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OBSTACLE PLANNING SIMULATION (OPS): INTRODUCTION AND USER INSTRUCTIONS

by
John M. Deponai III
James E. Snellen
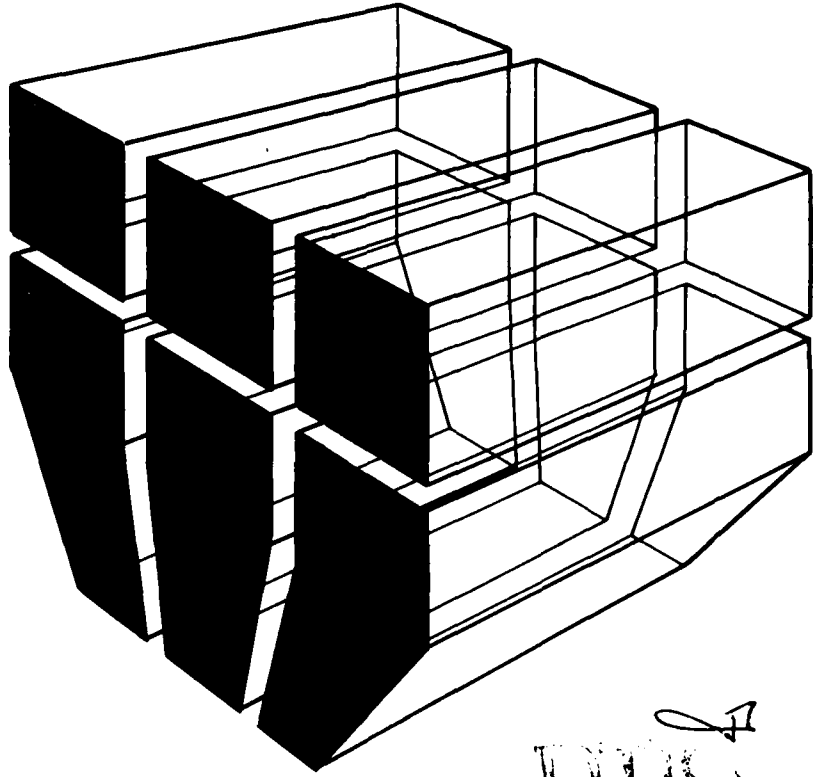
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20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

User instructions are given for the Obstacle Planning Simulation, Version 1.1, a PLATO-based video game developed for the U.S. Army Engineer School to teach combat engineers how to employ obstacles effectively. In Phase 1 of the game, the student employs limited engineer resources to fortify and defend a Brigade defensive position. In Phase 2 the student becomes a passive observer as an enemy mechanized infantry division attacks the defensive position. Combat results are displayed throughout the battle. Include, Tro device.

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FOREWORD

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OBSTACLE PLANNING SIMULATION (OPS):
INTRODUCTION AND USER INSTRUCTIONS

1 INTRODUCTION

Background

Obstacle Planning Simulation (OPS) has been developed as a practical exercise to give students at the U.S. Army Engineer School (USAES) experience in employing obstacles in a combat situation. It is a PLATO-based, interactive, map-based, video game for a single player that models the effects of combat engineer modifications to terrain via a limited set of obstacles. These obstacles are intended to slow and/or defeat an enemy mechanized infantry division attack on a friendly mechanized infantry task force defensive position.

OPS is a two-phase game. Phase 1 is preparation for battle. The player specifies and implements an obstacle plan of his/her own design in two to four blocks of time, each block representing 4 hours of real time in which to accomplish work on implementing a barrier plan. There is a limited number of resources to use when emplacing the obstacles and a limited amount of barrier material. Moreover, there is a limited amount of simulated time to place the obstacles. On a probablistic basis, the player is given two, three, or four blocks of time to emplace obstacles. Thus, as in real life, it is critical to the player's success to prioritize the work to be done. This phase is played interactively and is not a timed exercise.

Phase 2 is conduct of the battle; it is not interactive. Once the battle begins, the player can only observe the results. On a probablistic basis, one of five significantly different enemy attacks will be directed against the friendly defensive position. Each of these attacks is determined by the path of the attacking forces, which is preprogrammed in the model. However, the combat results are probablistic and are influenced by the obstacles placed in Phase 1.

Objective

The objective of this report is to provide a basic set of instructions on how to play the Obstacle Planning Simulation scenario resident in the MALOS simulation driver. The model will be discussed in more detail in a subsequent report.

This manual describes OPS Version 1.1, developed in FY84. Enhancements to OPS will be made over the next couple of years that may cause the current information to be somewhat out of date. Updated versions will have different version numbers.

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Approach

Chapter 2 explains how to interpret the map symbols used in OPS.
Chapter 3 gives the details of how to play Phase 1 of the game. Chapter 4
discusses barrier planning considerations for Phase 1 play. Chapter 5
discusses the nature of the attack plans and the interpretation of the Phase 2
displays.

Mode of Technology Transfer

OPS is one of several scenarios and game types that will ultimately be
developed to run under the MALOS simulation driver. To date MALOS is
installed only on the University of Illinois PLATO system. However, in the
future it will be installed on the USAES PLATO system and probably on the
Command and General Staff College PLATO system.

2 MAP SYMBOL INTERPRETATIONS

Map Display

The map used for OPS (Figure 1) is a display 30 cells (horizontal) by 60 cells (vertical). Each cell is an 8- by 8-dot matrix that may represent a terrain type, a unit type, or an obstacle type. As a terrain type, each cell represents an area 200 m by 200 m. The entire map represents an area 6 km by 12 km and is an abstraction of an area in West Germany south of Bad Hersfeld. The town represented by the cross-hatched symbol at the bottom center of the map is Hunfeld, and the town at the top right of the map is Oberstoppel. Approximate grid coordinates of the corner points of the map from the Germany 1:50000 USACGSC 50-264 Bad Hersfeld-Alsfeld mapsheet are NB461212, NB525114, NB575148, and NB512245. The scale of the map, as displayed on a normal PLATO screen, is slightly smaller than 1:50000.

Terrain Symbols

Three types of terrain attributes can be modeled by the MALOS simulation driver:

1. Three elevation attributes: ground level, slope, and hilltop

2. Eight surface feature attributes: woods, town, swamp, gully, ford, water, clear, and bridge

3. Roads, an attibute treated separately because of its effect on movement characteristics of the enemy units.

Symbols for simple terrain types and for some complex terrain types are shown in Figure 1. Clear ground level is represented by a clear grid. Not all terrain types noted are used in OPS. For example, no gullies, swamps, or fords are used on the OPS map.

Obstacle Symbols

The following obstacles are modeled in the OPS scenario and are designated by the symbols shown in Figure 1:

1. One to four belts of a 1-0-0 density minefield, 200 m long

2. An anti-tank ditch, 200 m long;

3. A point obstacle abatis

4. An urban rubble obstacle, 30 m long

5. A blown bridge

6. A point obstacle road crater
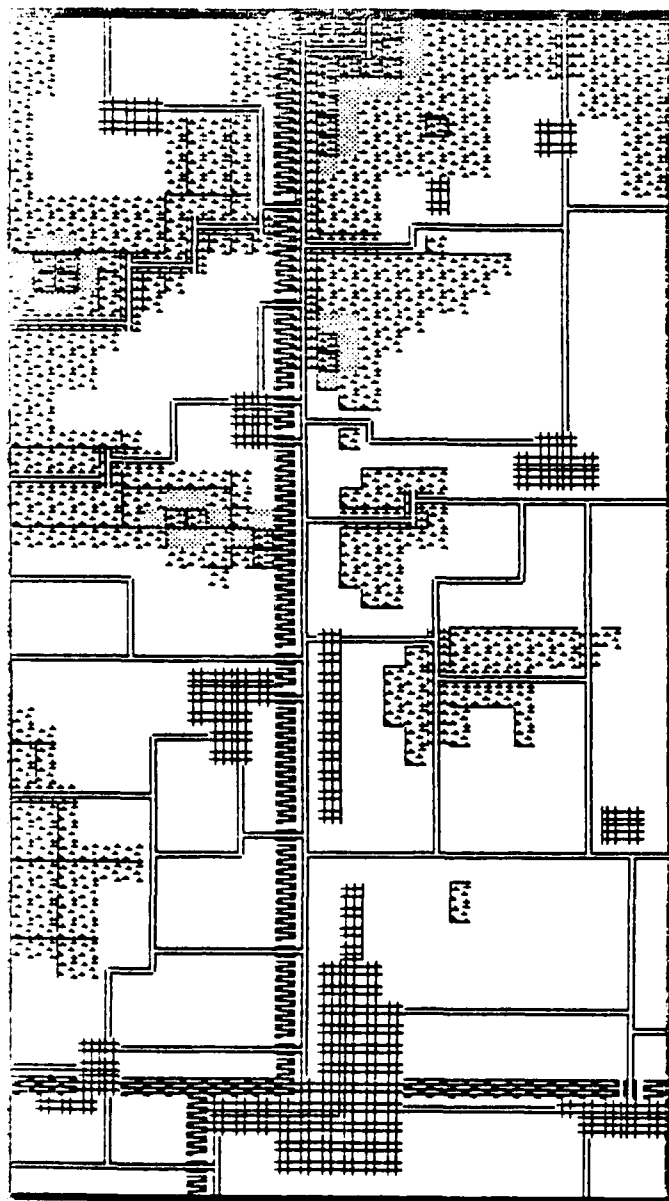
Figure 1.   Basic obstacle planning simulation map symbols.

