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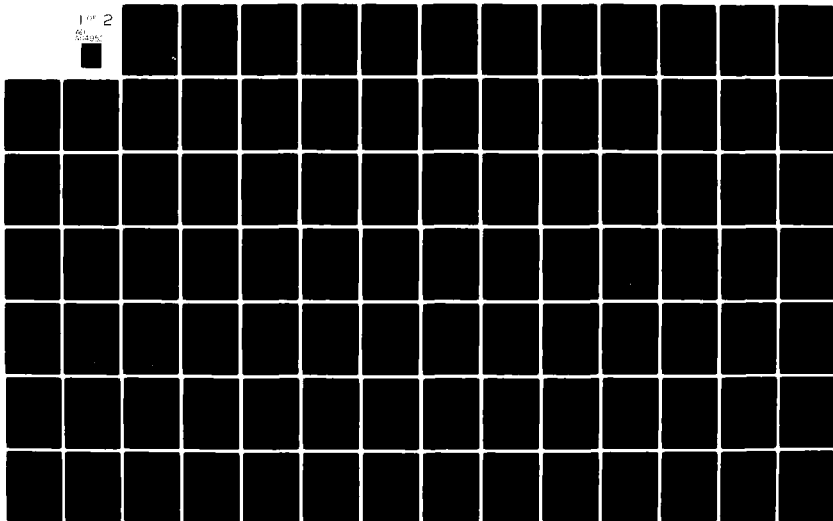
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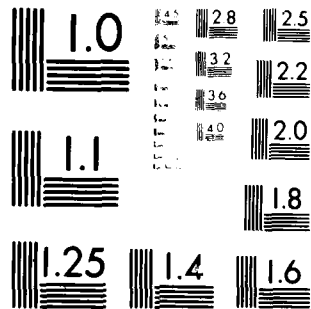
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REVISED RB 100-9: A GUIDE TO THE FORMULATION AND SELECTION OF FEASIBLE TACTICAL COURSES OF ACTION

JAYCOR
205 South Whiting Street
Alexandria, Virginia 22304

23 April 1981

Handbook

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This report provides a guide to the formulation and selection of feasible tactical courses of action for battle situations wherein nuclear/chemical munitions may be used; common tactical considerations, steps leading to the formulation of courses of action and the war gaming (decision making) process are related to the military estimate of the situation; sample formulation and selection of tactical courses of action are presented for defensive and offensive operations, leading to the identification of the WHAT, WHEN, WHY, WHERE and HOW elements of the military estimate of the situation.		

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PREFACE

A major fundamental of both offensive and defensive operations is to SEE THE BATTLEFIELD. Among other things, this involves detailed analysis of the terrain and weather, the enemy and the capabilities of our own troops. It is vital that the commander and staff logically and systematically analyze these factors as part of their military estimate leading to a sound plan for tactical operations.

The purpose of this reference book is to provide a systematic process for formulating and selecting feasible courses of action by analysis of the essential factors for both offensive and defensive operations. Chapter 1 outlines the tactical considerations common to all operations, identifies considerations that apply only to the offense or defense and establishes the basis for subsequent detail. Although the general considerations set out in Chapter 1 will usually apply to all problems, the detail will differ from operation to operation. Chapter 2 covers the detailed fundamental analyses (METT) necessary for sound planning of tactical operations and lists basic factors which must be considered in developing courses of action. Chapter 3 details the decision-making process of war gaming in arriving at alternative courses of action (COA), refinement of COAs and selecting a preferred COA. Chapter 4 provides sample formulation and selection of courses of action for the defense and the offense. The guidance in these chapters should be modified by the war gamer as the situation and tactical common sense dictate.

This reference book is based firmly on doctrine. FM 100-5, Operations, February 1981, establishes the need for detailed analysis of the factors of terrain, weather and enemy. The FM also states, in Chapter 4, that intelligence preparation of the battlefield (IPB) should be initiated well before combat operations begin and continues as the battle develops, using analytical overlays, situational and doctrinal templates. The detail of these techniques is contained in TC 34-3, Intelligence Preparation of the Battlefield, 1980. Terrain analysis is based on consideration of the five military aspects of terrain as set forth in FM 30-5, Combat Intelligence, October 1973.

This book attempts to place the analysis of factors leading to the formulation and selection of feasible tactical courses of action into a logical sequence, permitting the user to see how they fit into the whole military estimate process, to see the relationship between analysis of offensive and defensive problems and to make the user's analysis both faster and more complete.



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CHAPTER 1
COMMON TACTICAL CONSIDERATIONS
SECTION I. INTRODUCTION

This reference book is designed to offer a logical approach to the formulation, war gaming, comparison and selection of feasible courses of action. Selection of a specific course of action, the contents of commander's decision and the writing and issuing of plans and/or orders are outside the scope of this reference book. However, as you analyze, it is essential to retain a full understanding of where each part of the analysis process is leading you.

In order to conduct an effective analysis of any tactical problem, a logical process must be followed. The process used as the basis for analysis and selection of feasible courses of action is the Commander's Estimate of the Situation set forth in FM 101-5, Command and Control of Combat Operations, 198, and on the G3 worksheet. This process is adaptable to almost any tactical operation under consideration, using the following general format.

1. MISSION.
2. SITUATION AND COURSES OF ACTION.
 - a. What is the situation?
 - (1) What is the effect of terrain and weather?
 - (2) What threat forces are opposing us and where?
 - (3) What friendly forces are available?
 - (4) What conclusions can be drawn concerning relative combat power?
 - b. What are the Threat capabilities?
 - c. What difficulties may be anticipated that will have an unequal effect on each course of action?
 - d. What are the feasible (logical) courses of action that will accomplish the mission?

3. ANALYSIS OF OPPOSING COURSES OF ACTION.
 - a. War game courses of action against threat capabilities and anticipated difficulties.
 - b. Identify strengths and weaknesses of each course of action.
 - c. Identify critical events and actions.
4. COMPARISON OF OWN COURSES OF ACTION.
 - a. Evaluate each course of action in terms of significant advantages and disadvantages, or in terms of the major considerations, that emerge during the analysis (3 above).
 - b. Decide which course of action promises to be most successful in accomplishing the mission.
5. DECISION
 - a. Refine the best course of action into a clear decision statement (or recommendation) showing WHO, WHAT, WHERE, WHEN, HOW and WHY, as appropriate.
 - b. Announce the decision and concept of operation.

This process uses well-tried doctrinal concepts and supporting techniques. Analysis of the situation involves careful study of the factors of mission, enemy, terrain and weather and troops available (METT). In analyzing the terrain, the planner considers the five military aspects of terrain -- observation and fire; cover and concealment; obstacles; key terrain; and avenues of approach -- set forth in FM 30-5, Combat Intelligence, October 1973. In addition, when analyzing an avenue of approach for either friendly or Threat forces, the planner also considers adequacy of maneuver space and ease of movement (also set forth in FM 30-5).

The process is supplemented by the systematic use of the intelligence preparation of the battlefield (IPB) techniques of overlays and templating. These techniques are set forth in principle in FM 100-5, Operations, February 1981, Chapter 4, and in more detail in TC 34-3, Intelligence Preparation of the Battlefield, 1980. These IPB techniques rely heavily on the provision of detailed topographical information by the engineers, the provision of weather information by the staff weather officer and detailed knowledge of threat doctrine, tactics and

equipment by intelligence officers. IPB techniques save time by providing detailed information on the factors of terrain, weather and the threat in a readily discernible form.

SECTION II. FRAMEWORK FOR ANALYSES

Thus, a suitable framework for consideration of any tactical problem leading to the formulation and selection of feasible courses of action and finalization of an appropriate plan is outlined below. This framework is based on the military estimate and is supported by the IPB techniques and a decision-making process that recognizes and defines the problem; gathers the data needed to determine the scope of, and solution for, the problem; develops lists and analyzes possible solutions to the problem; and selects the best solution to the problem.

1. Perform a mission analysis. The mission analysis must point out:
 - a. The intent of the commander.
 - b. The essential tasks that must be performed.
 - c. The degree of risk to the force which is acceptable to insure mission accomplishment.
 - d. Constraints or limits on unit actions.
 - e. Whether or not the situation has changed significantly enough to affect the viability of the originally stated mission.

2. Conduct terrain analysis. The following are the most important questions in analyzing terrain (FM 100-5 Chapter 5, Section II):

- a. What is a good avenue of approach? Depending on the type of force being employed, a good avenue of approach usually offers:
 - (1) A reasonable degree of mobility, a direct approach to the objective and few, if any, obstacles.
 - (2) Little or no canalization of movements.
 - (3) Acceptable intervisibility conditions (e.g., observation and fields of fire).
 - (4) Some cover.

- (5) As much concealment as possible.
- (6) Good communications.
- b. What is good defensible terrain? As a general rule, good defensible terrain affords:
 - (1) Intervisibility out to extreme long ranges (greater than 3 km), and to at least long ranges (up to 3 km) in bad weather.
 - (2) Cover and concealment.
 - (3) Canalization of the attacking force.
 - (4) Obstacles to impede or disrupt movement.
- c. What is key terrain? Key terrain is a term related to a mission.

Since mission differs at each echelon of command, so does the perspective on key terrain. Terrain is designated as key because it is important to the accomplishment of the mission. Seizing key terrain helps insure the success of the attack. In the defense, retaining key terrain denies it to the attacker, but even more importantly helps insure the success of the defensive battle. Certain key terrain may be designated "decisive" if it has an extraordinary impact on the mission -- not just an important effect, but a decisive effect:

- (1) In the attack, controlling decisive terrain (possibly the objective itself or the ground dominating it) insures accomplishment of the mission.
- (2) In the defense, decisive terrain is that which, if it is controlled by the attacker, guarantees the failure of the defender's mission.

3. Analyze avenues of approach. Avenues of approach are analyzed in detail, from friendly and Threat points of view, to determine merits and problems of each. Consider the implications of the employment of nuclear weapons by either side on each avenue of approach.

4. Conduct weather analysis. Assess the effects of weather on the avenues of approach.

- a. Consider the effects of weather on each avenue of approach, particularly --

- (1) Fog.
- (2) Rain and consequent soil conditions.
- (3) Cloud cover.
- (4) Temperature, humidity and wind speed/direction.
- b. Reassess the relative merits of each avenue of approach based on weather conditions.

5. Threat integration. Template or array the Threat and analyze his capabilities.

- a. Plot known enemy locations. Identify known or postulated strength of Threat force, in terms of:
 - (1) Committed forces (e.g., number and size of Threat units on each avenue of approach available to the Threat).
 - (2) Reinforcements. Number, size and probable location of second echelon and reserve forces.
 - (3) Air, nuclear and chemical capabilities.
 - (4) Other considerations that could affect friendly combat power (e.g., Threat's capability to conduct electronic warfare, unconventional warfare, combat surveillance, etc.).
- b. Describe composition and type organization of Threat forces. Apply doctrinal templates. Doctrinal templates are models on Threat tactical doctrine; they depict how the Threat would like to fight if not restricted by terrain.
- c. Develop situation templates by adjusting the doctrinal templates to the terrain. To make the situation templates, the analyst recreates, as closely as possible, the doctrinal template by considering the surrounding terrain, to include natural and man-made obstacles.
- d. Combine known locations and templated locations to obtain probable Threat dispositions.
- e. Identify Threat courses of action that are physically within his capability to perform and that, if adopted, would influence the accomplishment of the friendly mission.
- f. Reassess the relative merits of each avenue of approach based on the Threat situation.

6. Consider friendly forces. Disposition, composition, force allocation and relative potential combat power of friendly and Threat forces are considered here. As a minimum, and before relative combat power can be estimated, the combat capability and effectiveness of friendly forces must be determined, taking into consideration --

- a. Personnel and materiel strengths.
- b. Types of equipment available.
- c. Degree of mobility possible.
- d. Availability of nuclear and chemical ammunition.
- e. Combat service support status.
- f. Air support available.
- g. Effectiveness of command control headquarters.
- h. Levels of training in units.
- i. Ability of subordinate commanders.
- j. Morale and condition of the soldiers.

7. Formulate feasible (logical) courses of action. Using the elements of METT (mission; enemy; terrain and weather; troops available) derived in 1 through 6, the analyst is now ready to develop his own course of action. The analyst will include the following elements in each course of action developed:

- a. WHAT: The type of action (e.g., attack; defend).
- b. WHEN: The time that the action will begin or be completed.
- c. WHERE: The location of the action (e.g., in the defense, the assigned sector; in the attack, the general direction of the attack).
- d. HOW: The use of available means (a broad indication of the maneuver elements, the form of maneuver or the formation to be employed and, when appropriate, nuclear and chemical fires to be employed; when necessary to distinguish between courses of action, the analyst may include other supporting fires).
- e. WHY: The purpose of the action. (Included when clarity of purpose is necessary to the understanding or explanation of the course of action).

In formulating courses of action, the analyst should use the following criteria as a guide:

- a. Will the course of action accomplish the mission-essential tasks?
- b. Is the course of action feasible; i.e., does the command have the capability to perform the contemplated action?
- c. Does the course of action expose the command to an unacceptable degree of risk?
- d. Are the courses of action in sufficient detail to be distinguishable one from the other, for purposes of analysis?

8. Analyze (war game) each course of action. Each course of action formulated is analyzed to determine its advantages and disadvantages, to incorporate improvements, to determine requirements for supporting fires and to define requirements for other actions that may be necessary in conjunction with execution of the course of action. This is accomplished, for example, by war gaming the course of action from current dispositions of a unit to the objective, to include any actions that may be required subsequent to securing the objective. The first part of the war game consists of a preliminary analysis to discriminate between those considerations (factors) or Threat capabilities that will materially assist in choosing the best course of action and those that will not. The second part of the war game process is the analysis of own courses of action. The analyst war games each friendly course of action separately against each selected Threat capability to determine its outcome; that is, the analyst "fights" each course of action from start to finish. This war gaming process is repeated until each formulated course of action has been analyzed.

9. Compare and decide on the best course of action. Own courses of action are compared only after the war gaming process has been completed. The following questions are helpful in deciding which course of action is best:

- a. What is the relative likelihood of mission success of each course?
- b. What forces and resources are required and what are likely to be the losses?
- c. What undesirable side effects can be foreseen?

More often than not, the right course of action will not jump from the page at the end of war game, but will require some hard choices on the part of the commander.

10. Refine the chosen course of action and issue concept and plans/orders. The elements of WHAT, WHEN, WHERE and HOW are present in the chosen course of action. However, before the decision is understandable as a concept, it normally must also include the elements of WHO (the command itself or, when the entire command is not involved, the appropriate elements of the command) and so much of the WHY (purpose to be attained and the reasons therefor) as are necessary for understanding.

SECTION III. SUMMARY

Though the process presented above provides a framework for analytical decision-making, the details of how various factors are considered, the order in which they are considered and whether or not some factors are considered concurrently, depend on the type of operation being planned. The details of planning for offensive and defensive operations will be somewhat different because of the different objectives of these operations and the different deductions which need to be drawn from consideration of the relevant factors. This difference notwithstanding, you should discern a common framework in both offensive and defensive operations in the following chapters.

