORMAT(*'BLUE',2X,'RED LOSSES',2X,'BLUE RNDs',2X,'PRIMARY/SECONDARY')
126c.
C
1DOO FORMAT(*'KILLER',52X,'PRIMARY/SECONDARY')
SIFIED

1300.  3000. FORMAT(6X,10(16))
1310.  4000. FORMAT(3X,14,12F6:1)
1315.  4005. FORMAT(55X,2F12:1)
1320.  4010. FORMAT(3X,14,10F6:1)
1330.  5000. FORMAT(1X,/,2X,"TOTAL",10F6:1)
1340.  6000. FORMAT(1X,/,2X,"RED",23X,"BLUE LOSSES",23X,"RED RWUS")
1350.  1 /*1X,"KILLER",52X,"PRIMARY/SECONDARY")
1360.  7000. FORMAT( /*2X,"DO YOU WISH TO WITHDRAW FORCES? ",
1370.  101=NO,2=BLUE WITHDRAWS,3=RED WITHDRAWS")
1380.  8000. FORMAT(11)
1390.  C
1400.  RETURN
1410.  DEBUG SUBCHK
1420.  AT 1
1430.  END

N 334 IBANK 621 DBANK 30 COMMON
SUBROUTINE RNDCK(I4,PN,XCHR,YCHR,XNUM,YNUM,XRDFR,XAMO,XRDSUM)

THIS SUBROUTINE COMPARES THE AMOUNT OF ROUNDS TO FIRE WITH
THE NUMBER OF ROUNDS AVAILABLE TO FIRE. IF ROUNDS FIRED
FROM XRDFR ARE GREATER THAN THE ROUNDS AVAILABLE TO FIRE
IN XAMO, THEN THE ROUNDS ARE REAPPORTIONED SO THAT THE
TOTAL NUMBER OF ROUNDS TO FIRE DOES NOT EXCEED ONE FOURTH
OF THE CURRENTLY AVAILABLE ROUNDS.

FOR WEAPON SYSTEMS THAT CARRY RIFLES AS SECONDARY WEAPONS,
THE NUMBER OF ROUNDS FOR RIFLES IS INCREASED TO REFLECT
RIFLE FIRING

NUMBER OF X FORCE WEAPON TYPE I IN TACTICAL
MODE J=1,3
AMMUNITION FOR X FORCE WEAPON TYPE I OF WHICH
J=1 IS FOR THE PRINCIPAL WEAPON, AND J=2 IS
FOR RIFLES. THIS ARRAY CONTAINS THE AVERAGE OF
AMMO AVAILABLE PER WEAPON
WEAPON CATEGORY FOR X FORCE WEAPON TYPE I:
DISMOUNTED=1, MORTARS=2, LIGHT=3, HEAVY=4
WEAPON CATEGORY FOR Y FORCE WEAPON TYPE I:
DISMOUNTED=1, MORTARS=2, LIGHT=3, HEAVY=4
TIME TO AIM, RELOAD, AND FIRE FOR X FORCE
WEAPON TYPE I
ROUNDS TO FIRE FOR X FORCE WEAPON TYPE I IN TACTICAL MODE K=1,2 AGAINST TARGETS J OF
WHICH J=1,20 ARE TACTICAL KODE 2
TOTAL ROUNDS FIRED FOR WEAPON TYPE I OF
WHICH J=1 IS PRINCIPAL AMMUNITION AND J=2
IS RIFLE AMMUNITION

DIMENSION XAMO(10,21),XPNII(10,31),YCHR(10,5),XCHR(10,5)
XRDFR(10,20,21),XRDSUM(10,21)

IXNUM’XNUM
IXNUM=YNUM
THIS LOOP REAPPORTIONS ALL NON-RIFLE ROUNDS FOR EACH FIRER
DO 160 I=1,IXNUM
SUM TOTAL ROUNDS FIRED AT ALL TARGETS
IF (XPNII(1,3).GT.0.0) GO TO 5
IF (XPNII(1,3).LE.0.0) GO TO 100
SUM = 0.0
SET RIFLE FLAG
IRIFLE=0
IF (XAMO(I,21).NE.0.0) IRIFLE=1
RUN THROUGH ALL TARGETS FOR NON-RIFLE FIRING
DU 20 J=1,IXNUM
CHECK FOR PERSONNEL TYPE TARGET. IF PERSON AND RIFLE
ROUNDS AVAILABLE THEN MUST FIRE RIFLE
IF (YCHR(4,J).EQ.1 .AND. IRIFLE.EQ.1) GO TO 20
SUM TOTAL ROUNDS FIRED AT THIS TARGET BY FIRERS IN
SIFTED