7. Fighting positions--two positions for each of two friendly vehicles located in the same 200-m grid square.

Logical Barriers

MALOS provides for the representation of logical barriers on the terrain map. These barriers, shown as thin lines overprinted on the terrain features, mark areas that block line of sight and line of fire. Neither enemy nor friendly forces can see or fire through these areas. The barrier network used for the OPS scenario is shown in Figure 2 as it appears in the map displayed during the game and by itself with no terrain features. Note that not all logical barriers have been included in the set. This is not necessary since the design of the attack is such that no action would occur in certain parts of the map.

Unit Representations

Friendly fighting vehicles are represented by "color-on-background" letters the size of a grid square. Each letter, A through F, represents two M-2 Bradley fighting vehicles; each letter, M or N, represents two M-1 Abrams tanks; each letter, X or Y, represents two Improved TOW Vehicles (ITV). Friendly forces are organized for combat as shown in Figure 3. It takes seven "A"s to make a mechanized infantry company, seven "M"s to make a tank company, and six "X"s to make an ITV company. Friendly forces are deployed for combat as shown in Figure 4. "A" and "D" vehicles of the friendly force are reserve forces that will appear on the map if, and only if, one or both of two conditions occur--when all friendly forces in their sector of fire are killed and/or when the enemy advances to within 2000 m (i.e., 10 grid squares) of the reserve's position.

Enemy companies are represented by reverse video letters the size of a grid square. Each letter, A through F, represents 11 BTR amphibious armored personnel carriers; each letter, M through O, represents 13 or 14 T-64 medium tanks that are organic to each of the three mechanized infantry regiments; each letter, P through R, represents 10 or 11 T-64 medium tanks that are organic to the tank regiment; and each letter, X through Z, represent 11 BMP amphibious armored infantry combat vehicles. Three letters are needed to represent each enemy battalion. Enemy organization for combat is shown in Figure 5. The enemy forces do not appear until Phase 2 of the game and the specific attack plan used in any game is a random selection of five significantly different attack plans so that the player will not know which attack to plan for.

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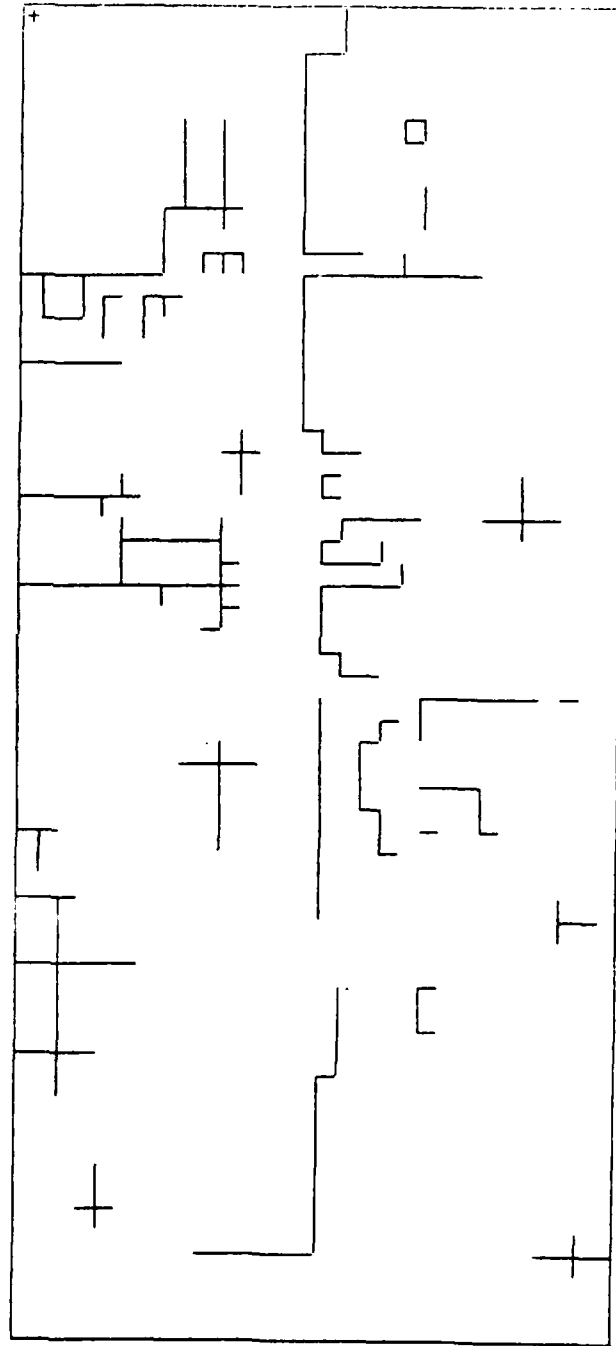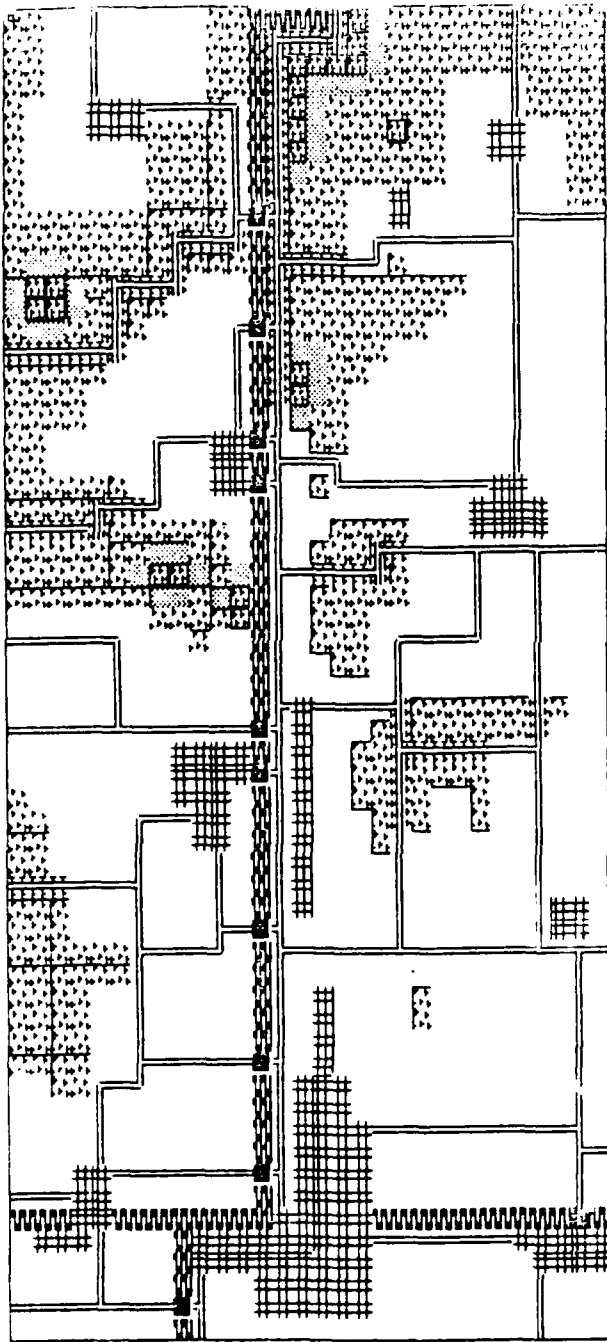
Figure 2.   Placement of logical barrier system in OPS.

X

NORTH TASK FORCE

SOUTH TASK FORCE

RESERVE

(A) 14 M2

RESERVE

(D) 14 M2

TEAM B

(B) 10 M2
(M) 4 M1
(X) 4 ITV

TEAM B'

(E) 10 M2
(N) 4 M1
(Y) 4 ITV

TEAM C

(C) 10 M2
(M) 4 M1
(X) 8 ITV

TEAM C'

(F) 10 M2
(N) 4 M1
(Y) 8 ITV

TEAM TANK

(M) 6 M1
(B) 4 M2
(C) 4 M2

TEAM TANK'

(N) 6 M1
(E) 4 M2
(F) 4 M2
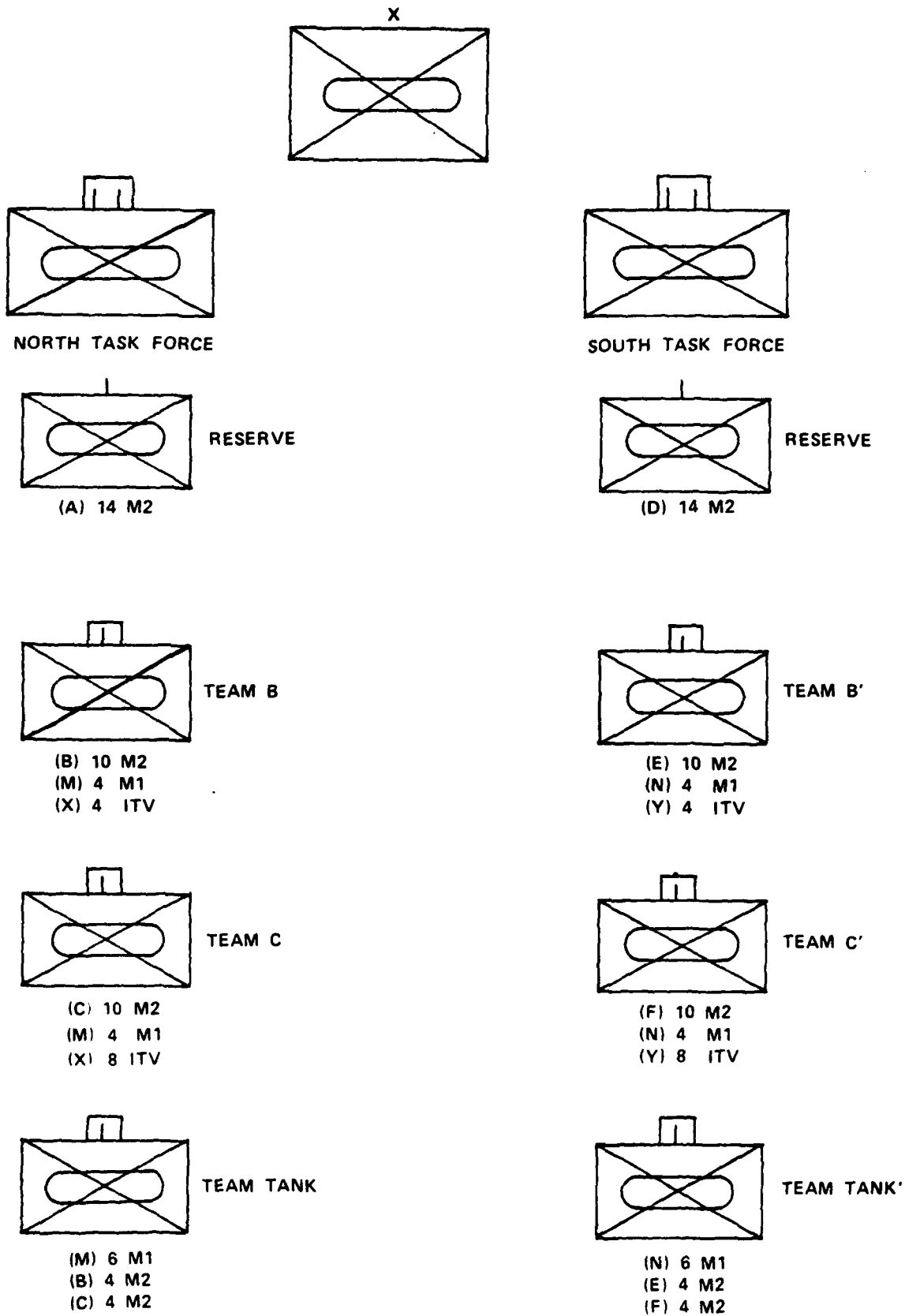
Figure 3. Friendly force organization for combat.