When applying the techniques/process suggested in this book, it is most important to recognize that tactics is not a purely analytical or mathematical activity. Some scientific methods may be profitably applied to tactical problems for the ease of relative comparisons, but the learned, artistic touch of the tactician must also be applied and carries more weight than attempts at quantification. Methods such as those suggested herein can only be viewed as tools which the tactician can expand or modify by exercising his knowledge, experience, common sense and judgment.

CHAPTER 2

STEPS LEADING TO FORMULATION OF COURSES OF ACTION

Section I - INTRODUCTION

This chapter discusses the fundamental analyses (METT) required as a foundation in formulating feasible courses of action:

- STEP 1: Perform a mission analysis.
- STEP 2: Conduct a terrain analysis.
- STEP 3: Analyze each avenue of approach.
- STEP 4: Conduct a weather analysis.
- STEP 5: Template the Threat.
- STEP 6: Consider availability and capability of friendly forces.

Section II. IDENTIFICATION OF THE WHAT, WHEN AND WHY ASPECTS OF A DEFENSIVE OR OFFENSIVE MISSION.

- STEP 1: Conduct a mission analysis (defensive or offensive courses of action)

The first step in the decision-making process is for the planner to conduct a mission analysis by examination of the mission and operation plan/order from higher headquarters. Frequently, the commander himself will perform this task, assisted by his principal staff officers.

a. First, the planner determines the specified tasks laid down in the operation plan/order by higher headquarters. These tasks will be found in paragraphs 2 and 3 of the plan/order, particularly in the concept for maneuver, the unit tasking subparagraph and the coordinating instructions.

b. Next, implied tasks are considered. These are additional major tasks that the planner identifies as necessary to the accomplishment of the mission but that are not explicit in the higher plan/order. Inherent, routine or SOP-type requirements are not included in the final list of implied tasks.

c. Next, the list of specified and implied tasks is examined to identify those tasks which are absolutely essential to the accomplishment of the mission.

d. Finally, the essential tasks are put in the form of a restated mission for the unit. This restated mission tells the planner WHAT he is to do, WHEN he is to do it and WHY he is to do it. This process is vital because it establishes the goal toward which the total effort of the command is to be directed. Although subsequent analysis will apply other considerations and factors in the refinement of objectives, selection of avenues of approach and formulation of courses of action, the purpose of the operation must be constantly maintained. Mission analysis provides a necessary focal point for the staff and subordinate units to orient their information collection effort and subsequent refinement of estimates of the situation. As the planning continues, new requirements may be discussed. Mission analysis is a dynamic process and continuous reassessment is necessary.

e. The WHAT, WHEN and WHY aspects of the offensive operation will normally remain constant. The WHERE and HOW aspects may vary considerably, depending on analysis of terrain and enemy, and assessment of own forces. These aspects will provide feasible courses of action. There will normally be many more courses of action available to the offensive planner than to the defensive planner. This is so because the attacker has the initiative and considerably more freedom of action than the defender. The attacker is in the position of making the thrusts and using deception and surprise to conceal his intentions. The defensive planner is concerned primarily with identifying the Threat's main thrusts and then reacting by correctly allocating and positioning forces to deal with those thrusts.

Section III. IDENTIFICATION OF THE WHERE ELEMENT OF
A DEFENSIVE OR OFFENSIVE COURSE OF ACTION.

STEP 2: Conduct a terrain analysis (defensive course of action)

For a defensive course of action, the planner must analyze the terrain in front of and within his sector to determine the Threat's possible schemes of maneuver. The following substeps are designed to provide the planner with a systematic method of identifying likely Threat avenues of approach.

a. Define the area of operations. The planner must analyze the terrain between coordinating points designated by higher headquarters for both the covering force area (CFA) and the main battle area (MBA). He determines the best terrain on which to establish the initial delaying position and subsequent delaying positions for the covering force operation and the forward limit of the MBA, taking maximum advantage of existing obstacles.

b. Identify likely enemy objectives. Objective identification is based on current Threat doctrine and tactical judgment. Present knowledge indicates that the Threat may select both subsequent and immediate objectives. For example, an immediate objective for a Threat army may be the subsequent objective for a first echelon division. Objectives may include key terrain, command and control facilities and communications centers necessary for sustaining the attack.

c. Identify mobility corridors/canalizing terrain. Before the planner can attempt to determine threat avenues of approach, he must complete a detailed terrain analysis to discover where in sector the enemy will be able to conduct rapid cross-country movement with his armored and motorized rifle forces. If the command is responsible for conducting the covering force operation, this analysis starts where the Threat is expected to enter the CFA; otherwise the analysis begins at the forward edge of the battle area (FEBA). This analysis will reveal the mobility corridors in sector. Since current Threat doctrine emphasizes speed and momentum of the attack, it is reasonable to assume that the Threat will use such mobility corridors whenever possible. At the same time, the planner must identify canalizing terrain which limits the Threat's freedom of movement. To assist in this process, the planner can often turn to terrain maps or overlays which have been prepared by the topographical services. These maps or overlays

graphically categorize the terrain into different degrees of cross-country movement, e.g., different speeds that vehicles can travel off-road in a given area. These movement speeds are normally based on the size of the urban areas, the slope of the ground, the vegetation in the area, the soil conditions in the area, weather effect on trafficability and the existing ground obstacles. An example of how such an overlay may be categorized is shown at Table 1.

(1) Regardless of the number of varying mobility categories available from previously prepared terrain analyses, the planner must at least decide to identify and take into consideration the good to poor terrain conditions.

Table 1. Relationship Between Speed and Maneuverability Conditions. (Armored and Mechanized Forces)		
Category	Estimated maximum speed (unopposed)	Maneuverability
1	40 km/hr or greater	good
2	32 to 40 km/hr	good
3	16 to 32 km/hr	acceptable
4	8 to 16 km/hr	acceptable
5	Less than 8 km/hr	poor
6	Passage blocked	poor
7	Built-up area	poor

(2) At this point it is important to note that canalizing terrain includes terrain where movement is confined to existing roads and trails. If we discover that the terrain reflected on the cross-country movement overlay as poor actually has sufficient roads and trails heading in the direction of the threat attack, then we would not be able to consider such terrain as poor or canalizing in nature. In this regard, the planner may consider sufficient roads to mean at least two roads per kilometer of width leading in the direction of the expected enemy attack. Types of roads that should be included range from autobahns to loose-surface roads.

d. Identify Threat avenues of approach. Having identified the likely Threat objectives and the mobility corridors and canalizing terrain within the sector, the planner can now identify avenues of approach within the sector, cross-over corridors and flank approaches.

(1) The planner (using a cross-country movement overlay) examines the zone of action to determine where the Threat can move. The planner should try to think like a Threat commander and foresee the Threat taking advantage of existing road networks while crossing the least possible amount of canalizing terrain. The planner should also consider the effects of weather, particularly as they affect cross-country movement of Threat vehicles. The planner may also decide to adjust or eliminate those potential avenues that make significant changes in direction or have multiple chokepoints.

(2) In addition, the planner should identify possible crossover avenues within the zone of action. Identification of these avenues is important because it will later assist the planner in war gaming techniques to determine where the Threat second-echelon forces can be introduced into the battle.

(3) The planner will need to consider flank approaches that either enter or leave his sector of responsibility. As with crossover avenues, the determination of flank approaches will assist the planner during the war gaming of the course of action.

(4) Further, the planner considers the effects of the possible use of nuclear weapons by either side on the avenue. Friendly employment of these weapons on Threat forces which have penetrated the MBA may produce additional bonus effects by creating obstacles (forest fires, tree blowdown, rubble) which will impede movement. Conversely, routes to be used by friendly forces to counterattack should not be blocked. It can be expected that the Threat will try to avoid ground zeros for his weapons which may obstruct the movement of his own forces.

(5) In summary, a good avenue usually offers:

- A reasonable degree of mobility, a direct approach to the objective and few, if any, obstacles.
- Little or no canalization of movement.
- Acceptable intervisibility conditions (e.g., observation and fields of fire).
- Some cover.
- As much concealment as possible.
- Good communications.

(6) Lastly, air avenues of approach for Threat attack helicopters, close air support aircraft and airmobile forces must also be considered. A good air avenue provides terrain masking from air defense radars and air defense weapons.

e. Based on the width of the avenue of approach, the planner determines the size enemy force that each avenue can accommodate. Table 2 sets forth Threat doctrinal attack frontages.

Table 2. Threat Doctrinal Attack Frontages.		
Formation Size	Main attack	Secondary attack
Division	4-16 km	10-30 km
Regiment	2-7 km	5-10 km
Battalion	1-2 km	2 km
Source: DA Manual, <u>Soviet Army Operations</u> , April 1978.		

f. Label, with a letter designation, each avenue that enters the sector. Avenues that enter the sector at the forward limit of the CFA (if applicable) and/or at the FEBA are labeled for ease of reference during later steps in the analysis. The labeling process is normally in alphabetical sequence starting at the Defender's left flank along the forward portion of the CFA (or FEBA) and proceeding to the right. In addition, the planner, using the doctrinal widths (Table 2), indicates the size of the Threat force expected to use each avenue and records this information after each avenue's letter designation. (See Map D, page 49).

g. Identify key terrain. At this point, the defensive planner designates key terrain, that is, terrain whose retention is essential to the accomplishment of the defensive mission from the standpoint of the level of command at which he is operating. The planner designates as key those dominant terrain features which must be controlled to successfully defend the FEBA and against the Threat avenues of approach. Certain key terrain may be designated as "decisive" if it has an extraordinary impact on the mission of the command--not only an important effect, but a decisive effect.

STEP 2 (continued): Conduct a terrain analysis (offensive course of action)

For an offensive course of action, the planner shifts his focus to the Threat-held terrain beyond the FEBA. He identifies and refines objectives, and

identifies canalizing terrain, mobility corridors, avenues of approach and flank approaches as described in the following paragraphs.

a. Identify and refine objectives.

(1) The objectives for an operation are usually given by higher headquarters and are determined with reference to the purpose(s) of the operation. After completing a mission analysis, subordinate commanders translate essential tasks into specific objectives, to include key terrain to achieve mission accomplishment. Objectives are also used to focus the efforts of attacking units and provide direction for avenues of approach.

(2) An objective is "the physical object of the action taken (e.g., a definite tactical feature, the securing, seizure or holding of which is essential to the commander's plan)" (FM 101-5-1, Operational Terms and Graphics, 1980)). The size of the objective does not indicate the number of troops, if any, required to physically occupy it. Moreover size of the objective will often be dictated by the physical feature selected; for example, a town, a mountain, or a bridge. A commander tasked with securing an objective will secure the terrain he needs to hold the objective.

(3) The planner must constantly be aware of the intent of higher headquarters. He must study the mission, essential tasks, and terrain to grasp the intent of the higher commander and confirm his objective. The planner may then refine the objective and determine the need for other objectives for his subordinate units. While objectives may be refined, the purpose must be maintained. He may:

- Define the objective by breaking it down into several objectives for his subordinate maneuver formations.
- Establish separate final or intermediate objectives for his subordinate maneuver formations.

(4) Intermediate objectives may be tentative at this stage of the planning. Subsequently, more detailed analysis of terrain, enemy and courses of action may establish, validate or deny the need for such objectives. Intermediate objectives are established only when essential to mission accomplishment; they have a tendency to interrupt the speed and momentum of an operation.

b. Identify canalizing terrain.

(1) The planner may have access to factual terrain data to assist in this process. Engineer topographical units produce terrain studies, and intelli-

gence staffs can produce intelligence preparation of the battlefield (IPB) overlays, as shown in TC 34-3, Intelligence Preparation of the Battlefield, 1980. The most useful products for identifying canalizing terrain are the cross-country movement (CCM) map and overlay, or the combined obstacles overlay. These maps or overlays graphically categorize terrain into different degrees of cross-country movement for force traveling off the roads. An example of categorization for armored and mechanized forces is shown in Table 3. (As a minimum, the planner must identify terrain offering good and poor maneuverability.)

(2) The terrain data provided may be modified by the planner, using tactical judgment. The CCM and combined obstacles products do not consider the road and trail network in the area. If an area has two or more roads per grid square that will facilitate tactical movement toward the objective, the area should not be considered canalizing.

Table 3. Cross-Country Movement Relationships. (Armored and Mechanized Forces)		
Category	Estimated Maximum Speed	Maneuverability
A	Greater than 32 km/hr	good
B	8 to 32 km/hr	acceptable
C	Less than 8 km/hr	poor

(3) Engineer terrain studies do not take into account urban areas of less than 0.25 square kilometers. Urban areas must be analyzed in relation to obstacles and other hindering terrain to decide on their effect. Small towns occupying less than about 1 square kilometer may not be considered obstacles if they can be readily bypassed.

(4) The modification of pure terrain data into meaningful tactical information is a matter of tactical judgment. If no factual terrain data are available or if time is short, the planner may conduct terrain analysis by map inspection and shading.

(5) Shade in built-up areas, steep slopes, heavily wooded areas, swampy or unstable soils, and river/stream confluences and other water obstacles. The idea is to shade in the terrain that is impassable or that severely slows down cross-country movement.

c. Identify mobility corridors.

(1) This terrain analysis will indicate the areas through which maneuver units can move; i.e., where the mobility corridors are. An assessment of mobility corridors is made to determine the size force they can accomodate. The planner considers mobility corridors for units two levels down; e.g., at division level, the planner considers battalion corridors. The following chart is provided as an example. Use of this chart must be tempered with tactical judgment and knowledge of the terrain.

Table 4. Attack Frontages, Friendly Formations.	
Unit	Width
Division	6 to 10 kilometers
Brigade	3 to 6 kilometers
Battalion	1 kilometer
Company	500 meters
Source: (To be provided by C&GSC, if required)	

(2) The planner identifies crossover corridors where lateral movement is possible, both to facilitate changes of direction and to highlight potential vulnerabilities to the attacker's flank.

d. Identify avenues of approach within the zone of action.

(1) Avenues of approach for the offense are usually derived for two levels down; e.g., the planner at division is looking for battalion avenues of approach. Selection of avenues is accomplished by exercising tactical judgment, considering the number of mobility corridors available, the likely composition of the attacking formations and the possible formation they may adopt. The characteristics of a good avenue of approach are the same as those identified for defensive courses of action; i.e. --

- A reasonable degree of mobility, a direct approach to the objective and few, if any, obstacles.
- Little or no canalization of movement.
- Acceptable intervisibility conditions (e.g., observation and fields of fire).

- Some cover.
- As much concealment as possible.
- Good communications.

(2) The planner must also consider air avenues of approach for attack helicopters, close air support aircraft and airmobile forces. A good air avenue provides terrain masking from air defense radars and air defense weapons.

e. Designate each avenue with a letter. To distinguish the avenues of approach for ease of reference, the planner normally labels each avenue where it crosses the proposed line of departure (LD) in letter sequence from left to right in zone.