690. C TACTICAL MODES 1 AND 2
700. DO 10 K=1,2
710. SUM=(RDFR[I,J,K]*XDFRI[I,J*K]) + SUM
720. 10 CONTINUE
730. 20 CONTINUE
740. C
750. C COMPARE NUMBER OF ROUNDS FIRED WITH NUMBER AVAILABLE.
760. C FIRST TOTAL NUMBER OF WEAPONS ALIVE TO FIRE
770. TWPN = XWPN(I,J)
780. IF(XWPN(I,J,G1,.0,.0) TWPN = TWPN + XWPN(I,J)
790. C
800. C
810. C COMPUTE THE NUMBER OF NON-RIFLE ROUNDS AVAILABLE
820. C PER WEAPON
830. AVL = TWPN * XAM(N1,1) * 0.25
860. C IF NUMBER FIRED LESS THAN AVAILABLE REDUCE ROUNDS
870. IF(SUM*.AVL) GO TO 50
880. C
890. C REAPPORTION THE NUMBER AVAILABLE OVER ALL FIRED
900. DO 40 J=1,NUM
910. C IGNORE PERSONNEL IF RIFLES ARE AVAILABLE
920. IF(YCHR(J,J4),EQ.1 .AND. IRIFLE,EQ.1) GO TO 40
930. DO 30 K=1,2
940. XRDFR(I,J,K) = XRDFR(I,J,K) / SUM * AVL
950. XRDFR(I,J*K) = XRDFR(I,J*K) / SUM * AVL
960. 30 CONTINUE
970. 40 CONTINUE
980. C
990. C UPDATE XAMO ARRAY
1000. XAMO(N1,1) = XAMO(N1,1) * 0.75
1010. GO TO 55
1020. C COMPUTE THE AVERAGE NUMBER OF ROUNDS LOST
1030. 50 XAMO(N1,1) = XAMO(N1,1) / SUM/TWPN
1050. C
1060. C IF NO RIFLE TOTAL ROUNDS
1070. 55 IF(IRIFLE,EQ.0) GO TO 94
1080. C CALCULATE RIFLE SHOTS AND SUM ALL SHOTS
1090. SUM = 0.0
1100. DO 70 J=1,NUM
1110. IF(YCHR(J,91),NE.1,.C) GO TO 70
1120. DO 60 K=1,2
1130. SUM = XRDFR(I,J,K) * XRDFR(I,J*K) / SUM
1140. 60 CONTINUE
1150. 70 CONTINUE
1160. C
1170. C IF(SUM,EQ.0,.C) GO TO 94
1180. C COMPUTE NUMBER OF WEAPONS AVAILABLE
1190. TWPN = XWPN(I,J)
1200. IF(XWPN(I,J31,.67,.01) TWPN = TWPN + XWPN(I,J)
1210. C
1220. C COMPUTE NUMBER OF RIFLE ROUNDS FIRED TAKE AIM
1230. C FIRE RELOAD TIME FOR THIS PRINCIPAL WEAPON ARE
1240. C DIVIDED BY 3 SECONDS FOR AIM, FIRE, AND RELOAD
1250. C FOR RIFLE
1260. AVL = XAMO(N1,21) * TWPN * 0.25
1290. IF(SUM*XCHR(I,51,3,.0,.LT. AVL1 AVL=SUM*XCHR(I,51,3,.C
1300. C
1310. C REAPPORTION RIFLE FIIRINGS
1320. DO 90 J=1,NUM
1330. C CHECK FOR PERSONNEL TARGET
1340. IF(YCHR(J,41),EQ.1) GO TO 90

SIFTED
3-68
1350. DO 8C K=1,2
1360. XRDFR(I,J,K) = XRDFR(I,J,K)/SUM = AVL
1370. XRDFR(I,J+10,K) = XRDFR(I,J+10,K)/SUM * AVL
1380. 80 CONTINUE
1390. 90 CONTINUE
1400. XAMO(I,Z) = XAMO(I,Z) - AVL/TWPN
1410. C
1420. C SUM ROUNDS FIRED
1430. 94 DO 95 J=1,IYNUM
1440. 95 K=1
1450. IF (IRIFLE.EQ.1 .AND. YCHR(I,J).EQ.1) K=2
1460. XRDSUM(I,K) = XRDFR(I,J,1) + XRDFR(I,J+10,2) + XRDSUM(I,K)
1470. 95 CONTINUE
1480. 100 CONTINUE
1490. C
1500. RETURN
1510. DEBUG SUBCHK
1520. AT 1
1530. END

N 761 IBANK 85 DBANK
**SUBROUTINE RNDFRD**

**FUNCTION:**
Calculates XRDFRI, M, J, rounds to fire by X force weapon types in tactical mode J = 1, 2 against Y force target types M of which M = 11, 20 are in tactical mode 2.

**PARAMETERS:**
- XRDFRI: Rounds to fire
- M: Target type
- J: Tactical mode

**INITIAL VALUES:**
- XRDFRI = 0
- M = 11 to 20
- J = 1, 2

**CALCULATION STEPS:**
1. Calculate XRDFRI based on visible percentages and tactical modes.
2. Update XRDFRI iteratively for each M and J.
3. Return XRDFRI as the final result.

**ALGORITHM:**
- Use dimensions to store intermediate results.
- Implement conditional logic for visible percentages and tactical modes.
- Iteratively update XRDFRI for each M and J combination.