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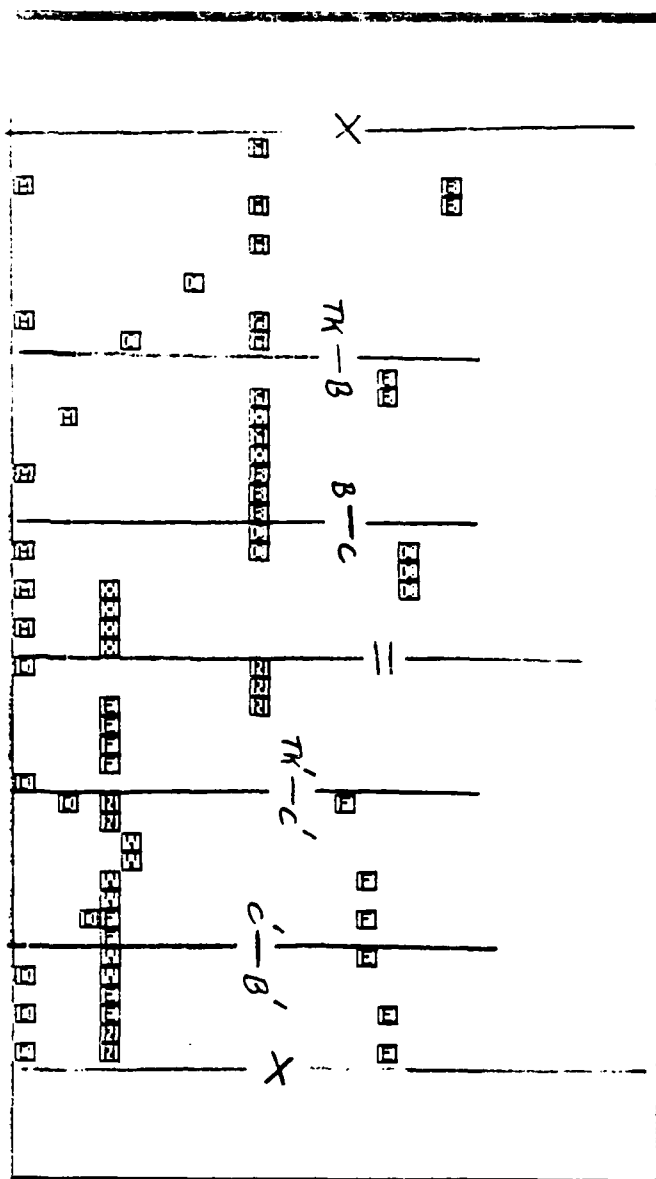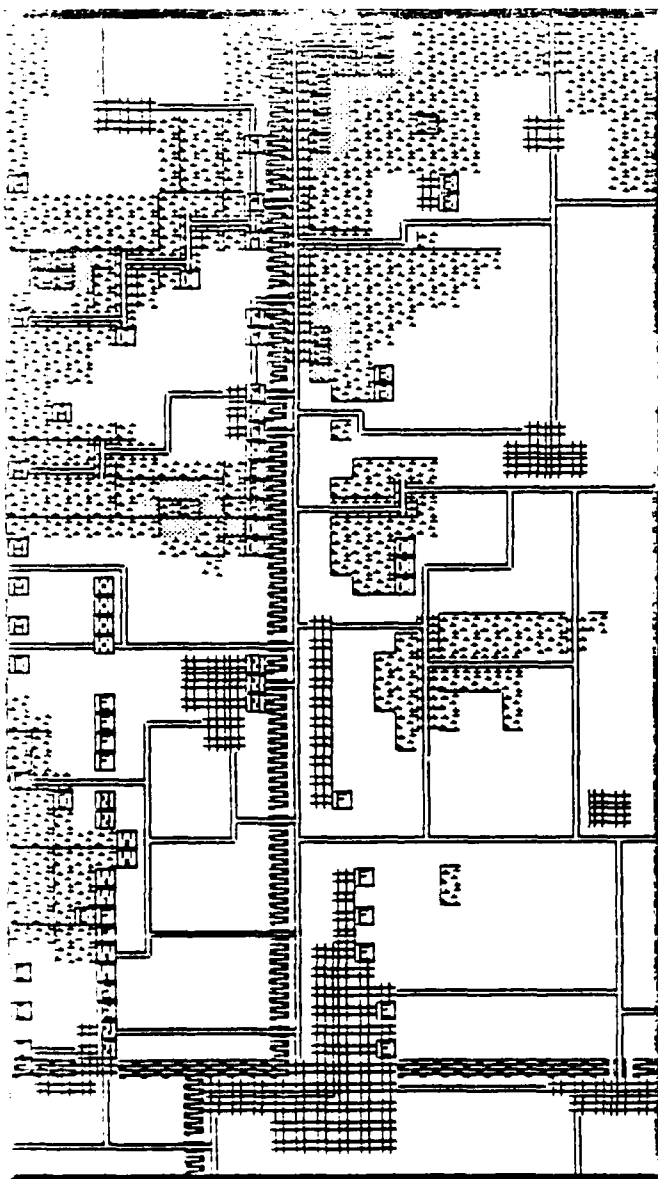
Figure 4. Friendly force deployment for combat.

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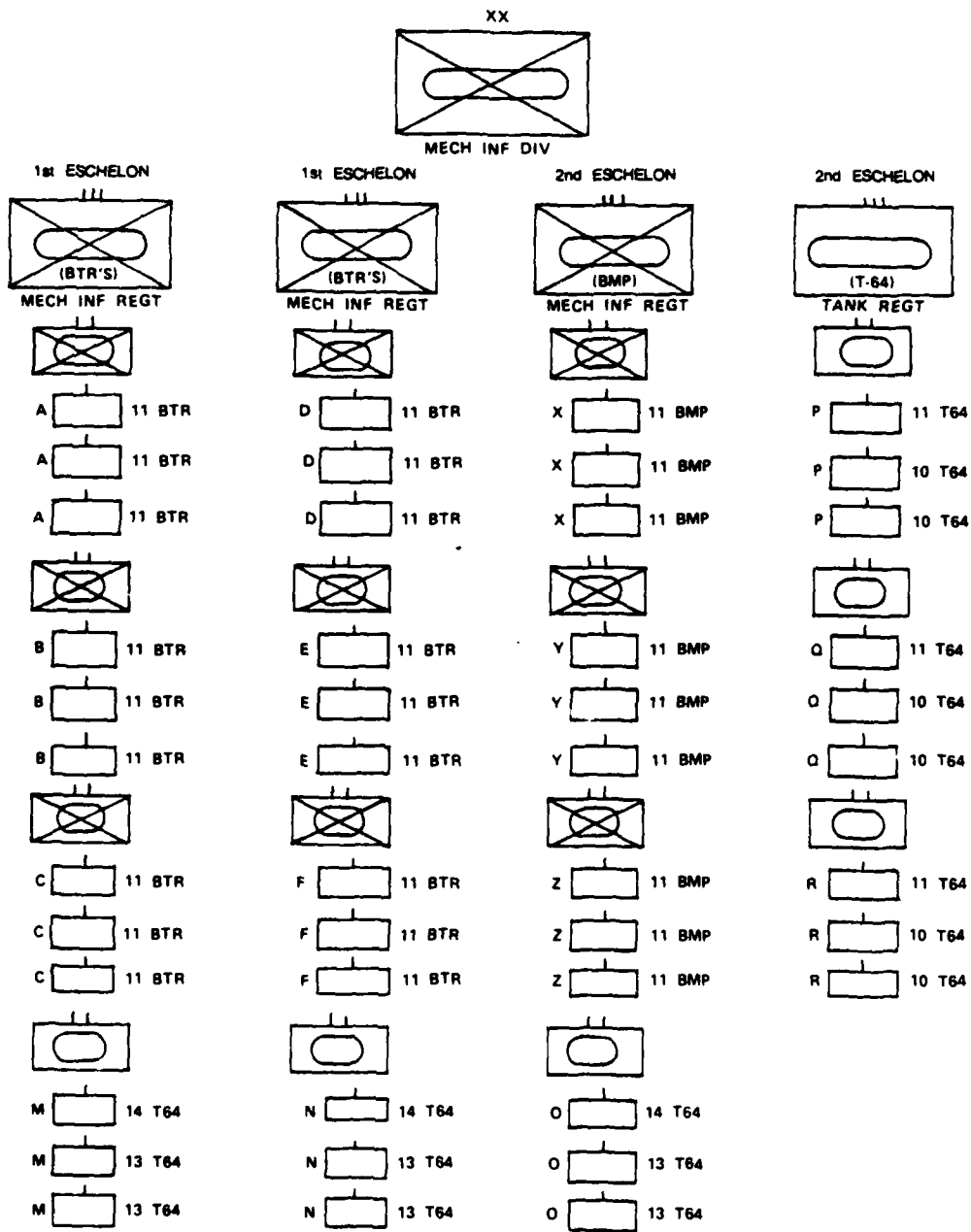
Figure 5. Enemy force organization for combat.