STEP 3: Analyze each avenue of approach (defensive or offensive courses of action). Each avenue of approach identified by the planner is now analyzed in detail, from both the friendly and the enemy points of view, to determine the merits and problems of each avenue. The analysis can be done by close study of the terrain, using a 1:50,000 map, supplemented by IPB terrain overlays, air and satellite photography and actual terrain reconnaissance, whenever possible. Considerations include:

- Observation and fire.
- Concealment and cover.
- Obstacles, both existing and potential.
- Identification and utilization of key terrain.
- Adequacy of maneuver space (size of the avenues).
- Ease of movement (trafficability, road network, length and directness).

a. Observation and fire. An assessment of the potential for the attacker's overwatch by observation and fire along the avenue must be made; conversely, the potential ability of the defender to observe movement along the avenue and place fire upon it from various positions on the terrain is also assessed.

(1) The areas over which the defender will have observation can be defined by drawing observation corridors from likely defensive positions, as shown in figure 1.

(2) Analysis of fire will be mainly concerned with the defender's capability to cover the terrain with effective direct fire. This capability can be defined by drawing range fans for various defender direct fire weapons from likely or known defensive positions.

b. Concealment and cover. Areas that may provide concealment and cover must be considered. Concealment is protection from observation; cover is protection from the effects of fire. Having previously considered those areas over which the defender has observation and fire, the planner should now consider those areas where attacking forces can move forward while concealed. The planner should consider concealment and cover in conjunction with observation and fire.

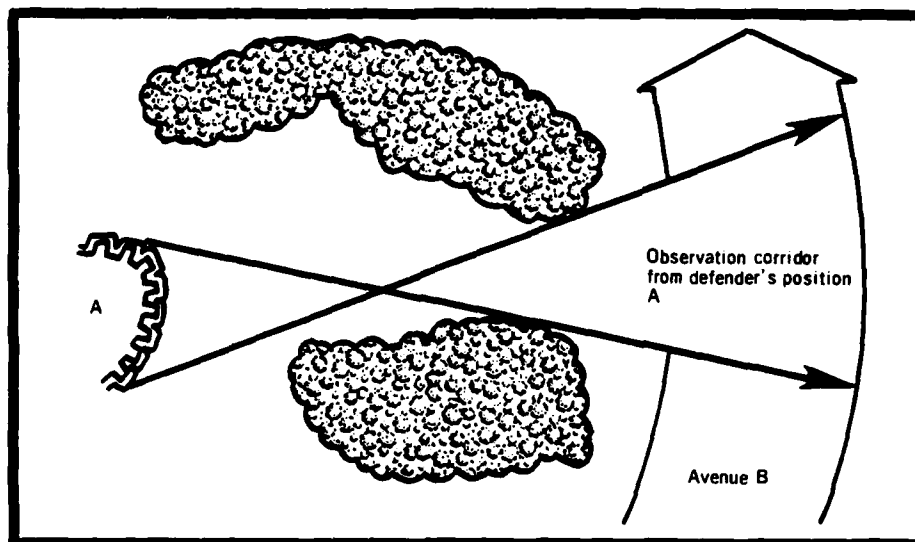


Figure 1. Observation corridor.

c. Obstacles.

(1) Existing obstacles are those restrictions to movement that are already part of the terrain; examples include rivers, steep slopes, forests, urban areas, quarries and railroad embankments.

(2) Reinforcing obstacles are those constructed, emplaced or detonated to enhance existing obstacles. Examples include minefields, wire fences, tank ditches and demolished bridges.

(3) Consider obstacles from both defender and attacker points of view:

- What existing obstacles astride the avenue will impede advance?
- What reinforcing obstacles has the defender emplaced or is he likely to emplace? Take particular note of areas, e.g., river lines, where existing obstacles can be easily reinforced.
- What existing obstacles parallel to the avenue of approach will afford flank protection or limit lateral movement?

- Where and how can further flank protection be afforded by planning reinforcing obstacles? The possible placement of obstacles to protect the attacker's flanks can be examined by noting the mobility corridors coming into avenues of approach from the flanks, which the defender could use for a counter-attack. The gaps through which these potential threats must come can then be covered with fires, smoke, chemical agents, FASCAM, other obstacles (emplaced or planned), forces in blocking positions or a combination of these measures. An example is shown in Figure 2.

- What obstacles may be created by terrain alteration resulting from Threat or friendly force employment of nuclear weapons, e.g., tree blowdown, forest fires or rubble of built-up areas?

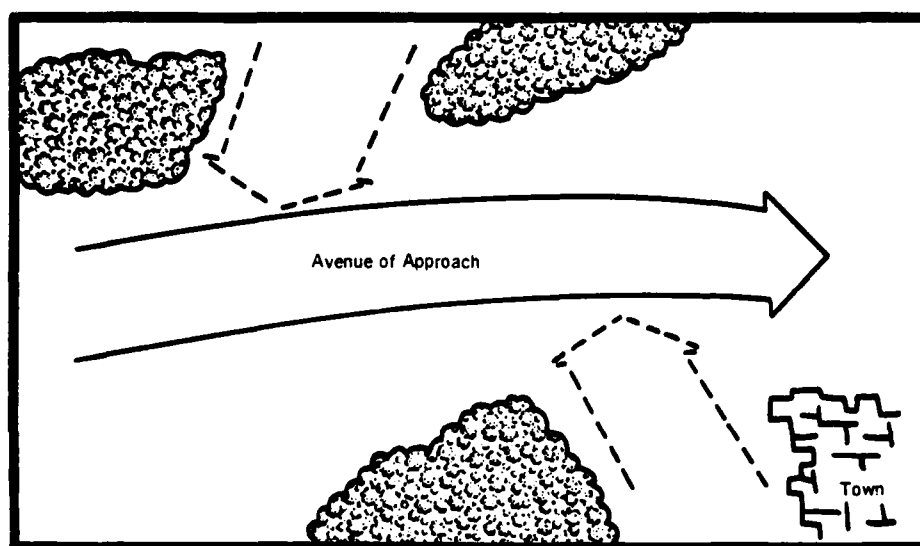


Figure 2. Enemy Flank Avenues.

d. Key terrain. Key terrain is an area the seizure or retention of which affords a marked advantage to either side. The planner considers key terrain with reference to his objectives and the avenues of approach determined earlier in the terrain analysis process. The planner is looking for terrain features that, if controlled by the enemy, would dominate the avenues of approach, intermediate objectives or final objectives. These dominating features usually become obvious in the course of a careful study of the preceding factors of observation and fire, concealment and cover and obstacles.

e. Adequacy of maneuver space. The planner has already identified mobility corridors and from these deduced avenues of approach. He knows where forces can move along the avenues. The purpose here is to get an overall impression of how much freedom of maneuver is available on the avenue and, conversely, how restrictive it is and where the chokepoints are.

f. Ease of movement. This factor is primarily one of time and space. The planner considers the overall trafficability of the avenue, its length and the directness of the approach as a means of gaining the objective. It should be possible to make a reasonable assessment of the minimum time it would take to traverse the avenue without resistance. It should be noted, however, that resistance to movement is not restricted only to enemy activity or obstacles. "Battlefield clutter" - the traffic congestion in areas behind the FEBA (or line of contact) caused by movement of all types of combat support and service support elements - may contribute to movement resistance. (Battlefield clutter is of particular significance during the active defense wherein it may be necessary to shift forces laterally, as well as forward or rearward.) An estimate of the time that will be taken while fighting the threat will depend on (among other things) the degree of resistance (attacker to defender firepower ratios) and the type of terrain over which the battle is being fought. Some suggested guidelines for opposed rates of movement are given in Table 5.

g. Advantages and disadvantages of selected avenues of approach. Using all of the foregoing terrain considerations, the planner analyzes all avenues of approach to identify the advantages and disadvantages associated with each.

STEP 4: Conduct a weather analysis.

a. Obtain weather data. The same considerations apply to the conduct of a weather analysis for both defensive and offensive courses of action. Once avenues of approach have been identified and their advantages and disadvantages assessed, weather conditions must be considered to determine how weather will affect the operation in general and the avenues in particular. The planner obtains information from the staff weather officer and Intelligence Preparation of the Battlefield (IPB) weather overlays. Two broad categories of weather information are available from these sources.

Table 5. Opposed Rates of Movement for Armor/Mech-Infantry/Dismounted-Infantry (kilometers per hour)

Degree of Resistance (Attacker to Defender Firepower Ratio)	Nature of Defense											
	Prepared Defenses ¹						Hasty Defenses ²					
	Type of Terrain ⁴						Type of Terrain ⁴					
	Open		Mixed		Close		Open		Mixed		Close	
	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf	Arm/Mech	Inf
Very Heavy ³ (2:1)	.6	.3	.4	.25	.25	.2	1.2	.6	.9	.4	.6	.3
Heavy (3:1)	.9	.5	.7	.35	.5	.3	1.5	.8	1.0	.6	.8	.5
Medium (4:1)	1.2	.6	.9	.5	.6	.4	1.8	1.1	1.4	.8	1.1	.7
Light (5:1 or better) ⁵	1.8	.8	1.2	.7	.7	.4	2.4	1.4	1.9	1.0	1.5	.8

Source: Adapted from CACDA JIFFY WAR GAME.

- NOTES: ¹Prepared defense is based on defender in prepared positions (24 hours or more).
²Hasty defense is based on 2-12 hours preparation time.
³Combat ratio of less than 2:1 is normally the point at which no advance is possible.
⁴Types of terrain:

- Open Terrain. Open terrain is flat or slightly rolling, with little vegetation and has an elevation variation from 0 to 100 meters per kilometer, permitting maximum cross country movement.
- Mixed Terrain. Mixed terrain is rolling terrain, lightly covered with trees and other vegetation with an elevation variation of 100 to 200 meters per kilometer produced by small hills with gentle slopes causing a slight reduction in ease of cross country movement.
- Close Terrain. Close terrain is rough, heavily wooded terrain with an elevation variation of 200 to 400 meters per kilometer. This variation is considered sufficient to cause significant slowing of cross country movement.

⁵Corresponding movement rates are also applicable to unopposed movement.

(1) Traditional weather products:

- Light data charts.
- 12-, 24-, 36-, and 72-hour forecasts.
- Long-range forecasts.

(2) IPB weather overlays. These can depict many different aspects of weather affecting tactical operations, some of the more significant being:

- Ground fog;
- Cloud coverage;
- Rain (and storm) effects;
- Wind direction.

b. Consider the effects of weather on each avenue of approach. The planner should consider the affect of forecast weather conditions as well as current conditions on each avenue of approach. He does this from the standpoint of the enemy commander in a defensive situation as well as for his own forces when planning an offensive operation. Examples of weather effects considerations include:

(1) River valleys which are likely to be affected by weather conditions: e.g., fog is prevalent in the mornings in such low-lying areas, reducing observation and fields of fire while enhancing concealment; flooding potential in heavy rains.

(2) Rain (and snow, unless the ground is frozen) may lead to local flooding and boggy soil conditions.

(3) Sub-freezing temperatures may result in low-lying areas normally impassable to vehicles becoming trafficable. Conversely, extreme cold temperatures with accompanying ice and snow may render open ridgeline approaches unusable.

(4) Temperature, humidity and wind affect the use of helicopters.

(5) Cloud cover in general and precipitation in particular may also restrict air reconnaissance and surveillance activities, attack helicopter, close air support and air interdiction efforts.

(6) Examples of IPB weather are given in TC 34-3, Intelligence Preparation of the Battlefield, 1980, Chapter 4, "Terrain Analysis and Weather Analysis."

c. Reassess the advantages and disadvantages of each avenue of approach in light of forecast weather conditions.

STEP 5: Template the Threat (defensive and offensive courses of action). This is done in the sequence indicated below.

a. Apply doctrinal templates. A doctrinal template depicts how the Threat would like to fight according to his doctrine if he were not restricted and influenced by terrain and weather. Doctrinal templates are usually available to the planner as a result of evaluation of Threat doctrine and tactics by intelligence analysts in his unit. However, the planner should also have a thorough knowledge of Threat doctrine and should carry a "mental template" in his head of how the Threat is likely to defend or attack in various circumstances.

b. Develop a situation template by adjusting the doctrinal template to the terrain.

(1) On the basis of the known Threat locations and the doctrinal templates available, the planner develops a situation template by applying the Threat doctrine to the terrain. The order of battle of Threat units reveals those units to be templated; the known locations and the doctrinal template provide guidance for positioning undetected units on the terrain.

(2) Levels of Threat forces templated by the planner:

- In the defense, the planner templates one level down; i.e.; the division planner templates Threat regiments, since he allocates forces to brigades and positions them based on regimental avenues of approach.
- In the offense, the planner templates two echelons down, i.e., the division planner templates Threat battalions. In some cases, particularly when planning a penetration, he will template down to company level because he attempts to avoid enemy strength.

c. Assess Threat capabilities. Additional Threat capabilities which are not apparent solely from templating must also be considered. These include but are not limited to Threat's --

- (1) Air, nuclear and chemical capabilities;
- (2) Capability to conduct electronic warfare;
- (3) Capability to conduct combat surveillance;
- (4) Capability to conduct unconventional operations.

d. Completion of the templating process for an offensive course of action.

(1) Having previously selected several avenues of approach based on terrain together with the effects of forecast weather on each, the planner now reassesses the avenues based on Threat dispositions.

(2) A conflict in this reassessment will be normal. It will not be unusual to find that the best avenue of approach, based on terrain factors, is also the most heavily defended, because the Threat has made an analysis similar to our own. As a rule, Threat strength should be avoided. It is usually better to attack Threat weakness on an avenue with less desirable terrain than to try to attack Threat strength on the avenue offering the best terrain advantages, unless some significant combat multiplier, such as nuclear or chemical weapons, surprise, deception, or limited visibility, can be used to neutralize the Threat advantage. If two avenues of approach offer equal, or nearly equal, terrain advantages, the Threat situation is the dominant, deciding factor.

STEP 6: Consider availability and capability of friendly forces.

a. List available resources. The planner should list the resources he has available -- organic, attached and OPCON from a higher formation -- specifically, maneuver forces, fire support and combat multipliers. The availability of nuclear and chemical weapons is considered if release has been authorized or is anticipated.

(1) Maneuver forces.

- Tanks, mechanized and infantry battalions;
- Cavalry.

(2) Fire support

- Attack helicopters;
- Field artillery;
- Air defense artillery;
- Close air support.

(3) Combat multipliers. These are both tangibles and intangibles;

for example:

- Combat service support;
- Electronic warfare capability;
- Smoke;
- Family of scatterable mines (FASCAM);
- Obstacle capability;
- STANO devices;
- Deception.

b. Force capability. Identify the combat capability and effectiveness of friendly forces in the following areas:

- (1) Personnel and materiel strengths;
- (2) Types of equipment available;
- (3) Degree of mobility possible;
- (4) Availability of nuclear and chemical ammunition;
- (5) Combat service support status;
- (6) Effectiveness of command control headquarters;
- (7) Level of training in units;
- (8) Ability of subordinate commanders;
- (9) Morale and condition of the soldiers.

c. Draw general conclusions concerning relative combat power.