**IMPLEMENTATION:**

```fortran
DIMENSION XTMKL(10,20,2), TOTYTG(10,2), WPNI(10,3), WPNI(10,3)

SUBROUTINE RNDFRD(XTMKL, TOTYTG, WPNI, PCVXYZ, PCVXYZ, XRDFRI)
   
   INTEGER, DIMENSION(10,20,2) :: XTMKL
   INTEGER, DIMENSION(10,2) :: TOTYTG
   INTEGER, DIMENSION(10,3) :: WPNI
   REAL :: PCVXYZ
   REAL :: PCVXYZ
   REAL, DIMENSION(10,20,2) :: XRDFRI
   
   INTEGER :: I, J, K, L, M, N
   REAL :: XRDFRI

   DO 10 J = 1, 2
       DO 20 I = 1, 10
           XRDFRI(I,J) = 0.5
   10 CONTINUE

   IF(XDFAT.EQ.2) THEN
       FRCTN = 0.1
   END IF

   IF(XDFAT.EQ.2) THEN
       FRCTN = 0.2
   END IF

   IF(XDFAT.EQ.2) THEN
       FRCTN = 0.3
   END IF

   IF(XDFAT.EQ.2) THEN
       FRCTN = 0.4
   END IF

   IF(XDFAT.EQ.2) THEN
       FRCTN = 0.5
   END IF

   DO 30 J = 1, 2
       DO 40 I = 1, 10
           XRDFRI(I,J) = 0.6
   30 CONTINUE

   IF(XDFAT.EQ.2) THEN
       FRCTN = 0.7
   END IF

   DO 50 J = 1, 2
       DO 60 I = 1, 10
           XRDFRI(I,J) = 0.8
   50 CONTINUE

   IF(XDFAT.EQ.2) THEN
       FRCTN = 0.9
   END IF

   DO 70 J = 1, 2
       DO 80 I = 1, 10
           XRDFRI(I,J) = 1.0
   70 CONTINUE

   RETURN
END SUBROUTINE RNDFRD
```
69C. DO 30 L=1,2
700. DO 40 K=1,10
710. C
720. XSPDG = I - XSPF DG(I,J)
730. YSPDG = I - YSPFDG(K,L)*0.33
740. RDKLL = XRDK LL(I,K*(L-1)*10,J)
750. TMKLL = XTMK LL(I,K*(L-1)*10,J)
760. TOTTG = TORDDG(I,J)
770. YWPNN = YWPN(K,L)*1) * PCYXXZ1K,J)-L-10,J)
780. XWPNN = XWPN1,J)+1) * PCXVXZ1,K*(L-1)*10,J)
790. C
800. IF (TOTTG .NE. 0 .AND. TMKLL .NE. 0) THEN
810. RDFR = MAX (RDKLL/ TMKLL/ XWPNN+ YWPNN/ TOTTG) *XSPDG*YSPDG
820. ELSE
830. RDFR = 0
840. END IF
850. XRDFR(I,K*(L-1)*10,J) = RDFR * FRCIN
860. C
870. 40 CONTINUE
880. 30 CONTINUE
890. 20 CONTINUE
900. 10 CONTINUE
910. C
920. RETURN
930. DEBUG SUB CHK
940. AT 1CO
950. END

'N 3^2 IBANK: 110 DRA NK
SUBROUTINE RNDKLL(XYPKW, XRDKLL)

THIS SUBROUTINE CALCULATES XRDKLL(I, M, J), ROUNDS TO KILL FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 AGAINST Y FORCE TARGET TYPES M OF WHICH M=11,20 ARE IN TACTICAL MODE 2

PROBABILITY OF KILL ISSPKI FOR X FORCE WEAPON TYPES I IN TACTICAL MODE J=1,2 AGAINST Y FORCE TARGET TYPE M OF WHICH M=11,20 ARE IN TACTICAL MODE 2

DIMENSION XYPKW(10, 2C, 2), XRDKLL(10, 2D, 2)

DO 10 J=1, 2
   DO 20 I=1, 10
      DO 30 L=1, 2
         DO 40 K=1, 10
            PK=XYPKW(I, K+L-11)*10, J
            IF (PK.GT.0) THEN
               XRDKLL(I, J, K+L-11)*10, J = XRDKLL(I, J, K+L-11)*10, J
               CONTINUE
            ELSE
               XRDKLL(I, J, K+L-11)*10, J = XRDKLL(I, J, K+L-11)*10, J
               CONTINUE
            END IF
   20 CONTINUE
10 CONTINUE
20 CONTINUE
30 CONTINUE
40 CONTINUE
41 CONTINUE
42 CONTINUE
43 CONTINUE
44 CONTINUE
45 CONTINUE
46 CONTINUE
47 CONTINUE
48 RETURN
49 DEBUG SUBCHII
50 A1 100
51 END
SUBROUTINE RANGBND

THIS SUBROUTINE CALCULATES BRRGBO(I,J,K1); THE RANGE BANDS FOR EACH BLUE FORCE WEAPON TYPE I IN TACTICAL MODE K=1,2 TO EACH RED FORCE WEAPON TYPE J OF WHICH J=11,20 ARE IN TACTICAL MODE 2.