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Startup

To access the OPS simulation, you must have access to a PLATO computer on which the MALOS simulation driver is installed. After accessing the lesson "MALOS," follow the instructions presented by the particular host system and either select the OPS scenario from a list of possible scenarios or (until more scenarios are created) be immediately inserted into the OPS scenario. For more information on how to access MALOS, contact the respective organization's PLATO system manager.

Once you have accessed MALOS, you will be presented with a series of options. The first option is:

Do you want the battle animated on your screen? (y/n)

(The simulation runs faster with animation off)

If you answer "n", you are presented with a page of explanations and when you press the "NEXT" key, Phase 1 of the game begins. Animated battle graphics are suppressed in Phase 2. Combat results are computed in the background and statistics are displayed after each 0.8-minute increment of simulated time. At the end, final statistics and the location of destroyed units are displayed. (Phase 2 takes about 67 percent less time to run without animation and tracers as with full animation, and about 60 percent less time to run as with animation but without tracers.)

If you answer "y" to the preceding option, you are presented with two more options. In sequence, they are:

Show red unit fire during the battle (y/n)?

and *Show blue unit fire during the battle (y/n)?*

If you answer "y" to these options, you will see "tracers" when the red and/or the blue units fire at each other. This animation feature has a tendency to destroy the terrain map somewhat, but the terrain in a particular grid is replotted whenever a red unit moves over that grid, and the terrain map is completely replotted when the battle is over. You may elect to see the tracers of one side or the other, or both, or none. Phase 2 without tracers takes about 25 percent less time to run as Phase 2 with tracers.

Once you choose the options, the next screen you see is a page of general information about the game. Press the "NEXT" key to begin Phase 1.

Phase 1--Mechanics

The first Phase 1 screen display is shown in Figure 6. Note that no reserve forces are shown. Although the reserve forces are actually prepositioned in OPS, they are treated as though the locations of their arrival are unknown. Thus, you cannot fortify their positions. The reserve forces will appear as needed when the enemy starts to penetrate a particular sector.
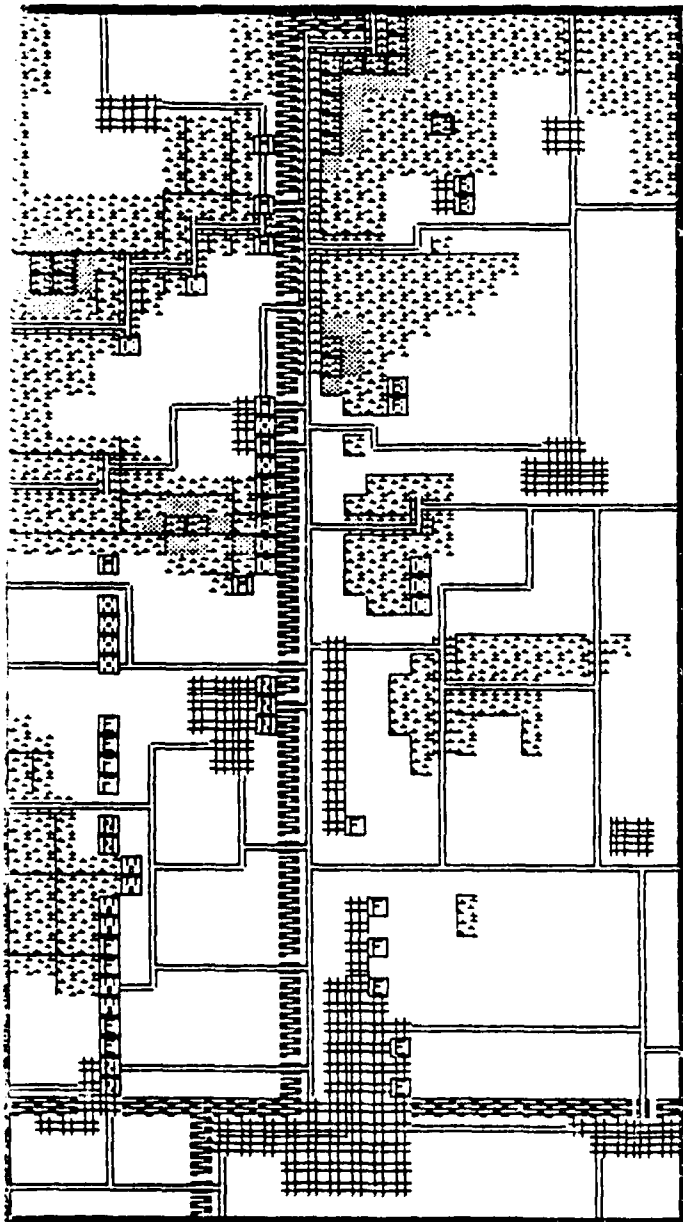
Reusable assets	Avail	Req
Engineer Squads	9	
M9 ACE	6	
M728 CEV	2	
Bucket Loader	2	
Sm. Empl. Excavator	2	
M128 Mine Layer	1	

Expendable assets	Avail	Req
M15 AT mines	2000	
M75 GEMSS minefield	3000	
RAAMS minefield	18	
M180 Kit	100	
Shape Charge (40lb)	125	
Crater Charge (40lb)	70	
TNT	15000	

mfj
mfg
mfa
atd
brb
rcm
aam
urr
fp

Select which task you wish to
execute, then press NEXT.

Shift-HELP terminates engineer activity for this round.

Figure 6. First screen display of Phase 1.

In your game role as Brigade Engineer, your job is to develop a defensive plan to support the disposition of the friendly defensive positions as shown in Figure 6. The reusable assets you have available are noted in the upper corner of Figure 6. These assets are renewed for each work period you are allowed for emplacing obstacles. Expendable assets available are also shown in Figure 6. These assets are decreased each time you use them to emplace an obstacle. Remaining assets are carried over, but are not renewed at the beginning of each work period.

Under the assets section of Figure 6, note the list of task codes. The abbreviations stand for the following tasks:

mfj--One 200- x 50-m conventional, 1-0-0 density minefield.

mfg--Four 200- x 50-m, 1-0-0 density minefields emplaced with an M128 Ground Emplaced Mine Scattering System (GEMMS). There can be four fields in one grid, or one field in four adjacent grids, or any combination in between. However, the four grids must be either adjacent or congruent. Thus, you may put a 4-0-0 density minefield in one 200- x 200-m field.

mfa--One 1-0-0 density minefield across a 200-m front emplaced using the Remote Anti-Armor Mine System (RAAMS). In OPS Version 1.1, RAAMS minefields have a 100 percent delivery probability. In later versions, RAAMS minefields, scheduled in Phase 1 of the game, will be implemented probablistically when the Phase 2 battle begins to simulate the likelihood of artillery support not being available due to higher priority fires. When you schedule a RAAMS minefield in Phase 1, it will be shown on the map during your Phase 1 activity; but in later versions, the symbol for a RAAMS minefield may disappear when the battle phase begins to signify nonavailability of artillery support.

atd--One 200-m-long anti-tank ditch.

brb--Demolish one primary two-lane highway bridge.

rcm--One relieved face road crater, 30 ft x 18 ft.

aam--One abatis, 75-m long.

urr--One urban rubble obstacle 100-ft long, both sides of street.

fp--Two each fighting positions for each of two vehicles located in the same 200 m grid square. You are prompted to specify which type of equipment is to dig the fighting positions.

To direct emplacement of an obstacle in a given time period, type in the obstacle code from the list presented on the screen and press the "NEXT" key.

If you select "fp", you will be presented with the screen format shown in Figure 7. Choose a number from the equipment menu to designate what kind of equipment is to be used to dig the fighting positions. If only one blade type is left, the system will automatically select it for you and will not present you with the screen in Figure 7.

```
┌────────────────────────────────┬──────────────┐
│ Reusable assets      Avail  Req│              │
├────────────────────────────────┤              │
│ Engineer Squads           9    │              │
│ M9 ACE                    6    │              │
│ M728 CEV                  2    │              │
│ Bucket Loader             1    │              │
│ Sm. Empl. Excavator       2    │              │
│ M128 Mine Layer           1    │              │
├────────────────────────────────┤              │
│ Expendable assets    Avail  Req│              │
├────────────────────────────────┤              │
│ M15 AT mines           2000    │              │
│ M75 GEMSS AT mines     3200    │              │
│ RAAMS volleys            18    │              │
│ M180 Kit                100    │              │
│ Shape Charge (40lb)     125    │              │
│ Crater Charge (40lb)     70    │              │
│ TNT                   15000    │              │
├────────────────────────────────┤              │
│ mfj                            │              │
│ mfg                            │              │
│ mfa                            │              │
│ atd                            │              │
│ brb             fp ok          │              │
│ rcm                            │              │
│ aam                            │              │
│ urr                            │              │
│ fp                             │              │
├────────────────────────────────┤              │
│   1. M9 ACE                    │              │
│   2. M728 CEV                  │              │
│   3. Bucket Loader             │              │
│   4. Sm. Empl. Excavator       │              │
│              ?                 │              │
│                                │              │
│                                │              │
│ Select (by number) which       │             │
│ vechile you wish to employ      │             │
│ for this task and then          │             │
│ press NEXT.                     │             │
└─────────────────────────────────┴─────────────┘
```

Figure 7.   Second screen of Phase 1 for Task "FP".