SECTION IV. SUMMARY

Having listed the assets available to him and templated and analyzed enemy assets and capabilities, the planner is now in a position to draw some conclusions about relative combat power to assist with formulating feasible courses of action. These conclusions consist of an estimate of the general overall relationship of the combat power of his forces to that of the enemy forces, to include significant strengths weaknesses and vulnerabilities. The planner's analysis of relative combat power provides a general background for formulating courses of action and may indicate the basic nature and the characteristics of feasible courses of action. Infeasible courses of action can be quickly discarded to speed up the analysis process. The planner should avoid becoming involved in an attempt to make a detailed analysis at this stage; he only reaches tentative conclusions based on a general impression of the relative capability of the friendly and enemy forces. The detailed analysis is performed during the conduct of the war game.

Chapter 3. THE WAR GAMING/DECISION-MAKING PROCESS (Determination of the HOW)

Section 1. INTRODUCTION.

*The general who wins a battle makes many calculations
in his temple ere the battle is fought.*

SUN TZU, 500 B.C.

Today, as in ancient China, commanders and staff planners must attempt to mentally visualize and wargame the battle in order to arrive at the selection of a course of action that will be most likely to enable the successful accomplishment of the assigned mission.

This chapter examines the decision-making process that, in general terms, should be followed in the evaluation and selection of feasible tactical courses of action.

Section II. OVERVIEW.

War gaming is an orderly process for the conduct of the selection of a preferred course of action. It is a logical approach to the analysis and complements (and focuses) the knowledge, judgment and experience of military planners. The goal of war/gaming or "thinking through" the upcoming battle is to mentally fight the battle in order to arrive at alternative courses of action: identify advantages and disadvantages, evaluate strengths and weaknesses; ultimately select the alternative that best suits the particular mission, enemy, terrain and weather and troops available (METT).

The overall process consists of four basic steps.

STEP 7. Formulate feasible (logical) courses of action. Based on the METT, develop alternative, feasible courses of action. The planner must first

select those factors he deems essential for mission success and then insure that any course of action satisfies each of those mission-essential factors; failure to satisfy the mission-essential factors precludes mission success and eliminates that course of action from further consideration.

STEP 8. Analyze (wargame) each course of actions. Refine each feasible course of action. Each feasible course of action must be evaluated for the degree of satisfaction of every mission-essential factor and other non-essential, but key, factors. Whereas Step 7 insured satisfaction of these mission-essential factors, Step 8 must examine ways to enhance-the-strengths/reduce-the-weaknesses of each feasible course of action relative to both essential and key factors. This process allows the commander to maximize the likelihood of success of each individual course of action proposed.

STEP 9. Compare each course of action and select the best one. Compare each individual, refined course of action, factor by factor, in a systematic manner to allow selection of the preferred course of action for the situation.

STEP 10. Refine chosen COA and issue concept and plans/orders.

Section III. BENEFITS.

The war gamer (staff planner and/or commander) can derive significant benefits from following a logical and systematic approach to decision making. Early identification of mission-essential and other key factors, based on METT, allows him to focus on the truly significant factors and not waste effort evaluating trivia. It decreases the likelihood that factors affecting the possible success or failure of a course of action (COA) will be overlooked. The analytical process virtually insures that the planner will become very familiar with each distinctive COA and the overall impact of revisions thereto. The process reduces overall uncertainty because the planner war games the courses of action by considering various enemy action/reactions. The detailed knowledge of METT, selected COA and possible enemy actions assist in identifying potential weaknesses in the COA that could require contingency plans.

Section IV. LIMITATIONS.

It must be recognized that the four step process is only a method of logically organizing the planner's thoughts and insuring that essential and key factors are addressed in arriving at the selected course of action. It cannot predict the future nor can it remove the ever present uncertainties associated with the complexities of battle. The human frailties of the war gamer (planner or commander) result in inherent limitations, inter alia:

a. Bias, intentional or unintentional, may influence the analysis. The war gamer must keep an open mind, guarding against the natural impulse to make a premature decision and then to pervert the facts to support that decision.

b. A lack of professional experience can significantly affect the value of the war game results. The greater the degree of experience and professional judgment of the war gamer, the more valid the overall analysis is likely to be.

c. War gaming is an abstraction or a simplification of reality. Thus, there is a possibility of emphasizing some considerations (factors) and overlooking others. Special effort in selecting mission-essential and other key factors must be exercised.

d. Lastly, war gaming cannot effectively address the very important, yet intangible, factors, such as leadership, morale, training and chance.

Thus, war gaming cannot answer all the questions confronting the commander or planner, nor can it eliminate uncertainty. It is only a planning tool that, when properly applied, can assist in reducing uncertainty and in identifying probable weaknesses/strengths inherent in the various courses of action analyzed.

Section V. SIGNIFICANT FACTORS.

The following are examples of other significant factors, which in conjunction with the mission-essential tasks to be performed, should be considered in the analysis (war gaming) of formulated courses of action (COA). This listing is not purported to be all-inclusive; differing situations in differing geographical areas could certainly suggest others.

- a. Can the COA be accomplished without the use of nuclear and/or chemical weapons?
- b. Does the COA provide all-around security --
 - (1) Flank and crossover approaches?
 - (2) Vertical envelopment?
 - (3) Potential encirclement?
 - (4) Penetration?
 - (5) Rear area?
- c. Does the COA provide time for additional battlefield preparation?
- d. Does the COA provide opportunity for deception? surprise?
- e. Does the COA provide opportunity for offensive operations?
- f. Does the COA provide capability to conduct future operations?
- g. Does the COA allow for the timely concentration of force?
- h. Does the COA afford sufficient flexibility to provide a balance between mass and dispersion?
- i. Does the COA afford sufficient flexibility to address various threat arrays?
- j. Does the COA make effective use of command control headquarters?
- k. Does the COA permit successful execution in the absence of continuous command control?
- l. Does the COA allow decentralized execution?
- m. Does the COA provide the proper force mix consistent with the terrain characteristics?
- n. Does the COA allow for possible terrain alteration by weapons of mass destruction?
- o. Does the COA facilitate the conduct of the extended battle?
- p. Does the COA permit the establishment of a reserve?

- q. Does the COA prescribe the location of the reserve?
- r. Does the COA prescribe the likely area of commitment for the reserve?
- s. Does the COA incorporate natural or man-made obstacles?
- t. Does the COA clearly assign responsibility for objectives, key terrain and avenues of approach (axis of advance)?
- u. Does the COA provide, in coordination with the scheme of maneuver, the effective and efficient employment of available --
 - (1) Field artillery?
 - (2) Air defense artillery?
 - (3) Combat engineers?
 - (4) Attack helicopters?
 - (5) Tactical air support?
 - (6) Electronic warfare?
- v. Can the COA be supported by available combat service support resources in the types and quantities required?
- w. Does the COA exploit Threat vulnerabilities?
- x. Does the COA exploit the use of nuclear and/or chemical weapons?
- y. Can the COA be accomplished in darkness or adverse weather conditions?

Section VI. WAR GAMING METHODOLOGY.

STEP 7. Formulate feasible courses of action.

- a. Insure that friendly and enemy positions, boundaries and avenues of approach, et al, necessary for the analysis, are posted or overlayed on a map.
- b. Based on METT, review mission-essential factors, i.e., those factors essential for the accomplishment of the specified and implied tasks.
- c. Visualize the battle in general terms, but in sufficient detail to allow formulation of feasible, alternative courses of action. Insure that each mission-essential factor is satisfied in the formulation

process. Two or more feasible COAs should be developed as a basis for detailed analysis; identification of only a single COA at this stage of the analysis usually reflects a premature judgment.

STEP 8. Analyze (war game) each course of action.

This step begins the detailed, analytical portion of the analysis. The courses of action were formulated based on a macro visualization of the battle and upon "yes" or "no" answers to the mission-essential factors. This step should "fine tune" or optimize each of the feasible COAs. Accordingly, the planner must now apply his knowledge and experience to a detailed visualization of the battle as it might be fought. In addition to the mission-essential factors, other significant or important factors (e.g., Section V) affecting mission accomplishment must be considered in the analysis of each COA.

A matrix similar to the one at Table 6 may be used.

The planner, after selecting the factors, must war game (or "what if") the course of action from beginning to end. The rating system is not precise nor is it meant to be. Rather it serves to identify strengths and weaknesses and highlights them for the planner. Failure to provide a system that summarizes the strengths and weaknesses could allow a planner to remember the good aspects of an intuitively preferred COA and forget the bad points. Successive modifications can be made to the basic COA, as shown in the example, in an attempt to strengthen the weaknesses and optimize the COA. It is imperative after a COA is modified, that the evaluation process be conducted again from the top in order to identify the possible "ripple effect" on other factors.

Table 6. Course of Action Refinement

FACTORS	COURSE OF ACTION "A"			
	Initial	Mod 1	Mod 2	Mod 3
MISSION-ESSENTIAL				
1	+	++	++	+
2	++	++	++	++
-	+	+	+	+
-	+	+	+	+
i	+	++	++	+
OTHER KEY				
1	-	-	0	+
2	0	+	++	+
-	+	+	++	++
-	0	0	0	0
-	0	0	0	0
-	0	0	0	0
-	0	0	0	0
n	0	0	0	0

++ Very strong

+ Strong

0 Neutral

- Weak

-- Very weak

The planner must resist the tendency to mechanistically select the modified course of action that produces the largest net number of "pluses". The purpose of the matrix is to systematically identify relative strengths and weaknesses. The ultimate decision regarding which of the modified courses is best is still a matter of military judgment and experience.

The planner must consider the comparative weights or importance of each factor relative to the overall METT in arriving at that version of a particular COA that is "optimum" in his view.

STEP 9. Compare each course of action and select the best one.

This step is very similar to the preceding one which arrived at refined COAs. However, rather than modifying aspects of a given COA and reevaluating the possible ripple effects on other factors, the objective here is to compare the refined version of each of the different COAs and to select the one judged best for the situation. The refined version of each COA, as determined by the planner, becomes a column in the matrix. Again, the net summation of the pluses must not be used as a mechanistic selection means. The matrix is only a summarization of the strong and weak aspects of each COA for ease of comparison. The ultimate decision to select a COA must inevitably depend on the commander's experience and judgment.

STEP 10: Refine chosen course of action and issue concept and plans/orders.

The elements of WHAT, WHEN, WHERE and HOW are present in the chosen course of action (COA). The preferred COA is selected or approved by the commander, normally based on the staff's recommended COA. Before the decision is understandable as a concept, it normally must also include the elements of WHO (the command itself or, when the entire command is not involved, the appropriate elements of the command) and so much of the WHY (purpose to be attained and the reasons therefor) as are necessary for understanding.

At this point, the various steps involved in the formulation and selection of feasible courses of action and the commander's (staff's) estimate of the situation have been accomplished; refinement (and revision, where necessary) will continue throughout planning and execution.

Section VII. SUMMARY.

The systematic approach to selecting a preferred course of action to deal with a given situation can be of significant value. It guides the planner in an orderly manner, causing him to consider the significant factors appropriate for the mission to be accomplished and allows him to exercise his talents, experience and judgment in a highly effective manner.

No system can predict the future nor will it enable a planner to quantify the intangibles of leadership, morale, determination, etc. This system will not allow the planner/commander to arrive at a precise, mechanistic solution. It will, however, assist in the application of knowledge, identification of comparative weaknesses/strengths of the various aspects of alternative COAs and the highlighting of the potential need for contingency plans to compensate for identified weaknesses.

CHAPTER 4

SAMPLE FORMULATION AND SELECTION OF TACTICAL COURSES OF ACTION

Section I. INTRODUCTION

The US Army's operational concept for modern battle is summarized by the following words: (FM 100-5, Chapter 2, Section II)

- Initiative;
- Violence;
- Integration;
- Depth.

Initiative is the key to the success of combat operations on the integrated conventional-nuclear-chemical battlefield from two perspectives. First, the tactical initiative must be seized and retained as a necessary prelude to winning. Attacks are relentlessly, vigorously exploited. The defense is conducted aggressively and with the purpose of setting the stage for offensive operations. In either case, every Threat weakness is exploited. Secondly, the initiative and imagination of our soldiers, which stand them apart from potential adversary counterparts, must be harnessed so that they can act in the absence of communications and orders to accomplish the intent of the next higher commander's plan.

Violence is shorthand for "violent execution" and has typified successful military operations throughout history. A vital attribute of all modern combat operations, it is a necessary counterpoint for the Threat precepts of mass and momentum. The defense is characterized by resolute, violent, aggressive execution -- the attack by sudden, explosive, shock action. Move fast, strike quickly and finish rapidly together generally describe fire and maneuver in battle, i.e., the need to mass and strike quickly, and either exploit the success or reposition quickly to fight follow-on forces. Whatever is done on the integrated battlefield must be done quickly and violently.

Integration, the bringing together of available and complementary means of fighting, is done to achieve maximum combat capability (power). It applies to unilateral combined arms; to joint operations of land, air and sea forces; to the use of conventional, nuclear and chemical means of destruction and to fighting shoulder-to-shoulder with allies. It includes all means -- all systems which are used by the arms and services of the Army -- and the effective use of terrain.

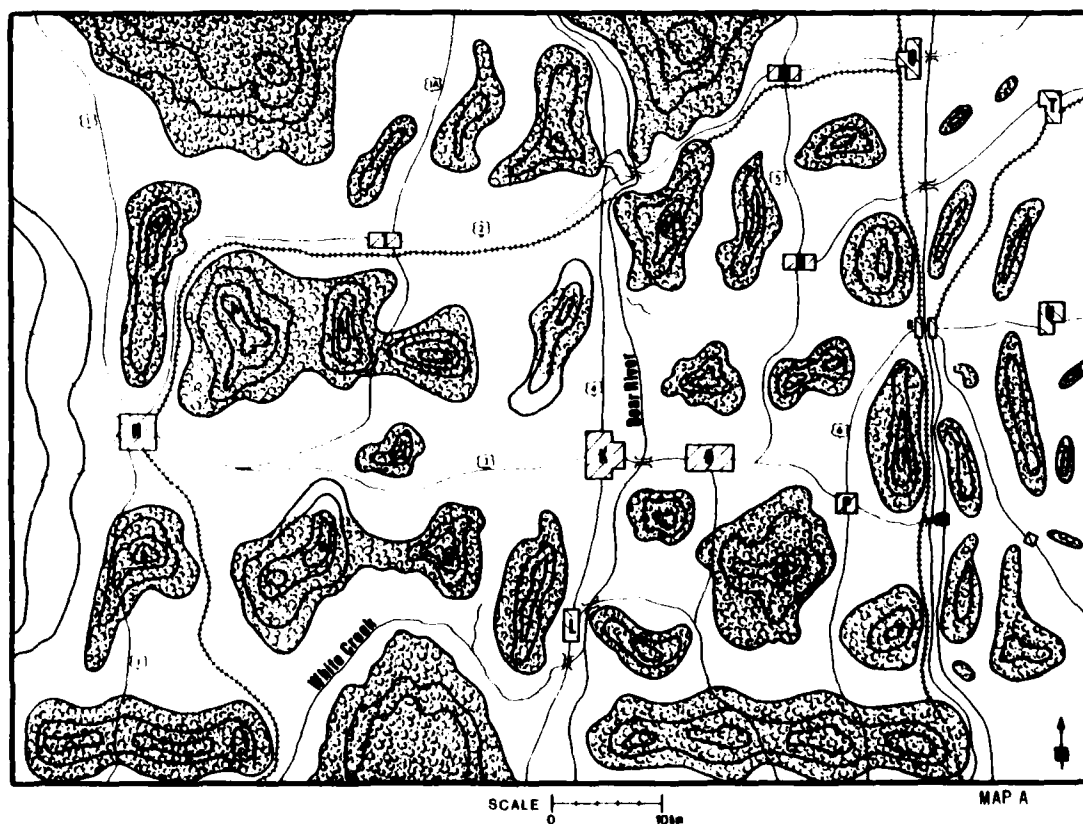
Depth is important to all army operations. On the one hand, depth requires looking, listening and sensing far enough forward into the battlefield to find, follow and then disrupt Threat forces assigned to follow-on echelons. On the other hand, it also requires that forces be positioned, disposed and maneuvered in depth within the battle area to provide momentum in the attack and elasticity in the defense.