DIMENSION DBWRWP(IJZ2),20,29,20,20

DO 10 K=1,2
20 DO 30 J=1,10
30 DO 50 J=1,20
10 CONTINUE

ABSUST = ABS(DBWRWP(IJ),K1)

IF(ABSUST.GT.4600) THEN
30 IBAND=6
ELSE IF(ABSUST.GE.4000 .AND. ABSUST.LE.2000) THEN
40 IBAND=4
ELSE IF(ABSUST.GT.2000 .AND. ABSUST.LE.2000) THEN
50 IBAND=2
ELSE IF(ABSUST.GT.1000 .AND. ABSUST.LE.1000) THEN
60 IBAND=1
ELSE
70 IBAND=0
END IF

40 BRRGBO(I,J,K1) = IBAND
20 CONTINUE
30 CONTINUE
40 CONTINUE
50 CONTINUE
60 CONTINUE
70 RETURN

N 127 IBANK 38 DBANK

3-73
SIFIED

DIAM Publish..RNQOST
R1 04/01/82-10:33 (0,)

100. C*** SUBROUTINE RNQOST *******************************************
110. C
120. C
130. C
140. C
150. C
160. C
170. C
180. C
190. C
200. C
210. C
220. C
230. C
240. C
250. C
260. C
270. C
280. C
290. C
300. C
310. C
320. C
330. C
340. C
350. C
360. C
370. C
380. I
390. DO 10 J=1,2
400. DO 2C 1=1,10
410. DO 3C L=1,2
420. DO 40 K=1,10
430. C
440. C
450. C
460. 40 CONTINUE
470. 30 CONTINUE
480. 20 CONTINUE
490. 10 CONTINUE
500. C
510. RETURN
520. DEBUG SUBCHII
530. AT 1
540. END

N 149 IBANK 51 DBANK

SIFIED

3-74
SIFIED
DIAMPUBLISH,SPDG
R1 04/01/82-10:33(0,)
100. C *************** SUBROUTINE SPDG ***********************
110. C
120. C
130. C
140. C
150. C
160. C
170. C
180. C
190. C
200. C
210. C
220. C
230. C
240. C
250. C
260. C
270. C
280. C
290. C
300. C
310. C
320. C
330. C
340. C
350. C
360. C
370. C
380. C
390. C
400. C
410. C
420. C
430. C
440. C
450. C
460. C
470. C
480. C
490. C
500. C
510. C
520. C
530. C
540. C
550. C
560. C
570. C
580. C
590. C
600. C
610. C
620. C
630. C
640. C
650. C
660. C
670. C
680. C
690. C

SUBROUTINE SPDG (XWDRW,YWDRW,XDFAT,XCHR,EXCLS,EVCLSS,EXARTSP,
XMNLSS,XSPFDG,XSPMDG)

THIS SUBROUTINE CALCULATES XSPFDG(I,M,J) AND XSPMDG(I,M,J),
FIRE AND MOVEMENT SUPPRESSION FACTORS FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2, FROM THE OPPOSING WEAPON TYPE M OF WHICH M=11,20 ARE IN TACTICAL MODE 2.

INDEX FOR X FORCE: ENGAGING=1, WITHDRAWING=2
INDEX FOR Y FORCE: ENGAGING=1, WITHDRAWING=2
INDEX FOR X FORCE: DEFENDING=1, ATTACKING=2
WEAPON CATEGORY FOR X FORCE WEAPON TYPE:
DISMOUNTED=1, MORTARS=2, LIGHT=3, HEAVY=4
THE EXPECTED COMMITTEE LOSSES FOR X FORCE TARGET TYPES 1 IN TACTICAL MODE J=1,2 FROM OPPOSING FORCE WEAPON TYPES M OF WHICH M=11,20 ARE IN TACTICAL MODE 2.
THE EXPECTED COMMITTEE LOSSES FOR Y FORCE TARGET TYPES K IN TACTICAL MODE L=1,2 FROM OPPOSING FORCE WEAPON TYPES N OF WHICH N=11,20 ARE IN TACTICAL MODE 2.
ARTILLERY LOSSES FOR SUPPRESSION FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2
MINEFIELD LOSSES FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2

DIMENSION XCHR(10,5),EXCLS(10,20,2),EVCLSS(10,20,2),
1 XSPFDG(10,2),XSPMDG(10,2),COEF(10,2),
1 XTOTCL(10,2),XARTSP(10,2),XTOTCF(10,2),
1 XMNLSS(10,2)

INITIALIZE COEFFICIENTS BASED ON WEAPON CATEGORY
DO 10 I=1,10
1 IF(XCHR(I,4).EQ.4) THEN
COEF(I,1) = 1
COEF(I,2) = 1
ELSE IF(XCHR(I,4).EQ.2) THEN
COEF(I,1) = 2.86
COEF(I,2) = 2.86
ELSE
COEF(I,1) = 2.86
COEF(I,2) = 2.86
END IF
CONTINUE
ZERO OUT ARRAYS
CALL INITI(XTOTCL,VARI)
CALL INITI(XTOTCF,VARI)
TOTAL LOSSES INFLECTED BY X FORCE WEAPON TYPES
TOTAL LOSSES OF X FORCE WEAPON TYPES
3-75
DO 40 I=1,10
   DO 50 J=1,2
   DO 60 K=1,10
   CONTINUE
   CONTINUE
   CONTINUE
   CONTINUE
   CONTINUE
   CONTINUE
IF (XTOTCF(I,J,G,T,EQ.1) .GT. 0) THEN
   RATIO = XTOTCF(I,J) / XTOTCF(I,J)
   END IF
   ELSE
   IF (XWDRW.EQ.1 .AND. YWDRW.EQ.1) THEN
   FSP = COEF1(I,J) * (2.06 * RATIO * 1.5) / 100
   ELSE
   FSP = COEF1(I,J) * (1.06 * RATIO * 14) / 100
   END IF
   ELSE
   IF (XWDRW.EQ.1 .AND. YWDRW.EQ.1) THEN
   FSP = COEF1(I,J) * (1.5 * RATIO**1.5 * 3.28) / 100
   ELSE
   FSP = COEF1(I,J) * (2.5 * RATIO**1.5 * 0.5) / 100
   END IF
   END IF
   XSPFDGI(J,J) = AMIN11+8,FSP
   XSPMDGI(J,J) = AMIN14+9,FSP
   ELSE
   XSPFDGI(J,J) = 0
   XSPMDGI(J,J) = 0
   END IF
   CONTINUE
   CONTINUE
   CONTINUE
   RETURN
   DEBUG SUBCHK
   AT 1
   END