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After you make the "fp" equipment selection, or if you select any task other then "fp", you will be presented with the screen format shown in Figure 8 which tells you to move the "+" cursor to where you want the obstacle placed. At this point, the touch screen feature of PLATO is active and you may position the cursor where you want it by touching the screen in that location. Use the cursor control keys (a, q, w, e, d, c, x, and z) to move the cursor to a more accurate position. Each time you press a cursor key, the cursor will move one map cell in the direction indicated by that cursor control key.

To move the cursor more rapidly, hold down the "SHIFT" key while pressing the cursor keys; this will make the cursor jump over a distance of several map cells with each press of a cursor key. If you do not have a touch-screen capability on your terminal, use this feature to move the cursor to the general vicinity where the obstacle is to be placed. For the first task of each round, the "+" cursor is originally located in the lower left corner of the map. After you move it and emplace an obstacle, the cursor stays where you last left it.

After you position the cursor to the map grid where the work is to be done, press the "SHIFT-NEXT" key to move on to the next task. A castle symbol appears at the location of the cursor and you may now select another task and begin the sequence again. If you try to do something that is not possible (for example, put an abatis in an open field or blow a bridge where there is no bridge), you are presented with an appropriate error message at the appropriate time. You are also advised when you try to do something without enough resources to do the work.

For task "mfg" an additional procedure is required to designate where the minefield is to be placed. Recall that actually four 1-0-0 density minefields are installed in this task, either in the same grid square or in adjacent grid squares or in combinations of the two. After moving the cursor to where the minefield is to start, press the "SHIFT-NEXT" key as for the other task types, but then use the cursor control keys (a, e, d, x, and s) to specify where the next three minefields are to be placed. Press the "s" (for stay) key to place another minefield in the same grid where the cursor is currently located. The first minefield will be placed in the grid where the cursor is first placed. After you make three cursor control selections, the system automatically reverts to the next task selection sequence.

When you compete all of the tasks you can do in the current work period, press the "SHIFT-HELP" key to tell the system to advance the clock to the next 4-hour work period. MALOS will then update the map, placing the appropriate obstacle symbols in the locations you specified. At this time, MALOS also refreshes the renewable assets if another work period is granted or begins the Phase 2 battle. After the first round of engineer activity, MALOS will no longer prompt you with the instructions on which keys to press. This speeds up the Phase 1 input.

More than one type of obstacle can be placed in a given map grid. The only limitation is that each map grid can contain only one of each obstacle type, except for minefields, which can have up to a maximum of four 1-0-0 density minefield belts in each grid. Each obstacle type must also be appropriate to the type of terrain in the map grid. For example, an abatis can be

Reusable assets	Avail	Req
Engineer Squads	9	
M9 ACE	6	
M728 CEV	2	1
Bucket Loader	1	
Sm. Empl. Excavator	2	
M128 Mine Layer	1	

Expendable assets	Avail	Req
M15 AT mines	2000	
M75 GEMSS AT mines	3200	
RAAMS volleys	18	
M180 kit	100	
Shape Charge (40lb)	125	
Crater Charge (40lb)	70	
TNT	15000	

mfj
mfg
mfa
atd
brb   fp ok
rcm
aam
urr
fp

Move the cursor (+) to the
location where you want the
task executed and then press
Shift-NEXT.

Figure 8.   Third screen of Phase 1 for Task "FP".

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constructed only in map grids that contain woods and an urban rubble can only be prepared in a town grid.

Engineer Task Resource Costs

Emplacing obstacles or fighting positions consumes quantities of time, men, equipment, and material. It is essential that those obstacles and fighting positions that are most critical be done in the first two periods of Phase 1 in case the battle begins after the second period. The resource costs for each type of engineer task per 4-hour period are given below and summarized in Table 1.

mfj--Requires 222 M15 Anti-Tank (AT) mines and three engineer squads.

mfg--Requires 800 M75 AT mines, a GEMS M128 minelayer, and one engineer squad.

mfa--Requires six artillery volleys of five guns each; i.e., 30 RAAMS artillery rounds.

atd--Requires two Armored Combat Earthmovers.

brb--Requires five 40-lb shape charges, five 40-lb cratering charges, 160 lb of TNT, and one engineer squad.

rcm--Requires five each M180 cratering kits and one engineer squad.

aam--Requires 100 lb TNT and one engineer squad.

urr--Requires 850 lb TNT and four engineer squads.

fp--Requires one "blade," either a combat engineer vehicle or a bucket loader or a small emplacement excavator (SEE).

Terrain-Related Delay Effects

The attack in Phase 2 is played in a series of increments, each representing 0.4 minutes of simulated time. Enemy units move across the terrain, either rapidly or slowly, depending on the type of terrain they are currently in and the type of terrain they are moving into. Every move requires a base cost of 0.4 minutes to move from one 200-m-grid square to another, regardless of the nature of the terrain. Additional time costs are incurred depending on the particular terrain features of the grids in which the movement is taking place. These additional movement penalties, measured in minutes of delay, are summarized in Table 2. The total time to move from one map cell to the next is determined by the sum of the time costs of all terrain attributes of the first map cell compared to all terrain attributes of the second map cell. There is an exception, however. If an enemy unit is traveling along a road, the effect on movement of other terrain attributes is ignored.

Example computation: If a unit is moving from a ground level woods with road to a slope without road, the movement time cost would be computed by MALOS as follows:

Table 1

Resource Costs for Engineer Tasks

Item	Availability	Conventional Minefield mfj	GEMMS Minefield mfg	RAMMS Minefield mfa	AT Ditch atd	Blow Bridge brb	Road Crater rcm	Abatis aam	Urban Rubble urr	Fighting Positions fp
Renewable Resources:										
SQDS	9	3	1			1	1	1	4	
ACE	6				2					
CEV	2									1 ea
BL	1									
SEE	2									
ML	1		1							
Non-Renewable Resources:										
M15 AT	2000	222								
M75(G)	3200		800							
M180 KITS	100						5			
SC (40 lb)	125					5				
CC (40 lb)	70					5				
TNT (#)	15,000					160		100	850	
RAAMS (volleys)	18			6						

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Table 2

Terrain Movement Delay Effects (In Minutes of Delay)

		road	gully	woods	slope	hilltop	town	swamp*	ford*	water	clear	ground	bridge
			*TO					*	*				
	Road	+0	**	**	**	**	**	**	**	**	**	**	+0
	*Gully	**	1.6	3.6	4.4	**	4.4	4.4	1.2	4.4	4.4	**	**
	Woods	**	1.2	2.0	2.0	**	0.8	1.2	1.2	4.4	0.8	**	0.8
	Slope	**	1.2	1.2	2.0	1.6	0.8	1.2	1.2	4.4	0.8	**	**
	Hilltop	**	**	**	1.2	**	**	**	**	**	**	**	**
	Town	**	0.8	0.8	1.2	**	**	0.8	0.8	4.4	0.4	**	**
FROM	*Swamp	**	**	**	**	**	**	**	**	**	**	**	**
	*Ford	**	0.8	0.8	2.0	**	0.8	0.8	0.8	4.4	0.8	**	**
	Water	**	4.4	4.4	4.4	**	4.4	4.4	4.4	4.4	4.4	**	**
	Clear	**	0.8	0.8	1.2	**	0.4	0.8	0.8	4.4	0.4	0.8	**
	Ground	**	**	**	2.0	**	**	**	**	**	**	**	**
	Bridge	+0	**	0.8	**	**	**	**	**	**	0.4	**	+0

* Not used in OPS scenario, but available in the MALOS simulation driver.
** Movement either not allowed or not counted by MALOS.

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"From Cell" Attribute	"To Cell" Attribute	Time Cost Minutes
ground level	slope	2.0
woods	(clear)	0.8
road	(clear)	n/a
	Subtotal:	2.8
	Plus Base cost:	0.4
	Total time:	3.2 minutes

Note: 200 m in 3.2 minutes equals 3.75 km/hr.

As a rule of thumb, enemy units on roads and in towns move from grid to grid in 0.4 minutes, or at a speed of 30 km/hr. Enemy units move half as fast when moving from clear ground to clear ground, one-sixth as fast when moving through a wooded area (with no road), and one-twelfth as fast when moving through water.

Obstacle Related Delay Effects

The delay effect of obstacles on enemy movement is computed as the sum of a base delay and a combat delay and is added to the terrain movement delay to determine the total delay in a particular grid. The base delay of the obstacle is always counted, regardless of whether the obstacle is covered by friendly fire. The combat delay is "Ø" if the obstacle is not covered by fire and is a positive amount if the obstacle is covered by fire. If the friendly covering force is destroyed during the course of the battle, the combat delay effect of the obstacle is immediately cancelled. Table 3 gives the delay effects of the various obstacle types.

A blown bridge is a special case. The delay effect of a blown bridge is the difference between crossing the water obstacle on a road versus in the water. (See the terrain movement cost tables for the different movement combinations into/out of water.)

A road crater is also a special case. Since a crater by itself only negates the road attribute of the map cell in which it is placed, when an enemy unit encounters a road crater, MALOS compares the amount of time required to clear the crater to the amount of time to "go around" the crater in that particular type of terrain; i.e., the amount of time to traverse the grid if it did not contain the road. If it takes less time to go around the road crater than to clear the road crater, the enemy unit goes around it and does not clear it.