Courses of action formulated and selected through the application of the processes, techniques and considerations presented in the preceding chapters embody these characteristics of operations on the integrated battlefield.

Section II. DEFENSIVE SITUATION AND COURSE OF ACTION WORKSHEET

SITUATION

Sketch map A and the situational information presented will be used to assist in demonstrating the processes of formulating and selecting defensive courses of action.



Situational information:

- The 54th Mech Div, consisting of 6 Mech and 5 Tk Bns plus the standard division base (which includes a Cav Sqdn), has received the following mission:

"Establish a covering force in sector along the Tiger River NLT 270600 Sep; delay forward of the Bear River for a minimum of 24 hours; then defend in sector."

- In his restated mission, the division commander has added the requirement to "conduct an active defense West of K-town."

- The corps intelligence estimate states that "7 CAA of the Northern Front will oppose the 54th Mech Div, from north to south, with two TkRs of the 9TkD; the 10 MRD augmented by a TkR from the 9 TkD; a TkR and MRR of the 5 MRD -- in the first echelon; 11 TkD in the second echelon; the 10 MRD, augmented, is expected to make the main attack.

- The corps intelligence estimate further states that the "Threat is capable of employing chemical and nuclear weapons (with yields 10 to 40 KT) anywhere within the division sector." In this regard, the corps commander has stated that he does not want to risk the loss of more than the equivalent of two company/battery size formations to any single Threat nuclear weapon used.

- The corps commander has provided the 54th Mech Div with the following attachments:

- FA Bde (1-155mm Bn; 2-8 in Bns; 1 Lance Bn)
- Engr Cmbt Bn (Corps)
- Atk Hel Co (Corps Avn Bn)

- Close air support sorties available to the division - 48 sorties per day for offensive air support.

- Other situational, operational and environmental data that are, or can be, available to the planner are subsequently identified when such information may affect the analyses.

COURSE OF ACTION WORKSHEET

The defensive course of action worksheet (page 44) is designed to permit the planner (war gamer) to record the essential parts of a course of action as they are formulated.

At the top of the worksheet, the planner will record the WHAT, WHEN and WHY elements of a course of action. The elements are recorded following completion of the mission analysis (step 1).

Next, following the analysis of terrain and identification of tentative avenues of approach (step 2); analysis of avenues of approach (step 3); assessment of the effects of weather (step 4) on the tentative avenues of approach; and development of situation templates of the Threat (step 5) compatible with the terrain and weather analyses, the planner will record the WHERE element of a course of action.

Following completion of step 6 (consideration of friendly forces) and step 7 (formulation of feasible courses of action), the planner will record the HOW element of a course of action. This will include recording the allocation of combat power and establishment of command and control responsibilities.

Up to this point, the planner has identified a single course of action (COA). The planner repeats step 7 until he has identified two or more feasible COAs. He then analyzes (war games) each COA (step 8). Whereas step 7 insures satisfaction of mission-essential and other key factors, step 8 examines ways to enhance-the-strengths/reduce-the-weaknesses of each feasible COA relative to both essential and key factors. In other words, step 8 allows the planner to maximize the likelihood of success of each individual COA proposed.

Next each individual, refined course of action (COA) can be compared (step 9) to identify the preferred COA for the situation. The planner may use the remarks section on the worksheet to further clarify details concerning the individual COA or to denote the advantages and disadvantages of each formulated COA.

It is the comparison of the advantages/disadvantages of individual COAs, tempered by the war gamer's (planner/commander) professional experience and judgment, that results in the adoption of a particular COA. Lastly, the selected COA is refined and the concept and plans/orders are issued.

DEFENSIVE COURSE OF ACTION WORKSHEET

WHAT:

WHEN:

WHY:

WHERE:

() 1st Ech	() 2d Ech	
	() 2d Ech	
	() 1st Ech	
Avenue Letter		

HOW:

CFA	1:5/1:3 vs () 1E		-		Avail	Over/ Short
MBA	1:3 vs () 1E		-			
Initial Rqmts	vs () 1E		-			

MBA	1:3 vs () 1,2E		-		Avail	Over/ Short
RES	1:3 vs () 2E		-			
Final Rqmts	vs () 1,2E		-			

Initial - Final Rqmts		-		
-----------------------	--	---	--	--

Adjusted Totals		-		-	Avail
-----------------	--	---	--	---	-------

REMARKS:

Section III. IDENTIFICATION OF THE WHAT, WHEN AND WHY
ELEMENTS OF A DEFENSIVE COURSE OF ACTION

STEP 1: MISSION ANALYSIS

Using the operation plan from higher headquarters, the planner (war gamer) performs a mission analysis to determine the WHAT, WHEN and WHY elements of the defensive course of action.

In our sample situation, we do not have a corps order/plan to evaluate; however, we have been provided with a statement of essential tasks (corps assigned mission and the division commander's additions when he restated his mission) and an evaluation of the expected threat. Therefore, we have sufficient information to complete step 1 and record the information in the WHAT, WHEN and WHY portion of the course of action worksheet (page 46), i.e. --

Specified tasks:

- (1) Establish a covering force along the Tiger River NLT 270600 Sep.
- (2) Delay forward of the BEAR River for a minimum of 24 hours.
- (3) Conduct active defense in sector.

Implied tasks: (Listed only if not included in unit SOP.)

- (1) Destruction of Threat forces.
- (2) Create opportunities to go on the offensive.
- (3) Take measures to reduce vulnerability to Threat use of nuclear and/or chemical weapons.

Essential tasks:

- (1) Delay forward of the BEAR River for a minimum of 24 hours.
- (2) Conduct active defense in sector.

DEFENSIVE COURSE OF ACTION WORKSHEET

WHAT: Establish a covering force; delay between the Tiger and Bear Rivers for a minimum of 24 hours; defend in sector.

WHEN: 270600 September

WHY: To destroy Threat forces through the conduct of an active defense; to create opportunities to go on the offensive.

WHERE:

() 1st Ech	() 2d Ech	
	() 2d Ech	
	() 1st Ech	
Avenue Letter		

HOW:

CFA	1:6/1:3 vs () 1E		-		Avail	Over/ Short
MBA	1:3 vs () 1E		-			
Initial Rqmts	vs () 1E		-			

MBA	1:3 vs () 1,2E		-		Avail	Over/ Short
RES	1:3 vs () 2E		-			
Final Rqmts	vs () 1,2E		-			

Initial - Final Rqmts		-		
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Adjusted Totals		-		-	Avail
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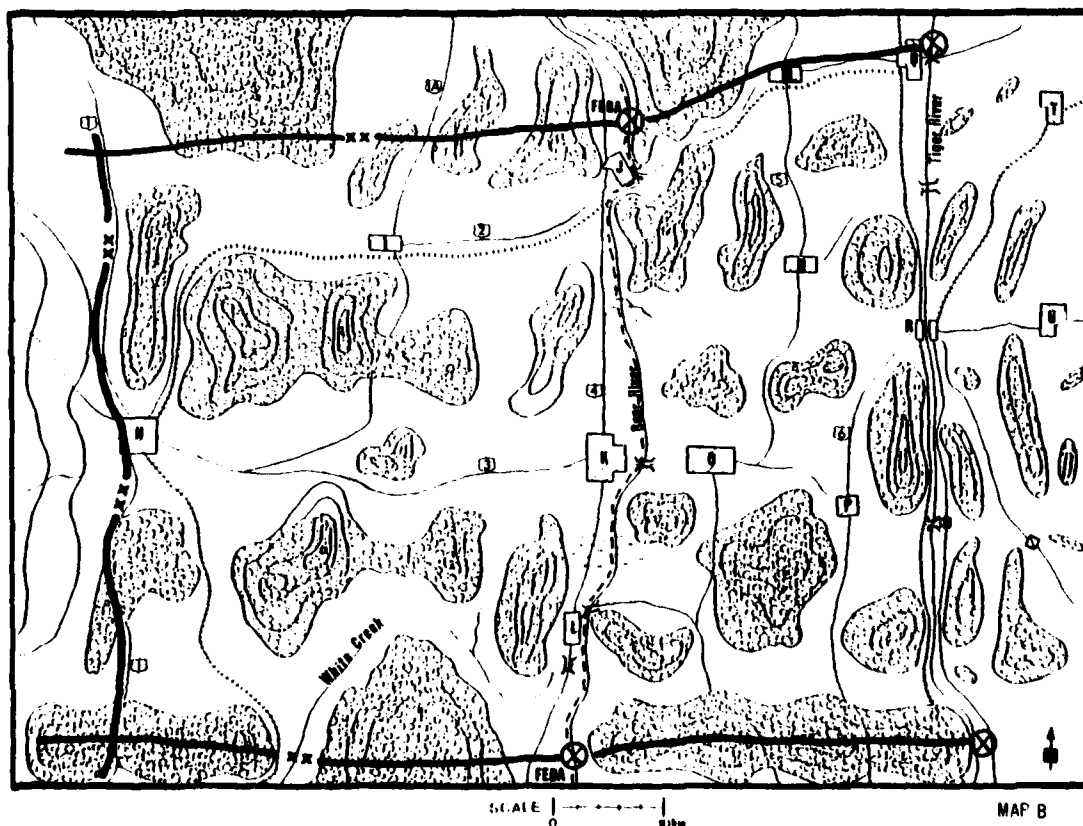
REMARKS:

Section IV. IDENTIFICATION OF THE WHERE ELEMENT OF A DEFENSIVE COURSE OF ACTION

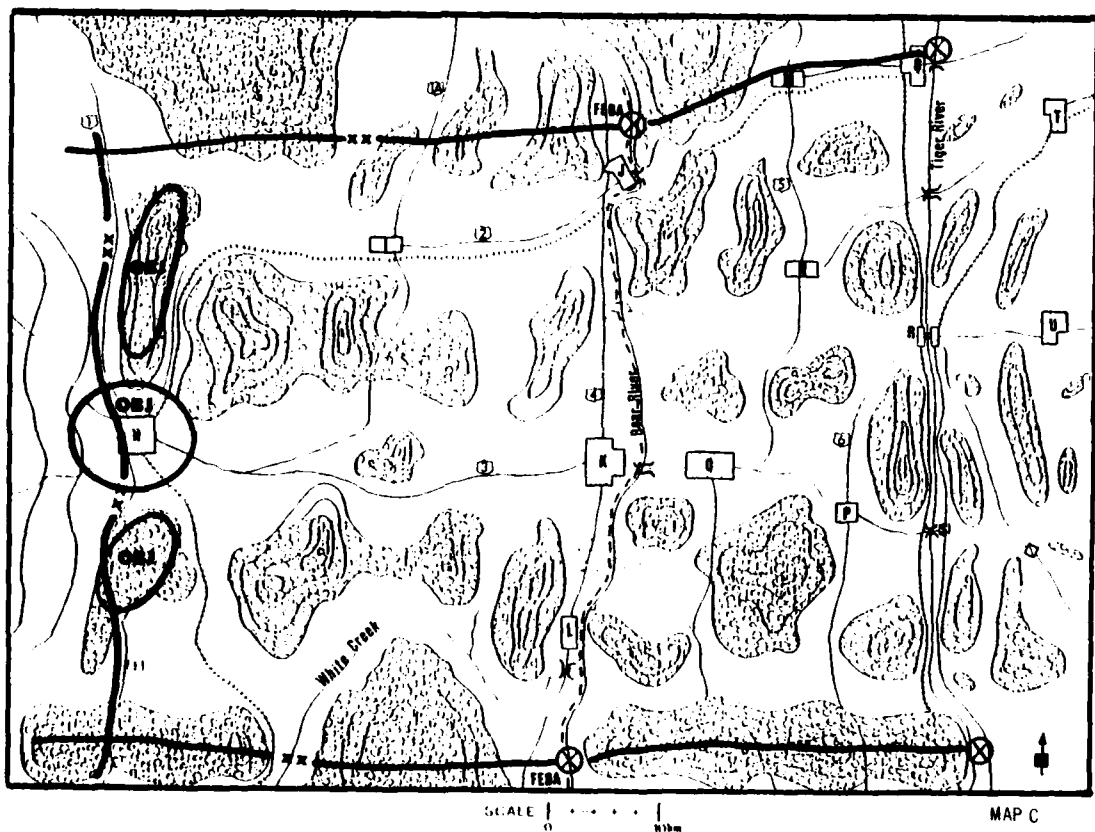
STEP 2: CONDUCT A TERRAIN ANALYSIS

For a defensive course of action, the planner analyzes the terrain approaching and leading through his sector to determine the Threat's possible schemes of maneuver:

Substep a. Define the area of operations. In our situation, corps has specified our area of operations by designating lateral and rear boundaries and coordinating points for both the covering force area (CFA) and the main battle area (MBA), as depicted on sketch map B. Both the TIGER and BEAR Rivers offer good defensible positions with excellent observation and fields of fire from their western banks, thus taking maximum advantage of the natural river obstacles. Also, the urban areas on the west side of both rivers, particularly the BEAR, will tend to canalize a Threat attack.