N 493 IBANK 185 DBANK
SUBROUTINE TACDSM(XMV, XCHR, YCHR, XWPNI, DXFXWP, DXWYWP, XTACA)

DIMENSION XCHR(10,51), YCHR(10,51), XWPNI(10,3), DXWYWP(10,20,2)

100. C =*************** SUBROUTINE TACDSM ***********************
110. C
120. C
130. C
140. C
150. C
160. C
170. C
180. C
190. C
200. C
210. C
220. C
230. C
240. C
250. C
260. C
270. C
280. C
290. C
300. C
310. C
320. C
330. C
340. C
350. C
360. C
370. C
380. C
390. C
400. C
410. C
420. C
430. C
440. C
450. C
460. C
470. C
480. I
490. I
500. C
510. C
520. C
530. C
540. C
550. C
560. C
570. C
580. C
590. C
600. C
610. C
620. C
630. C
640. C
650. C
660. C
670. C
680. I

**SUBROUTINE TACDSM ALTERS THE TACTICAL MODE OF ONLY LIGHT**

**CATEGORY WEAPON TYPES IN THE ATTACKING FORCE. WHEN A SPECIFIED OPPOSING**

**WEAPON CATEGORY IS WITHIN A SPECIFIED DISTANCE, THE LIGHT CATEGORY CAN DISMOUNT**

INFANTRY.

INDEX FOR X FORCE: 1=MOUNTED, 2=DISMOUNTED

CATEGORY OF X FORCE WEAPON TYPE I:
1=DISMOUNTED, 2=MORTARS, 3=LIGHT, 4=HEAVY

CATEGORY OF Y FORCE WEAPON TYPE M:
1=DISMOUNTED, 2=MORTARS, 3=LIGHT, 4=HEAVY

NUMBER OF X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2

DISTANCE FROM X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 TO Y FORCE WEAPON TYPE M OF WHICH M=1,20 ARE IN TACTICAL MODE 2 TACTICS ARRAY FOR ATTACKING FORCE X

WEAPON TYPE I IN TACTICAL MODE J=1,2

**DIMENSION XCHR(10,51), YCHR(10,51), XWPNI(10,3), DXWYWP(10,20,2)**

DO IF I=1,10
    DO 20 K=1,10
        DO 30 L=1,2
            XCAT=XCHR(I,4)
            IF (XCAT.EQ.3) THEN
                IF (XTACA(I,1).EQ.XCHR(K,4)) THEN
                    IF (XTACA(I,2).GE.ABS(DXWYWP(I,K+10,11))) THEN
                        DIST = DXFXWP(I,1)
                        END IF
                    END IF
                END IF
            END IF
            DISMOUNT TROOPS
            DO 40 M=1,10
                IF (XCHR(M,4).EQ.1) THEN
                    IF (XWPNI(M,2).GT.0) THEN
                        XWPNI(M,3) = XWPNI(M,2)
                        XWPNI(M,2) = 0
                    END IF
                    DXFXWP(M,2) = DIST
                    DXFXWP(M,1) = -9999999
                END IF
            END IF
            END IF
        END IF
    END IF
    CONTINUE
S.FIED

690. C
700. C CHANGE TROOP CARRIER MODE
710. DO 50 N=1,10
720. IF(XCHR(N,4),EQ,3) THEN
730. IF(XWP(N,3),GE,0) THEN
740. IF(XWP(N,2),GT,0) THEN
750. XWP(N,3) = XWP(N,2)
760. XWP(N,2) = 0
770. DXFXWP(N,2) = DXFXWP(N,1)
780. DXFXWP(N,1) = -9999999
790. END IF
800. END IF
810. END IF
820. 50 CONTINUE
830. XDMV = 2
840. RETURN
850. C END IF
860. END IF
870. END IF
880. END IF
890. C CONTINUE
900. 30 CONTINUE
910. 20 CONTINUE
920. 10 CONTINUE
930. C
940. C
950. C
960. RETURN
970. DEBUG SUBCHK
980. AT 1
990. END

N 340 IBANK 77 DBANK
SUBROUTINE TACOVW

THIS SUBROUTINE ALTERS THE TACTICAL MODE OF ONLY HEAVY CATEGORY WEAPON TYPES IN THE ATTACKING FORCE, WHEN A SPECIFIED OPPOSING WEAPON CATEGORY IS WITHIN A SPECIFIED DISTANCE, THE HEAVY CATEGORY CAN GO INTO OVERWATCH.