Table 3

Obstacle Movement Delay Effects (In Minutes)

Obstacle Type	Base Delay	Combat Delay	Total Delay
AT Minefield (Regardless of Delivery Method)			
1 Belt	4.8	2.0	6.8
2 Belts	9.6	4.0	13.6
3 Belts	14.4	6.0	20.4
4 Belts	19.2	8.0	27.2
Abatis	14.8	6.8	21.6
Urban Rubble	20.0	10.0	30.0
Anti-Tank Ditch	2.8	2.0	4.8
Road Crater	2.4	0.8	3.2

Fighting Position Effects

Fighting positions have no intrinsic delay effect; but they do increase the survivability of friendly vehicles significantly and thereby have an indirect delay effect on the enemy by enabling the friendly vehicles to survive longer and kill more enemy vehicles.

Obstacle Effects on Enemy Mortality

Minefields kill enemy vehicles directly as well as delay them. As long as a minefield is covered by fire, each 1-0-0 density minefield belt kills four enemy vehicles. A four-belt minefield in a single grid kills the first 16 enemy vehicles that traverse the field. However, if a minefield is not covered by friendly fire when the enemy first encounters it, only one enemy vehicle is killed regardless of the number of minefield belts in the grid.

If a minefield is initially covered by fire when the enemy first encounters it, and then the covering force is destroyed before the minefield is breached, the minefield ceases to kill any more enemy vehicles, and the enemy is delayed for only the base delay period.

While an enemy unit is engaging an obstacle, it is considered by MALOS to be in a "stopped" state and is subject to an additional 10 percent probability of being killed. Two enemy units cannot occupy the same grid. Therefore, if an enemy unit's progress is blocked by another enemy unit that is stopped by an obstacle, then the blocked enemy unit is also considered by MALOS to be in

a stopped state and is also subject to an additional 10 percent probability of being killed.

While an enemy unit is engaging an obstacle, up to three of the vehicles in that unit are considered by MALOS to be "clearing the obstacle." The result is a corresponding reduction in the killing power of the enemy unit since those vehicles engaged in clearing the obstacle are not firing at the blue forces.

5 PHASE 2 BATTLE CONSIDERATIONS

Phase 2 Displays

Figure 9 shows a screen display with the battle in progress. Figure 10 shows the final screen display. The elapsed simulation time is the length of time the battle would have actually lasted. The elapsed real-time is how long it takes the simulation to run. This will vary with how much processing time is available to you and is a function of how heavily the overall PLATO system is being used at the time you run the simulation. The real-time expansion ratio is the simulation time divided by the real time and is a measure of how quickly the simulation is running—the higher the ratio, the faster the simulation is running. During the conduct of the battle, the combat losses on both sides are tracked. At the end of the battle, the number of vehicles of each type on each side that survived is tallied in the last column.

Enemy Force Battle Tactics

Five enemy attack plans are currently programmed into OPS. Any one of these may be run against your position. In all of the attacks, the first echelon of the enemy force consists of the two BTR regiments that attack on line across the whole front. Their mission is to engage the friendly force and expose the friendly positions.

The enemy's second echelon forces attack either in column (to "punch through" the friendly position) or on-line (to destroy the friendly position). Each attack is identified in Figures 11 through 15 by a matrix that shows approximately where each enemy unit enters the board and the approximate simulated time of its arrival. This matrix will enable you to determine which attack is being used in a particular run.

29
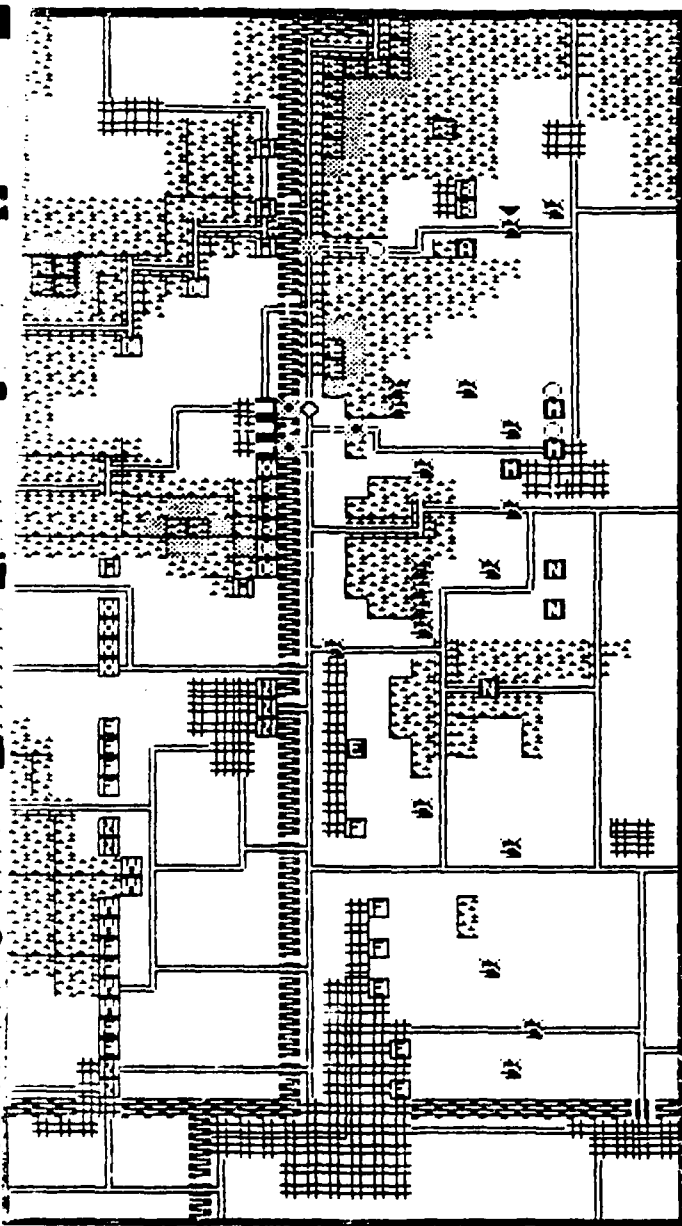
```
┌─────────────────────────────────┐
│    Elapsed Simulation Time      │
│         (HH:MM:SS)              │
│                                 │
│          0:14:24                │
├─────────────────────────────────┤
│      Elapsed Real Time          │
│         (HH:MM:SS)              │
│                                 │
│          0: 1:54                │
├─────────────────────────────────┤
│     Real Time Expansion         │
│                                 │
│        Ratio =  7.6             │
├─────────────────────────────────┤
│        Combat Losses            │
└─────────────────────────────────┘

Blue Team:
   ITV            0   (0%)
   M1             0   (0%)
   M2            11  (13%)
   Total:        11  (8.1%)

Red Team:
   BMP            0   (0%)
   BTR-60       184  (93%)
   T-64           4  (1.9%)
   Total:       188  (37%)
```
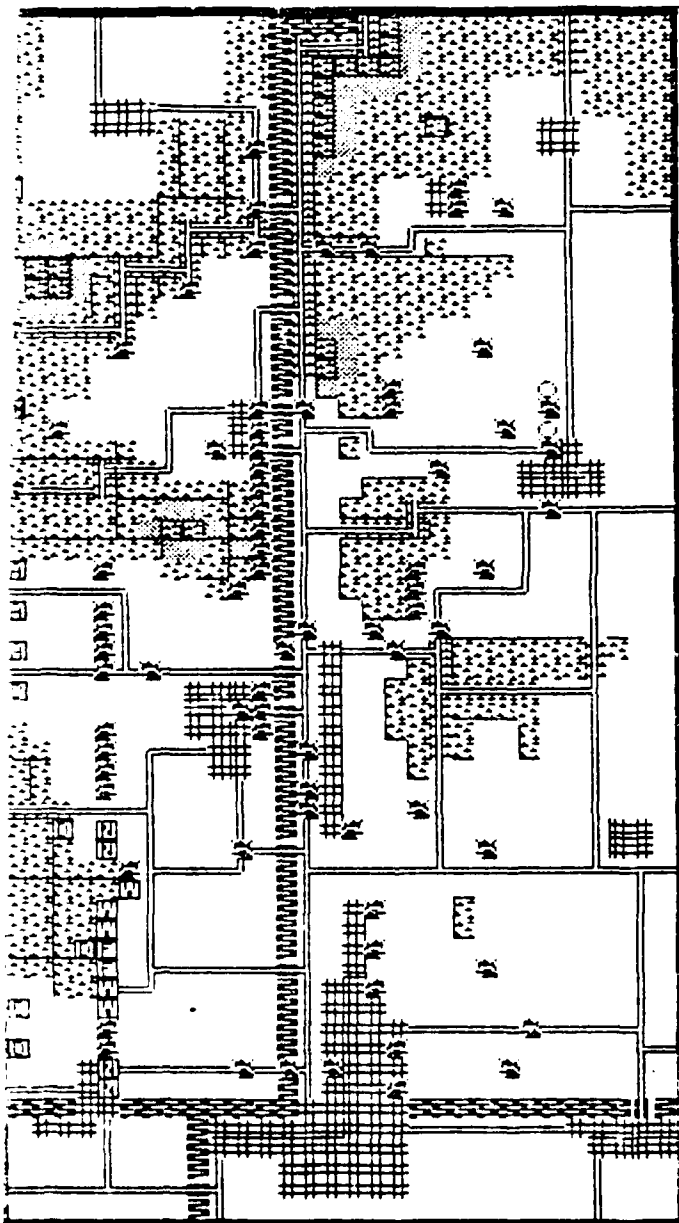
Figure 9. Phase 2 screen display, battle in progress.