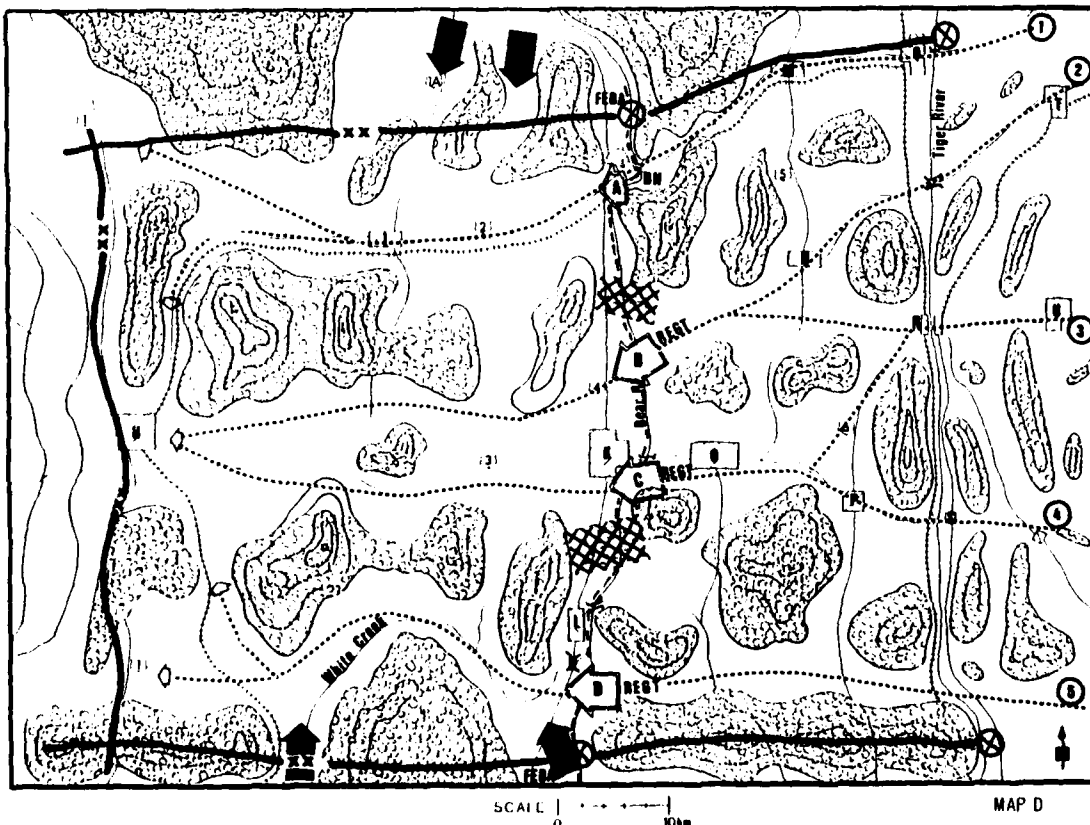


Substep b. Identify likely enemy objectives. Based on the terrain in our division sector, it would appear that H-town (sketch map C) is a likely objective; it is located astride an excellent east-west road network which could assist Threat forces in continuing and sustaining their attack. Similarly, likely objectives for Threat secondary attacks in the division sector are the terrain features north and south of H-town; control of these terrain features could assist the Threat in securing H-town and facilitate his continued westward movement.



Substep c. Identify mobility corridors/canalizing terrain. Since we are conducting our own covering force operations, the analysis of mobility corridors and canalizing terrain must start where the Threat is expected to enter the CFA. Mobility corridors, delineated by canalizing terrain, are identified on sketch map D.

- (1) Highway 2 corridor (Q-town - M-town - J-town - I-town - Hwy 1).
- (2) T-town - N-town - north of K-town - north of Hwy 3 - H-town.
- (3) U-town - R-town - merge with corridor 2 south of N-town or SW along Hwy 6 to merge with corridor 4.
- (4) S-town - P-town - O-town - south of K-town - Hwy 3 - H-town
- (5) North of southern boundary ridge line - south of L-town - along WHITE Creek - west to Hwy 1 or along RR to H-town.



Substep d. Identify Threat avenues of approach. Having located mobility corridors and canalizing terrain, the identification of potential Threat avenues of approach (to include flank approaches) into the CFA and MBA and crossover avenues within both areas is fairly straightforward. Potential Threat avenues of approach leading through the CFA and crossing the FEBA are identified by letter designation from north (left) to south (right) on sketch map D, page 49.

(1) In the north, avenue "A" enters the CFA south of Q-town and crosses the FEBA through the southern edge of J-town and continues westward astride Hwy 2. The defile northeast of J-town will accommodate not more than one battalion in attack formation; however, once BEAR Rive is crossed, this avenue will accommodate a regiment in attack formation.

(2) In the center, avenues "B" and "C" enter the CFA in the vicinity of R and S-towns and cross the FEBA north and south, respectively, of K-town. Each of these avenues will accommodate a regiment; once west of K-town, these avenues merge, "B/C", into a division-size avenue continuing westward, astride and north of Hwy 3 to H-town.

(3) In the south, avenue "D" enters the CFA north of the southern boundary and crosses the FEBA south of L-town; it follows a winding course along WHITE Creek before opening westward to Hwy 1 or NW to H-town. This avenue will accommodate a regiment.

(4) Numerous flank approaches enter the MBA along the northern and southern boundaries. These are identified by the solid arrows pointing into the MB., on sketch map D.

(5) Crossover avenues within the MBA are evidenced by the mobility corridors available in north-to-south/south-to-north directions.

The planner can now divide the WHERE allocation boxes of the course of action worksheet into as many columns as there are avenues of approach and fill in the letter designation:

* * * * * * * * * *

WHERE:
() 1st Echelon

() 2d Ech				
() 2d Ech				
() 2d Ech				
Avenue Letter	A	B	C	D

STEP 3: ANALYZE EACH AVENUE OF APPROACH.

The relative merits of each avenue of approach crossing the FEBA are assessed from the attacker and defender points of view: (Refer to map E, page 52.)

(1) Observation (overwatch) and fire. The terrain east of the BEAR River affords the Threat good observation and fields of fire where avenues A, B and C cross the FEBA; poor where avenue D crosses. The terrain west of the BEAR River offers us good observation and fields of fire along all avenues should the Threat be successful in crossing the river.

(2) Concealment and cover. At the FEBA, Threat avenues A, C and D appear to offer about equal cover and concealment, with avenue B offering somewhat less. Conversely, the terrain in our sector offers us good cover and concealment flanking any of the potential Threat avenues, west of the FEBA. Further, the crossover corridors in the MBA afford us an opportunity to conceal highly mobile forces for the active defense against the Threat if he successfully breaches the FEBA.

(3) Obstacles. The BEAR River offers a significant obstacle to the Threat throughout the division sector. He has to consider his chances of success being the poorest along avenue A, canalized by the valley approach and J-town; avenue D, however, straddling WHITE Creek, becomes unattractive in the event of heavy rain. Avenues B and C are rated about equal. From our viewpoint, once the Threat crosses the FEBA, natural obstacles will not hinder his movement along avenues A, B and C; however, we can employ supplemental obstacles on any of the Threat avenues to increase his exposure to our fires. Our use of one or more nuclear weapons against Threat forces in or near J-town would cause rubble which would further canalize Threat forces moving along this avenue.

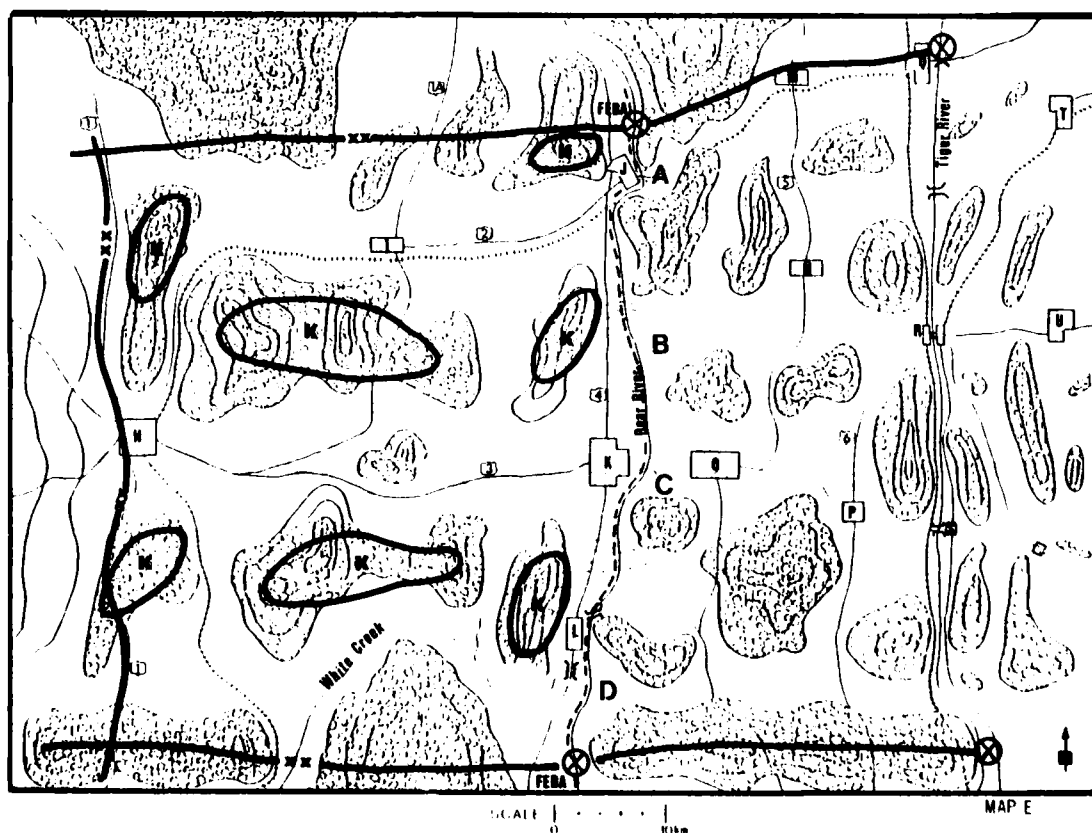
(4) Identification and utilization of key terrain. Threat avenues are about equal in this respect; terrain key to the Threat is in the division rear, north and south of his possible objective. From our point of view, all of the dominant terrain features immediately behind the FEBA are key to our successful defense; they anchor our defense well-forward and offer cover and concealment to our units in depth.

(5) Adequacy of maneuver space. Threat's maneuverability along avenues A and D are poor initially; avenue A improves west of J-town; avenue D remains poor until west of WHITE Creek. Threat's avenue C is moderately constrained by K-town and the high ground to the southeast, but widens west of Hwy 4. Avenue B affords essentially uniform and good maneuverability throughout. The same man-

euverability available to the Threat, west of the BEAR River, is available to us. In fact, adequacy of maneuver space should favor us if we are successful in early identification of his crossing sites.

(6) Ease of movement. Avenues A, B and C offer comparative ease of movement west of the BEAR River; however, B and C provide the most direct movement to the probable Threat main objective (H-town). Avenue D is poor in this respect, all along WHITE Creek. Ease of movement, alone, does not give us an upper hand over the Threat initially; however, the ease of movement available to us through crossover approaches should provide a significant contribution to our defense in that we have the flexibility of acting and reacting in multi-directions against the Threat avenues before he can secure and consolidate bridgeheads.

From the above assessment, it can be concluded that the greatest threat to the division will probably occur along avenues B and C, avenue A and avenue D, in order.



STEP 4: CONDUCT A WEATHER ANALYSIS

Once avenues of approach are analyzed based on terrain, the forecast weather conditions are applied to assess the effects of weather on the operations in general and the avenues of approach in particular. For our situation, the following conditions apply:

- "The area is under the influence of a high pressure system which reduces the probability of significant precipitation within the next 72 hours to less than 20 percent."
- "Temperatures will range from a low of 1° (Celsius) to a high of 15° (C); average daily humidity expected to be about 72 percent; winds up to 15 kilometers per hour from the southwest."
- "September is the start of the predominant periods of fog; fog is to be expected in the late night and early morning hours."

In this regard --

(1) Fog, which is likely to occur (particularly in the early morning hours) along the TIGER and BEAR Rivers will assist the Threat in concealing his deployments east of either river, as well as conceal his crossing site operations.

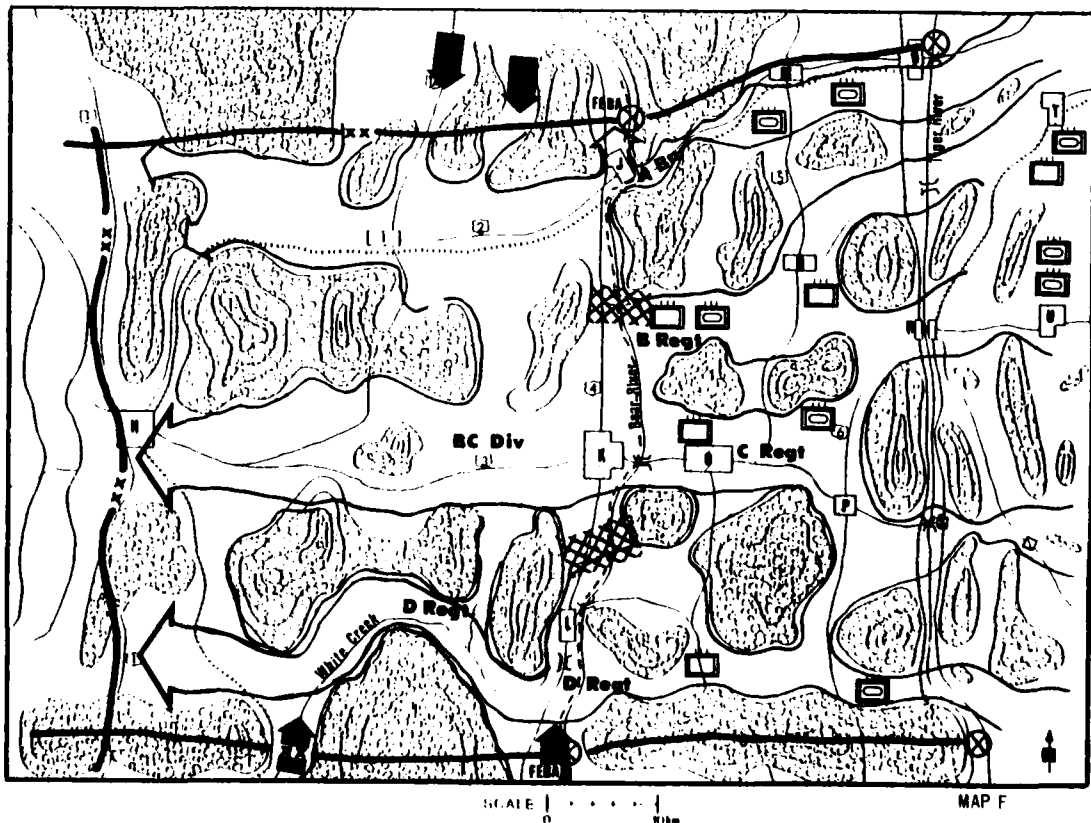
(2) Although unlikely, rain could enhance the obstacle value of both the TIGER and BEAR Rivers, result in worsened trafficability in the river valleys and impede movement, particularly along Threat avenue D in the vicinity of WHITE Creek. Conversely, rain would degrade our surveillance and target acquisition capabilities along all avenues of approach; however, the Threat would encounter the same difficulties.

(3) The wind direction does not favor the Threat use of non-persistent chemical agents to support his river crossing operations; conversely, the wind direction does support our use of non-persistent chemical and smoke munitions.