INDEX FOR X FORCE: 1 = NOT IN OVERWATCH, 2 = IN OVERWATCH

CATEGORY OF X FORCE WEAPON TYPE I:
1 = DISMOUNTED, 2 = MORTARS, 3 = LIGHT, 4 = HEAVY

CATEGORY OF Y FORCE WEAPON TYPE M:
1 = DISMOUNTED, 2 = MORTARS, 3 = LIGHT, 4 = HEAVY

NUMBER OF X FORCE WEAPON TYPE I IN TACTICAL MODE
MORE J = 1, 2

DISTANCE FROM X FORCE WEAPON TYPE I IN TACTICAL MODE J = 1, 2 TO Y FORCE WEAPON TYPE M OF WHICH
MORE J = 1, 2 ARE IN TACTICAL MODE 2

TACTICS ARRAY FOR ATTACKING FORCE X
A = 1 FOR LIGHT CATEGORY
A = 2 FOR HEAVY CATEGORY
B = 1 OPPOSING WEAPON CATEGORY
B = 2 DISTANCE BETWEEN A AND B = 1
B = 3 PERCENTAGE OF NUMBER OF WEAPON TYPES IN TACTICAL MODE I THAT GO INTO TACTICAL MODE 2

DISTANCE FROM X FORCE CENTROID TO X FORCE WEAPON TYPE I IN TACTICAL MODE J = 1, 2

DIMENSION XCHR(10, 5), YCHR(10, 5), XWPN(10, 3), DXWYP(10, 20, 21)

SHIFT HEAVY WEAPONS INTO OVERWATCH

END IF

CONTINUE
SIFIED.

660.      XCMTH = 2
700.      RETURN
710.      C
720.      END IF
730.      END IF
740.      END IF
750.      C
760.      30      CONTINUE
770.      20      CONTINUE
780.      10      CONTINUE
790.      C
800.      C
810.      RETURN
820.      DEBUG SUBCHK
830.      AT 1
840.      END

N 256 IBANK 73 DBANK
SUBROUTINE TALLY(XWPN, EXTLSS, XARTLS, XMNLSS, XDEAD)

THIS SUBROUTINE CUMULATES XDEAD(I,J), TOTAL LOSSES OF X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2. THE REMAINING X FORCE WEAPON TYPES ARE ALSO DETERMINED.

XWPN(I,J+1) NUMBER OF X FORCE TYPE WEAPON TYPE I IN TACTICAL MODE J=1,2
EXTLSS(I,J) TOTAL EXPECTED LOSSES FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2
XMNLSS(I,J) MINE LOSSES FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2

DIMENSION XWPN(10,3),EXTLSS(10,2),XDEAD(10,2),XARTLS(10,2)

DO 10 J=1,2
DO 20 I=1,10

XWPN(I,J+1) = XWPN(I,J+1) - EXTLSS(I,J) - XMNLSS(I,J)
XDEAD(I,J) = XDEAD(I,J) + EXTLSS(I,J) + XMNLSS(I,J)

IF(XWPN(I,J+1).GT.0) THEN
   XARTLS(I,J) = XWPN(I,J+1)
   END IF

CONTINUE

RETURN

N 318 IBANK 51 DBANK
THIS SUBROUTINE LOADS THE FOLLOWING VISIBILITY TABLES, CORRIDOR WIDTHS, WEAPON CATEGORY DISTANCE OFFSETS, AND DISENGAGEMENT CRITERIA.