30

Elapsed Simulation Time
(HH:MM:SS)

1:41:12

Elapsed Real Time
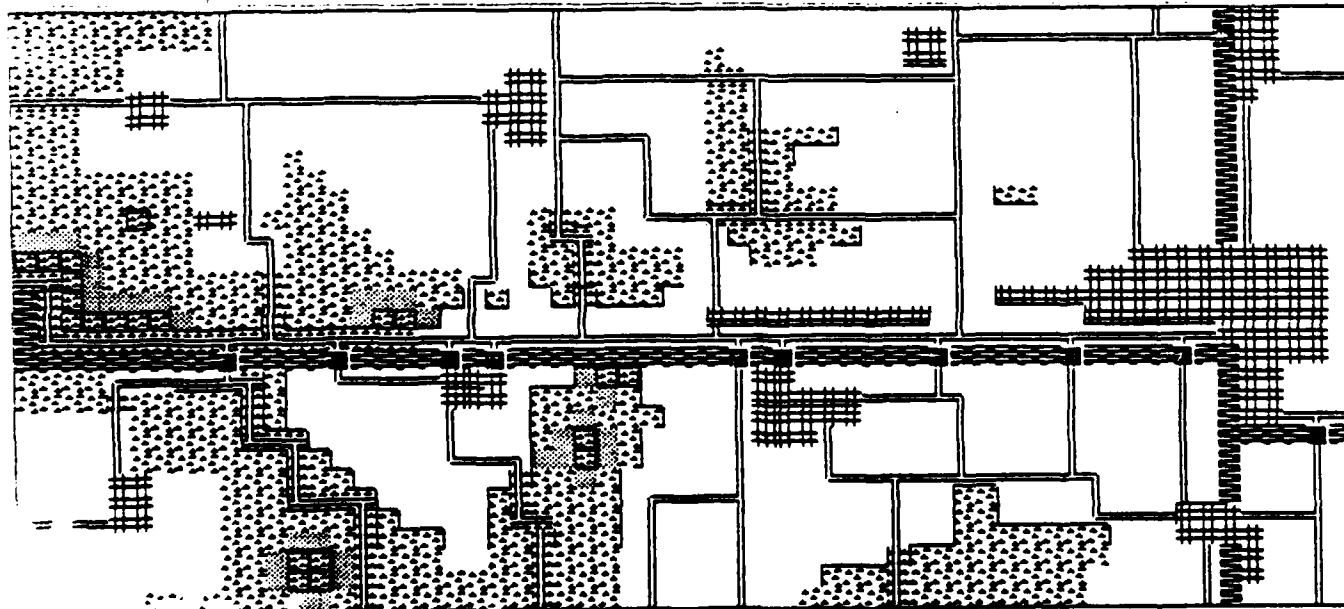(HH:MM:SS)

0: 9:32

Real Time Expansion

Ratio = 10.6

Combat Losses

Blue Team:			Survivors:
ITV	15	(63%)	9
M1	21	(75%)	7
M2	58	(69%)	26
Total:	94	(69%)	42

Red Team:			
BMP	40	(40%)	59
BTR-60	198	(100%)	0
T-64	173	(81%)	40
Total:	411	(81%)	99

** The Battle is Over **

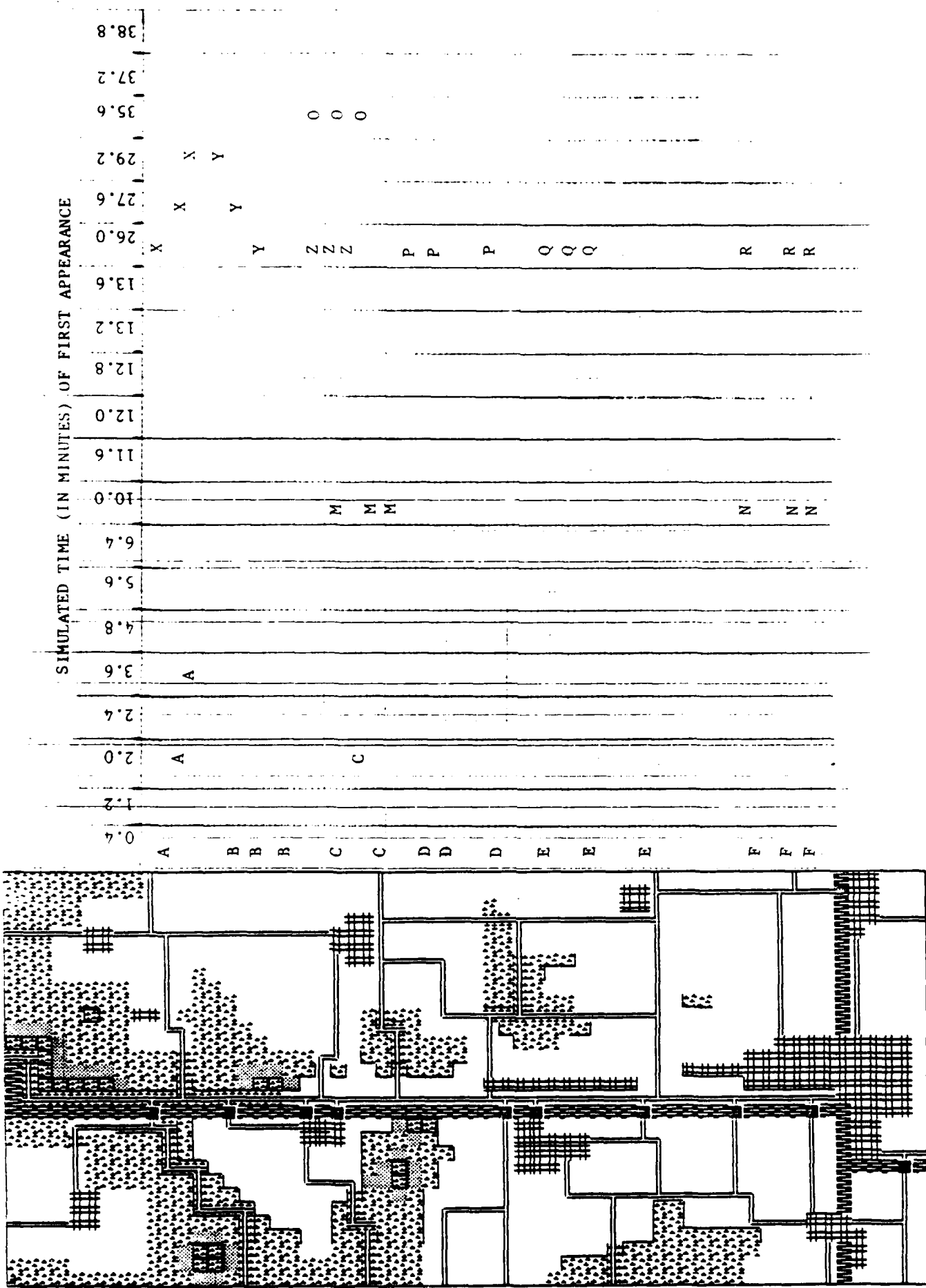Figure 10. Phase 2 screen display, battle over.

Figure 11. Enemy attack formation "A".

Figure 12. Enemy attack formation "B".
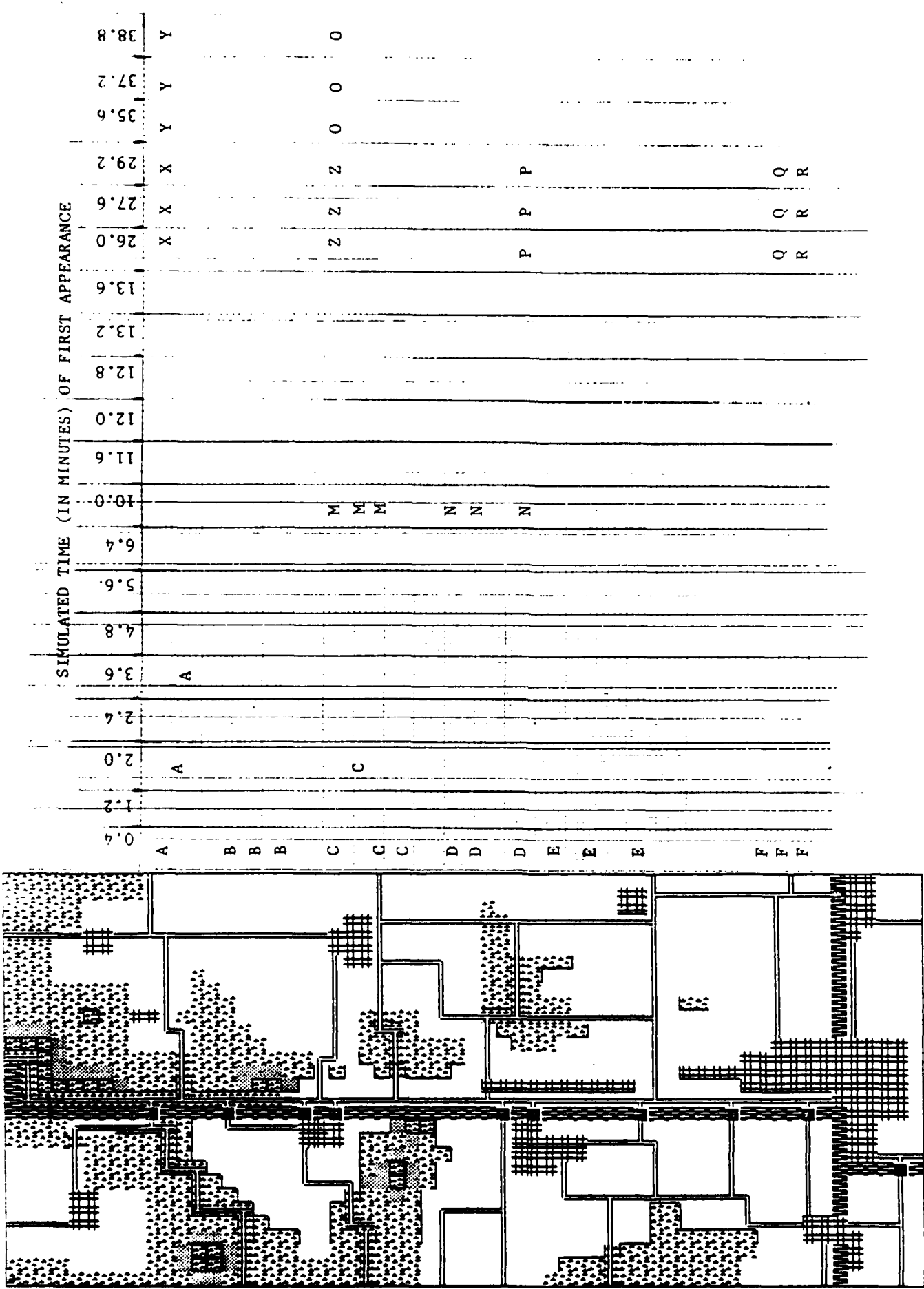
Figure 13. Enemy attack formation "C".