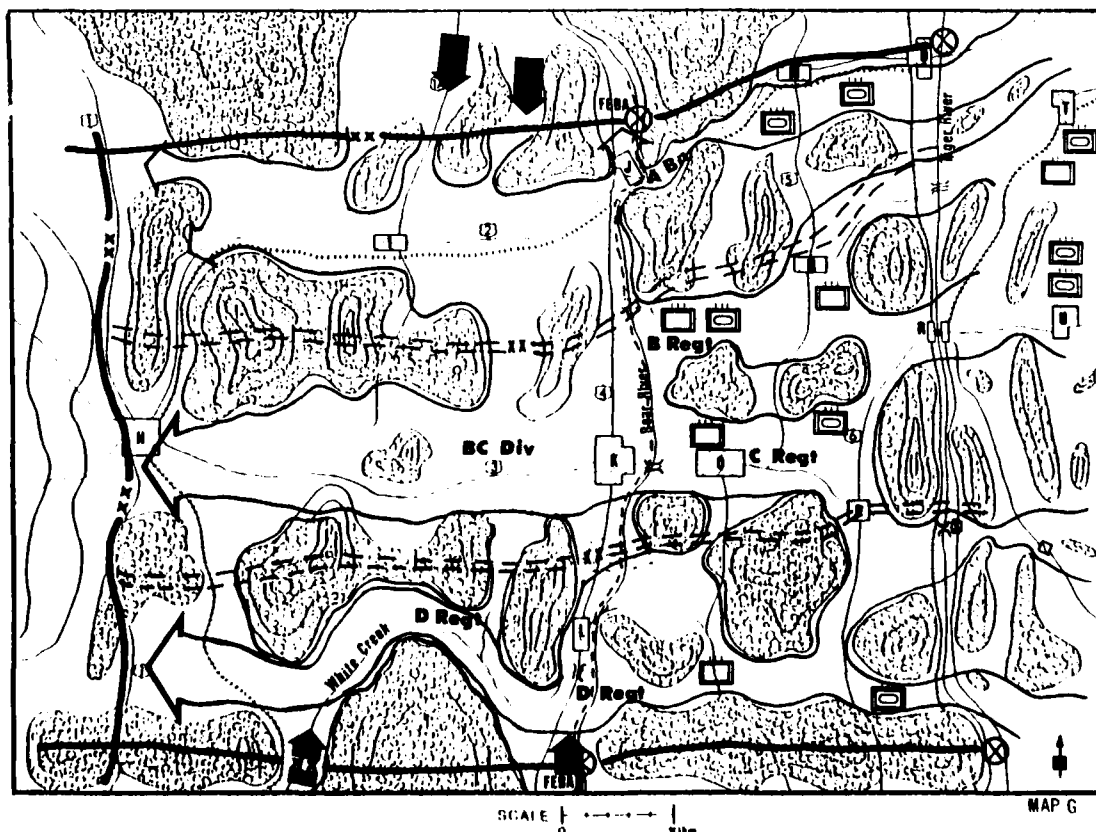
(4) In sum, the variations in weather conditions expected will have an equal effect on all likely Threat avenues of approach. From the standpoint of operations in general, wind direction favors the defender.

STEP 5: TEMPLATE THE THREAT

Substep a. Develop a situation template. Using a combination of threat doctrinal attack zones (e.g., Table 2, page 17) and avenues of approach previously identified, we are now in a position to develop the most probable situation template that conforms to the Threat doctrinal norms, the terrain constraints and the weather. We should also project the Threat second-echelon forces if these have been identified as part of the threat expected in sector, as is the case for our situation. This last consideration is recommended even though it is recognized that in most cases any projection of such higher level second-echelon forces will be subject to considerable chance once hostilities begin and/or the battle is joined. Thus, sketch map F templates the Threat in depth to include the second-echelon division of the first echelon army; this division is depicted east of the TIGER River, at a depth that doctrinally corresponds to where the Threat would plan to organize this division into tactical formations (e.g., regiments).



Substep b. Identify Threat main and secondary zones of action. Having identified possible Threat objectives, identified and analyzed possible Threat avenues of approach and templated the probable Threat dispositions, it is now possible to determine the probable placement of Threat division boundaries. Although the corps intelligence estimate has advised us to expect the main attack to be conducted by an augmented MRD, it was the situational templating (page 4-15) that provides an indication of where this main effort will probably be directed. When the templated Threat posture is considered in conjunction with the terrain leading west and the Threat's doctrinal attack frontages, the assumed boundaries shown on sketch map G appear logical. The postulated boundaries provide an inclusive avenue of approach 10 to 12 kilometers in width, consistent with Threat doctrinal frontage of 4-16 km for a division making the main attack; flanking divisions making the secondary attacks doctrinally have frontages of 10-30 km; realistically, the outer boundaries of these divisions extend beyond our division sector boundaries, off the sketch map. Nonetheless, as the planner, you should be aware that elements of the flanking divisions not directly opposing you initially, may show up subsequently via flank approaches into your sector.



STEP 6: CONSIDER FRIENDLY FORCES

Substep a. List available resources. The planner lists the resources he has available -- organic, attached and OPCON from a higher.

(1) Maneuver forces:

- 6 Mech Inf Bns;
- 5 Tank Bns;
- 1 Cav Sqdn.

(2) Fire support:

- Div Arty (3 155mm Bns; 1 8-in Bn);
- FA Bde (Corps) (1 155mm Bn; 2 8-in Bns; 1 Lance Bn);
- Atk Hel Co (Corps Avn Bn);
- Close air support -- 48 sorties per day.

(3) Combat multipliers: (These are both tangibles and intangibles.)

- Combat service support -- ability to preposition in depth and to widely disperse should provide us with more staying power than that which the Threat can generate in an attack posture.
- Nuclear and chemical weapons -- nuclear weapons probably give us a slight edge over the Threat; he has to be concerned about when and where to mass for the main attack and for how long. The Threat has a sizeable edge in numbers of chemical munitions, but wind conditions hamper his use of non-persistent chemicals in close-in support.
- Electronic warfare capability -- if we concentrate our EW effort on the main attack force and minimize our use of electronic transmissions we achieve an edge.
- Smoke -- wind direction favors our use of smoke/non-persistent chemicals.
- FASCAM -- Threat is not known to possess this capability.
- Obstacle capability -- with FASCAM we have a decided edge.
- STANO devices -- Threat capabilities are improving, but we still have the edge here.
- Deception -- in the defense, deception commences in the CFA; if we allocate sufficient resources to the CF, they can deceive the Threat into thinking he has already encountered the MBA.

Substep b. Force capability. Identify the combat capability and effectiveness of friendly forces in the following areas:

- (1) Personnel and materiel strengths;
- (2) Types of equipment available;
- (3) Degree of mobility possible;
- (4) Availability of nuclear and chemical ammunition;
- (5) Combat service support status;
- (6) Effectiveness of command control headquarters;
- (7) Level of training in units;
- (8) Ability of subordinate commanders;
- (9) Morale and condition of the soldiers.

Substep c. Draw general conclusions concerning relative combat power. Having completed Threat and own capability assessments, back-to-back, the planner may mentally draw some tentative conclusions concerning relative combat power, at this time, to be considered in war gaming COAs.

Section V. IDENTIFICATION OF THE HOW ELEMENT OF
A DEFENSIVE COURSE OF ACTION

STEP 7: FORMULATE FEASIBLE COURSES OF ACTION

It is important, before proceeding, that the planner (war gamer) recognize that a defensive course of action (COA) is much more than an exercise in arithmetic. The simple calculations addressed and applied serve to enhance the planner's understanding of a feasible COA with a visual summary of enemy and friendly dispositions and strengths. It should assist the planner in identifying possible areas of risk. It also should, however, be noted that force allocation in this section refers only to maneuver units -- not to overall combat power which defies quantification.

Substep a. Allocate Threat maneuver forces. The use of the defensive COA worksheet has already been briefly described and the WHAT, WHEN, WHY and avenue of approach components of WHERE elements of feasible COAs identified. It remains now to complete the Threat portion of the WHERE before describing the friendly force oriented HOW element.

(1) The chart below portrays those elements against which brigades, divisions and corps allocate forces.

	Brigade allocates against	Division allocates against	Corps allocates against
CFA 1:6 1:3	Division's 1st Echelon (D1E)		
M B A 1:3	Regiment's 1st Echelon (R1E)	D1E	Army's 1st Echelon (A1E)
	Regiment's 1st & 2d Echelon (R12E)	Division's 1st & 2d Echelon (D12E)	Army's 1st & 2d Echelon (A12E)
RES 1:3	D12E	A12E	Front's 1st & 2d Echelon (F12E)

For this division-level defensive operation, the Threat forces against which friendly forces must be allocated are highlighted on the chart and entered on the worksheet under (a1), page 60.

(2) Based on the situation templates for the course of action being analyzed, fill in the elements of the Threat array and their equivalent in US battalions. The postulated enemy disposition for the COA being analyzed is summarized below.

(A) 1st Ech	(A) 2d Ech		1 TkR 1 MRR	2 TkR	
	(D) 2d Ech	1 TkR	1 MRR	1 TkR	1 TkR
	(D) 1st Ech	1 TkR	1 MRR 1 TkR	1 MRR	1 MRR
Avenue		A	B	C	D

In order to approximate the number of US units needed to defend against the Threat elements, it is necessary to convert Threat elements into US battalion equivalents. Based on a weapons comparison, the 16 organic battalions of a MRD equal about 11 US battalions and the 13 organic battalions of a TD equal about 9 US battalions. As an approximation, therefore, we may assume a MRR equals 3 US battalions and a TkR equals 2 US battalions. Accordingly, the postulated Threat in terms of battalion equivalents, is entered on the worksheet. (See (a2).)

Substep b. Allocate friendly maneuver forces.

(1) This allocation of defensive forces considers the conduct of two distinct operations: initial or early contact and the final or main defensive action. The initial or early contact requires a covering force capable of countering the Threat divisions' first echelon (DIE) and a main battle area (MBA) force

DEFENSIVE COURSE OF ACTION WORKSHEET

WHAT: Establish a covering force; delay between the Tiger and Bear Rivers for a minimum of 24 hours; defend in sector.

WHEN: 270600 September

WHY: To destroy Threat forces through the conduct of an active defense; to create opportunities to go on the offensive.

WHERE:

	(a1)	(a2)		
(A) 2d Ech		5	1	
(D) 2d Ech	2	3	2	2
(D) 1st Ech	2	5	3	3
Avenue Letter	A	B	C	D

HOW:

CFA	1:6/1:3 vs () 1E					-		
MBA	1:3 vs () 1E					-		
Initial Rqmts	vs () 1E					-		

Avail Over/Short

MBA	1:3 vs () 1,2E					-		
RES	1:3 vs () 2E					-		
Final Rqmts	vs () 1,2E					-		

Avail Over/Short

Initial - Final Rqmts						-		
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Adjusted Totals						-		
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Avail

REMARKS:

capable of successfully defending against the same D1E. The final source allocation must be capable of countering the division 1st & 2d echelons and the army 2d echelon.

(2) It is generally accepted that a defender can successfully defeat an attacking force of about three times his equivalent strength. Therefore, calculation of the required defensive forces will assume a 1 to 3 force ratio. Because covering forces are not usually required to become heavily engaged with attacking forces, rather they deceive and disrupt, they can usually be effective when deployed at a ratio of about 1 to 6. The calculations for the force allocation, by avenue, are quite simple. For the CFA row, divide the Threat division 1st echelon by six, round up to the nearest $\frac{1}{3}$ and enter in the appropriate avenue column. The MBA row is determined by dividing the Threat D1E row by 3. (See (b1) on the worksheet, page 62.) The total initial requirements to man both the covering force and the main battle area force (against the Threat division leading elements) are seen to be 7 US battalions; 12 battalions (counting the division's cavalry squadron) are available; thus, 5 battalions are excess during this initial phase of the battle and could either be assigned preparatory tasks or used to strengthen the covering forces.

(3) The final phase of the battle acknowledges a requirement for the MBA forces to defend against the army 1st echelon (the division's first and second echelons. Again, the defensive ratio of 1 to 3 is used. (See (b2).) The sum of the MBA and reserve forces results in the "final" force requirements. The row, "Initial minus Final Requirements", highlights those avenues where additional forces must be positioned to supplement the initial forces. $3 \frac{1}{3}$ battalions of those initially excess need to be positioned in order to defend at a 1 to 3 force ratio. $1 \frac{2}{3}$ battalions are still excess and can be positioned as the planner sees fit.

(4) The adjusted totals row on the worksheet (b3) reflects the planner's intent to position one additional battalion on avenue B and $\frac{2}{3}$ of a battalion on avenue C to oppose the postulated Threat main attack.

(5) If the force requirements had exceeded the forces available, the planner would change/reduce the required allocation beginning with the forces allocated to the reserve. The planner can best afford to reduce the reserve

DEFENSIVE COURSE OF ACTION WORKSHEET

WHAT: Establish a covering force; delay between the Tiger and Bear Rivers for a minimum of 24 hours; defend in sector.

WHEN: 270600 September

WHY: To destroy Threat forces through the conduct of an active defense; to create opportunities to go on the offensive.

WHERE:

(A) 1st Ech	(A) 2d Ech		5	4	
	(D) 2d Ech	4	3	2	2
	(D) 1st Ech	2	5	3	3
Avenue Letter		A	B	C	D

(61)

HOW:

CFA	1:6/1:3 vs (D) 1E	1/3	1	2/3	2/3	-	2 2/3	Avail	Over/ Short
MBA	1:3 vs (D) 1E	2/3	1 2/3	1	1	-	4 1/3		
Initial Rqmts	vs (D) 1E	1	2 2/3	1 2/3	1 2/3	-	7		
								12	5

(62)

MBA	1:3 vs (D) 1,2E	1 1/3	2 2/3	1 2/3	1 2/3	-	7 1/3	Avail	Over/ Short
RES	1:3 vs (D) 2E	0	1 2/3	1 1/3	0	-	3		
Final Rqmts	vs (D) 1,2E	1 1/3	4 1/3	3	1 2/3	-	10 1/3		
								12	2 2/3

Initial - Final Rqmts	- 1/3	-1 2/3	-1 1/3	0	-	3 1/3	3 1/3
-----------------------	-------	--------	--------	---	---	-------	-------

(63)

Adjusted Totals	1 1/3	5 1/3	3 2/3	1 2/3	-	12	Avail	12
-----------------	-------	-------	-------	-------	---	----	-------	----

REMARKS:

because the first echelon division is the immediate Threat followed by the second echelon division. It is possible that the army 2d echelon may not be introduced. In any case, the reserve is the logical place to accept a risk if the planner is short of forces.

(6) On completion of substep b, the defensive planner has identified the overall allocation of maneuver forces by avenue. He must, however, decide where to position the 5 battalions designated as excess in the initial phase and where to position the 1 2/3 battalions allocated to avenues B and C in the final adjusted totals. Remarks (b4) (page 64) explain the adjustment the planner could make in arriving at an alternative COA. (f1) and (f2) (page 65) show the revised allocations and the avenue and force summaries.