**SUBROUTINE TERIN**

**IBAT**
POINTER TO GAMER SELECTED TERRAIN FILE

**KK25**
POINTER FROM VISIBILITY FILE

**PCRVBE(I,J,K)**
FRACTION OF RED FORCE WEAPON CATEGORY 1

**PCBVRE(I,J,K)**
FRACTION OF BLUE FORCE WEAPON CATEGORY I

**PCBVRN(I,J,K)**
FRACTION OF RED FORCE WEAPON CATEGORY J

**DGHATT(A,B)**
DISENGAGEMENT ATTRITION FRACTION: OF

**DFCHCIA,A,B**
DISTANCE FROM B FORCE CENTROID TO WEAPON CATEGORY CENTROID A (SEE ABOVE)

**AWDTHA(A,K)**
CORRIDOR WIDTHS FOR ATTACKER WEAPON CATEGORY A IN RANGE BAND K (SEE ABOVE)

**BWDTHA(A,K)**
CORRIDOR WIDTHS FOR WITHDRAWING BLUE WEAPON CATEGORY A IN RANGE BAND K (SEE ABOVE)

**RDWTHTA(A,K)**
CORRIDOR WIDTHS FOR WITHDRAWING RED WEAPON CATEGORY A IN RANGE BAND K (SEE ABOVE)

**DIMENSION**
**PCRVBE(4,4,5),PCBVRE(4,4,5),PCBW(4,4,5)**
690. C * OFCWC14,21
700. C
710. C
720. C SET K25 BASED ON DESIRED FILE
740. C K25=35*(IBAT-11)
750. C
760. C READ RED VISIBLE TO BLUE DURING ENGAGEMENT
770. C DO 10 K=1,5
780. C READ25*K2511P(CRBE1J,K1,J=1,4)
790. C 10 CONTINUE
800. C
810. C READ BLUE VISIBLE TO RED DURING ENGAGEMENT
820. C DO 20 K=1,5
830. C READ25*K2511P(CBVRE1J,K1,J=1,4)
840. C 20 CONTINUE
850. C
860. C READ RED VISIBLE TO BLUE WITHDRAWING
870. C DO 30 K=1,5
880. C READ25*K2511P(CRVBE1J,K1,J=1,4)
890. C 30 CONTINUE
900. C
910. C READ BLUE WITHDRAWING VISIBLE TO RED
920. C DO 40 K=1,5
930. C READ25*K2511P(CBVWR1J,K1,J=1,4)
940. C 40 CONTINUE
950. C
960. C READ RED WITHDRAWING VISIBLE TO BLUE
970. C DO 50 K=1,5
980. C READ25*K2511P(CRWDB1J,K1,J=1,4)
990. C 50 CONTINUE
1000. C
1010. C READ BLUE VISIBLE TO RED WITHDRAWING
1020. C DO 60 K=1,5
1030. C READ25*K2511P(CBVWR1J,K1,J=1,4)
1040. C 60 CONTINUE
1050. C
1060. C READ OFFSET DISTANCES FOR BLUE THEN RED
1070. C READ25*K2511P(OFCWCIJ,J1,J=1,4)
1080. C
1090. C READ CORRIDOR WIDTHS FOR THE ATTACKER
1100. C READ25*K2511P(AWDTHI1J,J1,J=1,5)
1110. C
1120. C READ BLUE WITHDRAWAL WIDTHS
1130. C READ25*K2511P(BWDTHI1J,J1,J=1,5)
1140. C
1150. C READ RED WITHDRAWAL WIDTHS
1160. C READ25*K2511P(RWDTHI1J,J1,J=1,5)
1170. C
1180. C READ DISENGAGEMENT CRITERIA
1190. C READ25*K2511P(OGMATT1J,J1,J=1,4)
1200. C
1210. C CLOSE25
1220. C KK25=K25
1230. C RETURN
1240. C DEBUG SUBCKH
1250. C AT 1
1260. C END

N 153 IDANK 390 DEANK 3-83
SUBROUTINE TIMENG

**DIMENSIONS**

- XVPK(I, 10:20, 2), XRGBD(I, 10:20, 2), XCHR(I, 10:5)
- YDFAT(I, 10:5, ITHENG)
- XDTCT(I, 10:5, ITHENG)

**Variables**

- XOUTHT: INDEX FOR X FORCE
- YDFAT: Y FORCE DEFEND OR ATTACK VARIABLE
- IENPSR: VEHICLE EXPOSED: 1, VEHICLE IN DEFILADE: 2
- IENPSR: SOLDIER EXPOSED: 3, SOLDIER IN DEFILADE: 4
- M: 1, 2
- J: 1, 2
- I: 1, 10
- K: 1, 10
- L: 1, 10

**Functions**

1. **SUBROUTINE TIMENG**
   - **CALL** XVPK(I, 10:20, 2), XRGBD(I, 10:20, 2), XCHR(I, 10:5)
   - **DO** 1:10, K=1, 10
     - **IF** IENPSR(I, 1, K) = 1
       - **DO** 1:10, L=1, 2
         - **IF** IENPSR(I, 1, L) = 1
           - **IF** XOUTHT(I, 1, J) = 1
             - **IF** YDFAT(I, 1, K) = 1
               - **IF** IENPSR(I, 1, K) = 1
                 - **IF** YDFAT(I, 1, K) = 1
                   - END IF
     - ELSE
       - END IF
   - ELSE
     - END IF
   - END IF

2. **TIMENG1**
   - **FOR** X FORCE WEAPON TYPE 1 IN TACTICAL MODE J=1, 2 TO ALL
   - **FOR** Y FORCE TARGET TYPE M OF WHICH M=11, 20 ARE IN TACTICAL MODE

3. **NOT IN OVERWATCH**:
   - IN OVERWATCH:
   - X FORCE DETECT TIMES BASED ON EXPOSURE
   - A, SENSORS B, AND RANGE BAND C

4. **PROBABILITY OF KILL FOR X FORCE**
   - AGAINST Y FORCE TARGET TYPE M

5. **INDEX FOR X FORCE**
   - XVPK(I, 10:20, 2)