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SIMULATED TIME (IN MINUTES) OF FIRST APPEARANCE

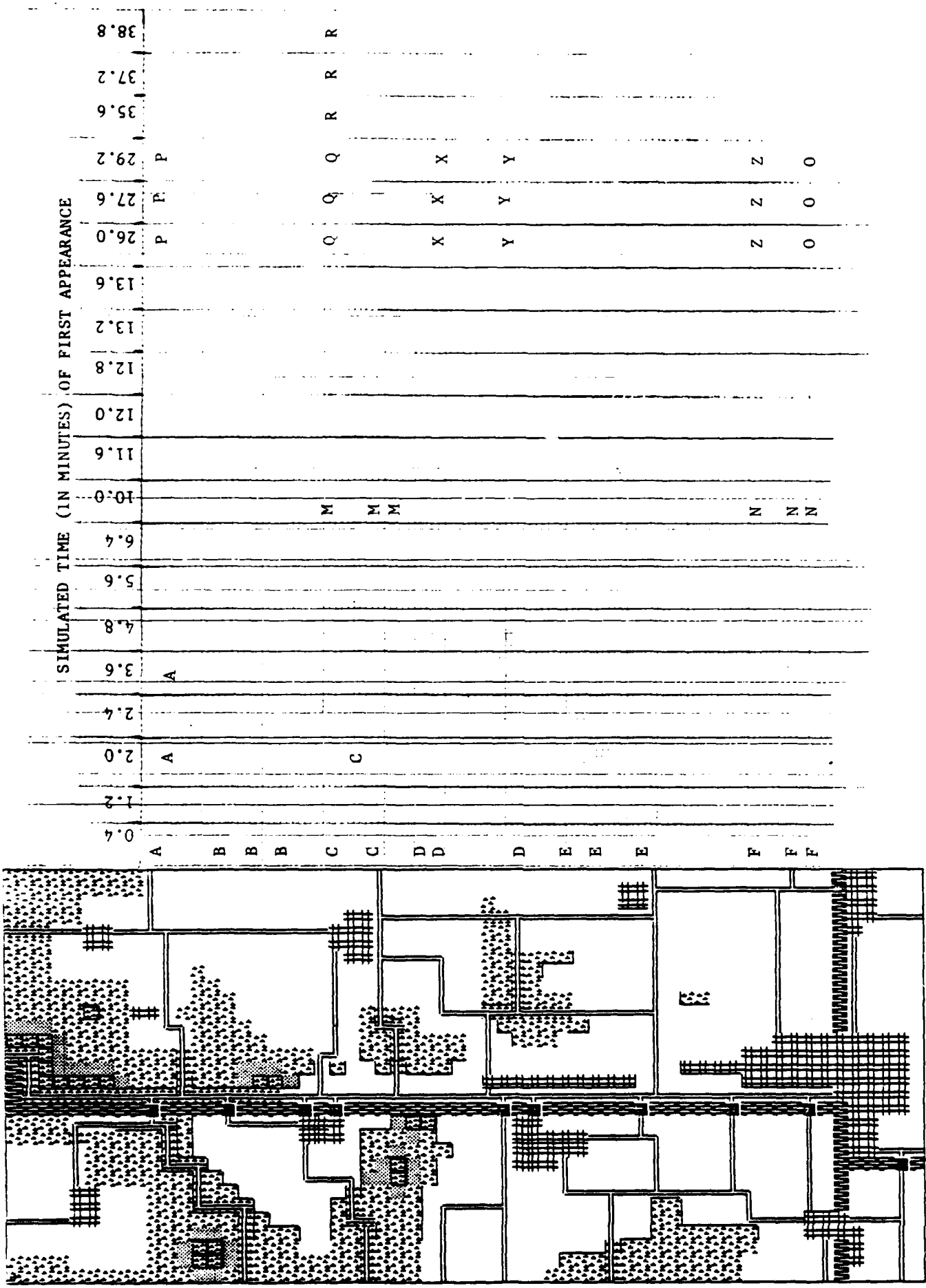|	0.4	1.2	2.0	2.4	3.6	4.8	5.6	6.4	10.0	11.6	12.0	12.8	13.2	13.6	26.0	27.6	29.2	35.6	37.2	38.8
A			A		A										P	P	P			
B									M						Q	Q	Q	R	R	R
B									M											
B									M											
C			C																	
C															X	X	X			
D															Y	Y	Y			
D																				
D																				
E																				
E																				
E																				
F									N						Z	Z	Z			
F									N						O	O	O			
F									N											

Figure 14. Enemy attack formation "D".

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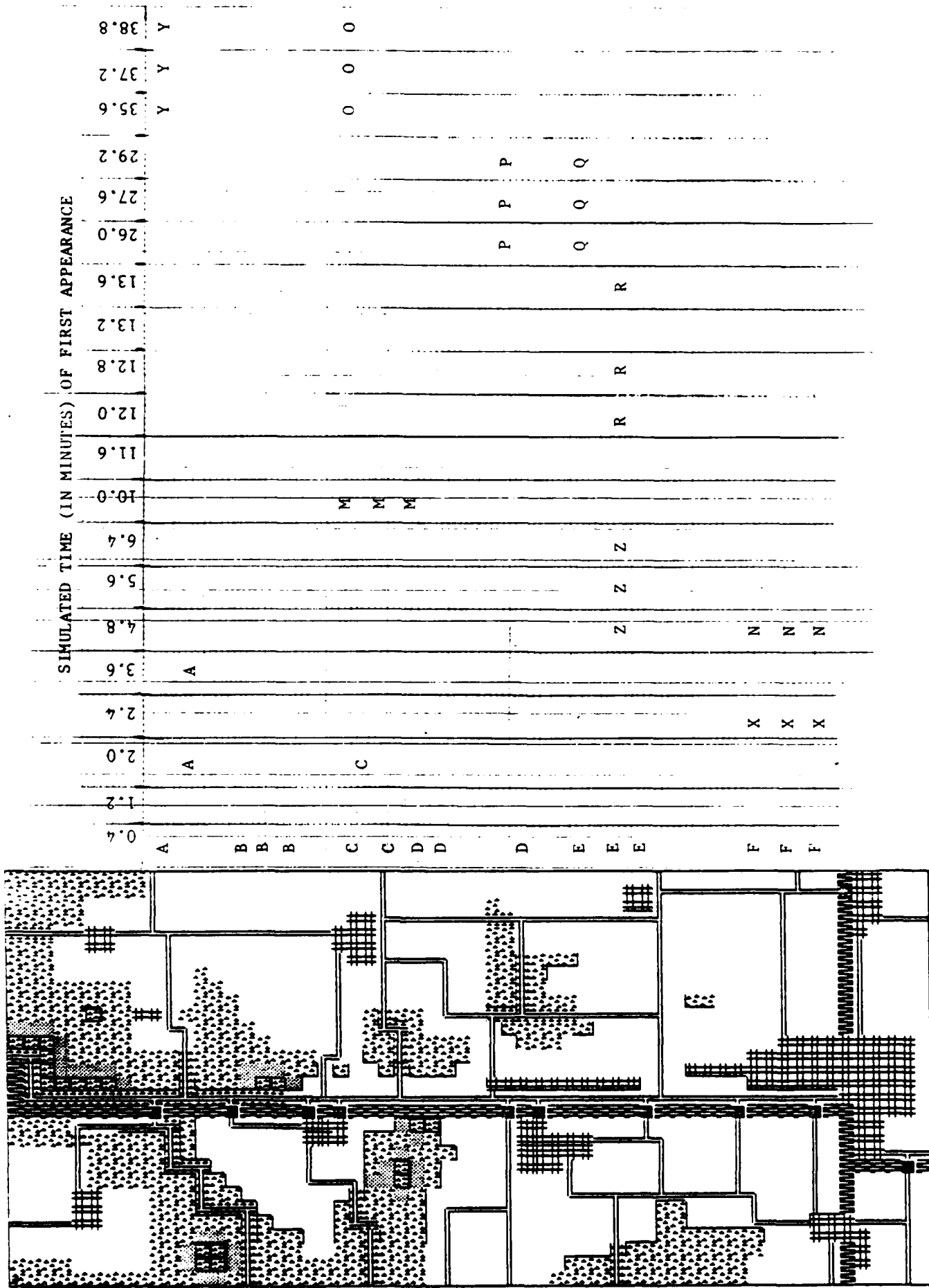
Figure 15. Enemy attack formation "E".

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  ATTN: DAEN-ZCF
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