6. **WEAPON TYPE I:**
   - EYE: 1, OPTICAL: 2
   - THERMAL: 3, IMAGE INTENSIFIER: 4

7. **CONTAINS CATEGORY OF Y FORCE WEAPON**
   - DISMOUNTED: 1, MORTARS: 2
   - LIGHT: 3, HEAVY: 4

8. **VEHICLE EXPOSED: 1, VEHICLE IN DEFILADE: 2**
   - SOLDIER EXPOSED: 3, SOLDIER IN DEFILADE: 4
SIFIED

610.  IEXPSR = 2
700.  ELSE
710.  IEXPSR = 1
720.  END IF
730.  ELSE
740.  IEXPSR = 1
750.  END IF
760.  ELSE
770.  IEXPSR = 2
780.  END IF
790.  C
800.  ELSE IF (ICAT.EQ.1) THEN
810.    IF (YDFAT.EQ.2) THEN
820.      IF (L.EQ.2) THEN
830.        IEXPSR = 3
840.      ELSE
850.        IEXPSR = 4
860.      END IF
870.    END IF
880.  ELSE
890.    IEXPSR = 4
900.  END IF
910.  C
920.  ELSE
930.    IEXPSR = 4
940.  END IF
950.  C
960.  XTHMENG(1,K*(L-1)*10,J) =
570.    XDYTIEXPSR,XCHR(1,1),XRGBD1(I,K*(L-1)*10,J))
980.  C
990.  ELSE
1000.  XTHMENG(1,K*(L-1)*10,J) = 9999999
1010.  END IF
1020.  C
1030.  IF (XTHMENG(1,K*(L-1)*10,J).LE.0) THEN
1040.    XTHMENG(1,K*(L-1)*10,J) = 9999999
1050.  END IF
1060.  C
1070.  CONTINUE
1080.  CONTINUE
1090.  CONTINUE
1100.  CONTINUE
1110.  C
1120.  RETURN
1130.  DEBUG SUBCHK
1140.  AT 100
1150.  END

N 312 1BANK 75 DBANK
**SUBROUTINE TMKLL **********

SUBROUTINE TMKLL(XTMENG,XCHR,XRDKL,XYRGBP,XTMKLL)

THIS SUBROUTINE CALCULATES, XTMKLL(I,H,J), THE TIME TO KILL FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 AGAINST Y FORCE TARGET TYPES H OF WHICH H=11,20 ARE IN TACTICAL MODE 2

XYRGBP(I,M,J) RANGE BANDS FROM X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 TO Y FORCE TARGET TYPE M OF WHICH M=11,20 ARE IN TACTICAL MODE 2

XTMENG(I,M,J) TIME TO ENGAGE FOR X FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 AGAINST Y FORCE TARGET TYPES M OF WHICH M=11,20 ARE TACTICAL MODE 2

XCHR(I,2) CONTAINS FLIGHT TIME IN SECS/200 METER RANGE BANDS FOR X FORCE WEAPON TYPE I

XCHR(I,5) CONTAINS TIME TO AIM, FIRE, AND RELOAD FOR X FORCE WEAPON TYPE I

DIMENSION XTMENG(10,20,2),XCHR(10,5,1),XRDKL(10,20,2)

XYRGBP(10,20,2),XTMKLL(10,20,2)

DO 10 J=1,2

DO 20 K=1,10

IF(XYRGBP(I,K*(L-1)+10,J).EQ.0) THEN

XTMKLL(I,K*(L-1)+10,J)=0

ELSE

XTMKLL(I,K*(L-1)+10,J)=XTMENG(I,K*(L-1)+10,J)

+ (XCHR(I,5)*XCHR(I,21)*XYRGBP(I,K*(L-1)+10,J))

ENDIF

XTMKLL(I,K*(L-1)+10,J)=XTMKLL(I,K*(L-1)+10,J)/60.

CONTINUE

CONTINUE

CONTINUE

RETURN

DEBUG SUBCHK

AT 1

END
SUBROUTINE WPNDST

THIS SUBROUTINE CALCULATES DBFBWP(I,M,J,J) THE DISTANCE FROM BLUE FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2 TO RED FORCE WEAPON TYPE M OF WHICH M=11,20 ARE IN TACTICAL MODE.

DBFBWP(I,J) DISTANCE FROM BLUE FORCE CENTROID TO BLUE FORCE WEAPON TYPE I IN TACTICAL MODE J=1,2

DRFRWP(I,K,L) DISTANCE FROM RED FORCE CENTROID TO RED FORCE WEAPON TYPE K IN TACTICAL MODE L=1,2

DSTBR DISTANCE BETWEEN BLUE AND RED FORCE CENTROIDS

BWPN(I,J+1) NUMBER OF BLUE WEAPON TYPE I IN TACTICAL MODE J=1,2

RWPN(I,K,L+1) NUMBER OF RED WEAPON TYPE K IN TACTICAL MODE L=1,2

DSIMIN MINIMUM DISTANCE BETWEEN OPPosing WEAPONS

DIMENSION DBFBWP(10,2),DRFRWP(10,2),BWPN(10,3)

10 DBFBWP(10,2),DRFRWP(10,2),BWPN(10,3)

DO 10 J=1,2
    DO 20 I=1,10
        DO 30 L=1,2
            DO 40 K=1,10
            40 IF(BWPN(I,J+1),GT,0 .AND. RWPN(I,K,L+1),GT,0) THEN
                DBFBWP(I,J) = DSTBR-DBFBWP(I,J)-DRFRWP(I,K,L)
                ELSE
                END IF
            CONTINUE
        30 CONTINUE
    20 CONTINUE
10 CONTINUE

50 CONTINUE

C DETERMINE MINIMUM DISTANCE BETWEEN OPPOSING WEAPONS

C

DO 50 J=1,10
    50 CONTINUE

DO 60 H=1,20
    60 CONTINUE

DO 70 J=1,2
    70 CONTINUE

DSIMIN = AMIN(DSTMIN,ABS(DBFBWP(I,J)))

RETURN

DEBUG SUBCHK
AT 1
END
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