(7) Now the planner must take this estimate and consider the combat support and combat service support requirements and assign command control responsibilities in order to finish his formulation task. The detailed evaluation of support requirements is outside the scope of this reference book; however, available supporting resources would be weighed in the sector where the Threat is expected to make his main effort. Possible command control assignments are as follows: the strong covering force of 5 Bns could be assigned to the commander, 1st Bde; upon completion of the covering force battle, he would assume responsibility for the 4 2/3 battalion reserve. The 1 1/3 battalions on avenue A could be assigned to a battalion task force commander; the 4 1/3 battalions on avenues B and C assigned to commander, 2d Bde; and the 1 2/3 battalions on avenue D could be assigned commander, 3rd Bde. This assignment insures that avenues B and C, which merge into one avenue of approach just west of K-town, are the responsibility of one commander. See (b5), page 65.

NOTE: On completion of the defensive course of action worksheet, the planner will have recorded a single course of action he feels will be a feasible way to defend his sector with the forces available. However, this does not mean he is ready to go to the commander for a decision. Instead, the planner must formulate alternative courses of action in the same manner as he did the one just completed. Then he war games each feasible course of action so that he can identify its advantages and disadvantages. Finally, he must compare courses of action and develop a recommendation for the commander's consideration and final decision.

DEFENSIVE COURSE OF ACTION WORKSHEET

WHAT: Establish a covering force; delay between the Tiger and Bear Rivers for a minimum of 24 hours; defend in sector.

WHEN: 270600 September

WHY: To destroy Threat forces through the conduct of an active defense; to create opportunities to go on the offensive.

WHERE:

(A) 1st Ech	(A) 2d Ech		5	1	
	(D) 2d Ech	2	3	2	2
	(D) 1st Ech	2	5	3	3
Avenue Letter		A	B	C	D

HOW:

CFA	1:6/1:3 vs (D) 1E	1/3	+ 2 1/3	~~2 1/3~~ 2 1/3	~~2 1/3~~ 1 2/3	- ~~2 1/3~~ 5	Avail	Over/ Short
MBA	1:3 vs (D) 1E	2/3	+ ~~2 1/3~~ 2 2/3	+ 1 2/3	1	- ~~1 1/3~~ 6		
Initial Rqmts	vs (D) 1E	1	~~2 2/3~~ 5	+ ~~2 1/3~~ 3 1/3	1 2/3	- ~~7~~ 11		

MBA	1:3 vs (D) 1,2E	1 1/3	2 2/3	1 2/3	1 2/3	- ~~7~~ 1/3	Avail	Over/ Short
RES	1:3 vs (D) 2E	0	+ ~~2 1/3~~ 2 2/3	+ ~~1 1/3~~ 2	0	- ~~1 2/3~~ 3		
Final Rqmts	vs (D) 1,2E	1 1/3	+ ~~1 1/3~~ 5 1/3	~~2~~ 3 2/3	1 2/3	- ~~10~~ 12		

Initial - Final Rqmts	- 1/3	- 1 2/3	- 1 1/3	0	- ~~3~~ 1/3	3 1/3
-----------------------	-------	---------	---------	---	--------------------	-------

Adjusted Totals	1 1/3	5 1/3	3 2/3	1 2/3	- 12	12
-----------------	-------	-------	-------	-------	------	----

(64)

REMARKS: Consider the 5 "excess" battalions in the initial phase: 2 1/3 additional battalions are positioned in the CFA, 1 1/3 to "B" and 1 to "C", resulting in a 5 Bn covering force; 1 2/3 additional battalions are positioned in the MBA, 1 in "B" and 2/3 in "C". The remaining "excess" battalion can be used as a contingency force to counter a potential vertical envelopment. (Also see §1, page 65.) In the final phase, the CFA (5 Bns) and contingency (1 Bn) battalions, for a total of 6 battalions, are distributed as follows: 1 1/3 Bns to MBA Final, 2/3 Bn to "A" and 2/3 Bn to "D"; 4 2/3 Bns to Reserve, 2 2/3 Bns to "B" and 2 Bns to "C". (Also see §2, page 65.) The emphasis of the planner was to strengthen the CFA to 5 Bns, to meet the 24-hour delay requirement; insure the required MBA forces were in position on avenues "B" and "C" in the initial phase; allow passage of the CFA Battalions; and the resultant formation of the reserve with minimum confusion.

DEFENSIVE COURSE OF ACTION WORKSHEET

WHAT: Establish a covering force; delay between the Tiger and Bear Rivers for a minimum of 24 hours; defend in sector.

WHEN: 270600 September

WHY: To destroy Threat forces through the conduct of an active defense; to create opportunities to go on the offensive.

WHERE:

(A) 2d Ech		5	3	
(D) 2d Ech	2	3	2	2
(D) 1st Ech	2	5	3	3
Avenue Letter	A	B	C	D

(1)

HOW:	CFA	1:6/1:3 vs (D) 1E	1 1/3	2 1/3	1 2/3	2/3	-	5	Avail	Over/ Short
	MBA	1:3 vs (D) 1E	2/3	2 2/3	1 2/3	1	-	6		
	Initial Rqmts	vs (D) 1E	1	5	3 1/3	1 2/3	-	11		
								12		1

(2)

	MBA	1:3 vs (D) 1,2E	1 1/3	2 2/3	1 2/3	1 2/3	-	7 1/3	Avail	Over/ Short
	RES	1:3 vs (D) 2E	0	2 2/3	2	0	-	4 2/3		
	Final Rqmts	vs (D) 1,2E	1 1/3	5 1/3	3 2/3	1 2/3	-	12		
								12		0
	Initial - Final Rqmts		-1/3	-1/3	-1/3	0	-	1		1
	Adjusted Totals		1 1/3	5 1/3	5 2/3	1 2/3	-	12	Avail	12

REMARKS: (b5)

Cdr, 1st Bde, in command of CFA, reverting to command of the reserve.

Cdr, X Bn, commands task force on avenue "A".

Cdr, 2nd Bde, commands forces on avenues "B" and "C".

Cdr, 3rd Bde, commands forces on avenue "D".

Contingency Bn, in initial phase, under division control.

STEP 8: ANALYZE (WAR GAME) EACH COURSE OF ACTION

Each feasible course of action must undergo analysis and be subjected to possible refinements to enhance-the-strengths/reduce-the-weaknesses. In addition to relative maneuver forces, other elements that contribute to overall combat power are considered. Both mission-essential and other key factors should be addressed.

Substep a. Mission-essential tasks. The mission-essential tasks are derived from analysis of the mission. This example set forth two essential tasks:

(1) TASK: Delay forward of the BEAR River for a minimum of 24 hours.

DISCUSSION: The planner allocated 5 Bns to the CFA, sufficient to defend against the Threat divisions first echelon (4 1/4 required) or to conduct normal covering force delaying action against both the Division's 1st and 2d echelons (3 2/3 required).

EVALUATION: ++ (very strong)

(2) TASK: Conduct active defense west of K-town.

DISCUSSION: Sufficient forces have been allocated to the MBA to achieve a 1:3 ratio. Further, the reserve forces of 4 2/3 Bns can be split to allow one Bn to be positioned near H-town to provide rear area security/protection against vertical envelopment; part of the reserve is located about 20 km west of the FEBA between avenues "A" and "B" and the remainder is located 20 km west of the FEBA between avenues "C" and "D".

EVALUATION: ++

Substep b. Other key (significant) factors. Various other key factors affecting the overall course should also be evaluated. Examples of those ascertained as key by the planner/commander, for this situation include:

(1) FACTOR: Can the COA be accomplished without the use of nuclear and/or chemical weapons?

DISCUSSION: The 54th Mech Div to Threat force ratio, overall, is about 1:2.6, and given the dispersion required to meet the corps commander's guidance that no more than 2 company/battery-size units be lost to a Threat nuclear weapon, it appears that the defense can be successful without the defender having to use nuclear or chemical weapons. However, this posture can change drastically if the Threat uses 3 or more nuclear weapons in sector; employs chemical agents against the division's reserve formations, support and/or service support formations; or attacks with additional forces against the division's flank.

EVALUATION: Ø (neutral)

(2) FACTOR: Does the COA provide all-around security?

DISCUSSION: The use of obstacles (and adjacent forces) guards against flank or crossover approaches. Vertical envelopment and rear area security is provided in the vicinity of H-town. A strong covering force will probably force the Threat to commit his forces earlier than he intended in order to counter the CF, which he may mistake for the MBA force, thus identifying, early, probable Threat axes of attack. The possible avenues (A and D) by which friendly forces could be encircled are relatively easy to defend and allow quick employment of the reserves. The major threat is the possibility of a penetration on avenues "B" and "C"; heavy covering forces, MBA forces and reserves in that portion of the sector should be able to counter that threat.

EVALUATION: ++

(3) FACTOR: Does COA provide time for battlefield preparation?

DISCUSSION: The covering force should delay for 24 hours. Additionally, the planner has allocated all remaining forces, except the rear area battalion, to the MBA to fortify defensive positions, emplace obstacles, plan subordinate level operations, etc.

EVALUATION: ++

(4) FACTOR: Does the COA provide for deception?

DISCUSSION: The use of an active defense, coupled with the positioning of the reserves, provide the possibility to "allow" an enemy penetration on avenues "B" and "C" and then employ the 2 reserve forces to cut off the penetration and destroy the forces in the controlled penetration.

EVALUATION: ++

(5) FACTOR: Does COA provide opportunity for offensive operations? Future operations?

DISCUSSION: In the active defense, all defensive forces are not initially in direct contact with the attacking Threat; those not so engaged are always ready to counterattack locally or to take the initiative should such an opportunity present itself.

EVALUATION: +

(6) FACTOR: Does the COA afford sufficient flexibility to provide a balance between mass and dispersion?

DISCUSSION: The initial deployment of the division with five battalions in the covering force, six in the MBA and one in reserve provides the opportunity for forces to be dispersed to avoid presenting remunerative (battalion-size) targets. The mobility of the forces coupled with the favorable terrain will permit maneuver units to concentrate when necessary, using multiple routes, as the distance from the enemy decreases. The period of maximum vulnerability to Threat nuclear and chemical weapons will occur as the covering force withdraws across the BEAR River and passes through the forces occupying the MBA. This movement must be carefully controlled and conducted during the hours of darkness if possible. Subsequently, the forces can remain dispersed in company/battery-size units. (Dispersal of the reserve was discussed in subparagraph (2) on page 4-27.) The maneuver battalions in the MBA can deploy approximately one-half of their companies on or near the FEBA with the remainder occupying hide positions behind the FEBA prepared to move forward to reinforce the defense or conduct local counterattacks. Alternate routes for forward, lateral and rearward movement must be selected because of the likelihood of terrain alteration by Threat nuclear weapons.

EVALUATION: +

(7) FACTOR: Does the COA have sufficient flexibility to address various threat arrays? To concentrate forces?

DISCUSSION: The reserve forces are dispersed in the central portion of the sector, allowing concentration of forces to counter a threat on any avenue of approach.

EVALUATION: +

(8) FACTOR: Does the COA permit successful execution in the absence of continuous command and control? decentralized execution?

DISCUSSION: The assignment of avenues of approach to subordinate commanders (avenue "A" to the Bn Task Force commander, "B" and "C" to the 2d Bde Cdr and D to the 3rd Bde Cdr) allow conduct of the three "battles", each independent of the other for short periods of time. The conduct of the covering force operation, with five battalions conducting a delaying action across a 50 km front, will require close coordination, particularly during the crossing of the BEAR River. However, a carefully prepared plan with liberal use of control measures (e.g., delaying positions, boundaries delineating sectors and phase lines) will permit a series of independent unit actions within the framework of the overall plan, thus obviating the need for continuous command and control.

EVALUATION: +

(9) FACTOR: Does COA incorporate natural or man-made obstacles?

DISCUSSION: The forward edge of the CFA is along the TIGER River; this natural barrier, coupled with a strong covering force will slow the enemy (and perhaps deceive them into believing they are at the FEBA). The actual FEBA is located along the west bank of the BEAR River and further uses the towns on the west bank to good advantage. Both the CF and MBA force can supplement natural obstacles with FASCAM; additionally, the MBA force has time to manually and mechanically create supplemental obstacles.

EVALUATION: +

(10) FACTOR: Does the COA establish clear responsibility for key terrain and avenues of approach?

DISCUSSION: Yes, see sketch map E. The boundaries assigned and the forces allocated insure that the key terrain and avenues of approach are the clear, undivided responsibility of the appropriate commander.

EVALUATION: +

(11) FACTOR: Does the COA exploit the use of nuclear and/or chemical weapons?

DISCUSSIONS: The COA will present opportunities to exploit the use of nuclear and/or chemical weapons if release is authorized. By locating the FEBA immediately behind the BEAR River, a significant obstacle, the Threat will have to concentrate forces, at least for a short time, to force a crossing. As this occurs the Threat should be particularly vulnerable to a nuclear or chemical

attack by friendly forces. His vulnerability will be considerably increased should he find it necessary to pass his 2d echelon regiments through his 1st echelon at this point. Chemical weapons may also be employed against crossing sites as well as troop concentrations, artillery positions and command posts. The prevailing wind from the southwest favors friendly use of chemicals.

EVALUATION: +

Substep c. Refinement of COA. The foregoing representative (but not all inclusive) factors can be summarized on a matrix as shown below:

FACTORS	COURSE OF ACTION "A"	
	Initial	Mod 1/COA B
Mission-essential		
(1) Delay 24 hrs?	++	+
(2) Active defense?	++	++
OTHER KEY		
(1) Need nuc/chem?	Ø	Ø
(2) All-around security?	++	+
(3) Battlefield prep?	+	++
(4) Deception, surprise?	++	++
(5) Offensive, future opns?	+	+
(6) Balance between mass and dispersion?	+	+
(7) Flexibility?	+	+
(8) Decent. execution?	+	+
(9) Use obstacles?	+	+
(10) Key terrain aces?	+	+
(11) Exploits nuclear/chemical use?	+	+

(1) The planner, after evaluating the various factors above, may decide that "battlefield preparation" should be increased. He might opt to send the minimum covering force forward (2 1/3 Bns) and use the remaining 2 2/3 battalions to prepare the battlefield (dig in and emplace obstacles).

(2) The overall evaluation process must be repeated to determine the effect on other factors. The mod 1 column might reflect the second evaluation.

MISSION ESSENTIAL:

(1) The likelihood of delaying for 24 hours with a lesser covering force is decreased to + vice ++.

OTHER KEY:

(2) The all-around security could be perceived as being reduced from ++ to +. A minimum covering force might not have sufficient strength to force the enemy to expose its main body and the general direction of its main attack. The result is that the MBA forces will not have as much time to readjust to the main attack when the lesser covering force is employed.

(3) The increase in the battlefield preparation capabilities of Mod 1 is based on the additional forces involved and on the assumption that the covering force still delays for 24 hours.

STEP 9: COMPARE COAs AND SELECT BEST ONE.

Other modifications/courses of action would be evaluated in a similar manner. Whether the planner considers a change in the COA to be sufficiently minor to be termed a "modification" or a "different" COA (more likely in the example chosen) is not important - all variants are compared and the one that is judged best for the situation is chosen.

STEP 10: REFINING THE CHOSEN COURSE OF ACTION AND ISSUING
CONCEPT AND PLANS/ORDERS

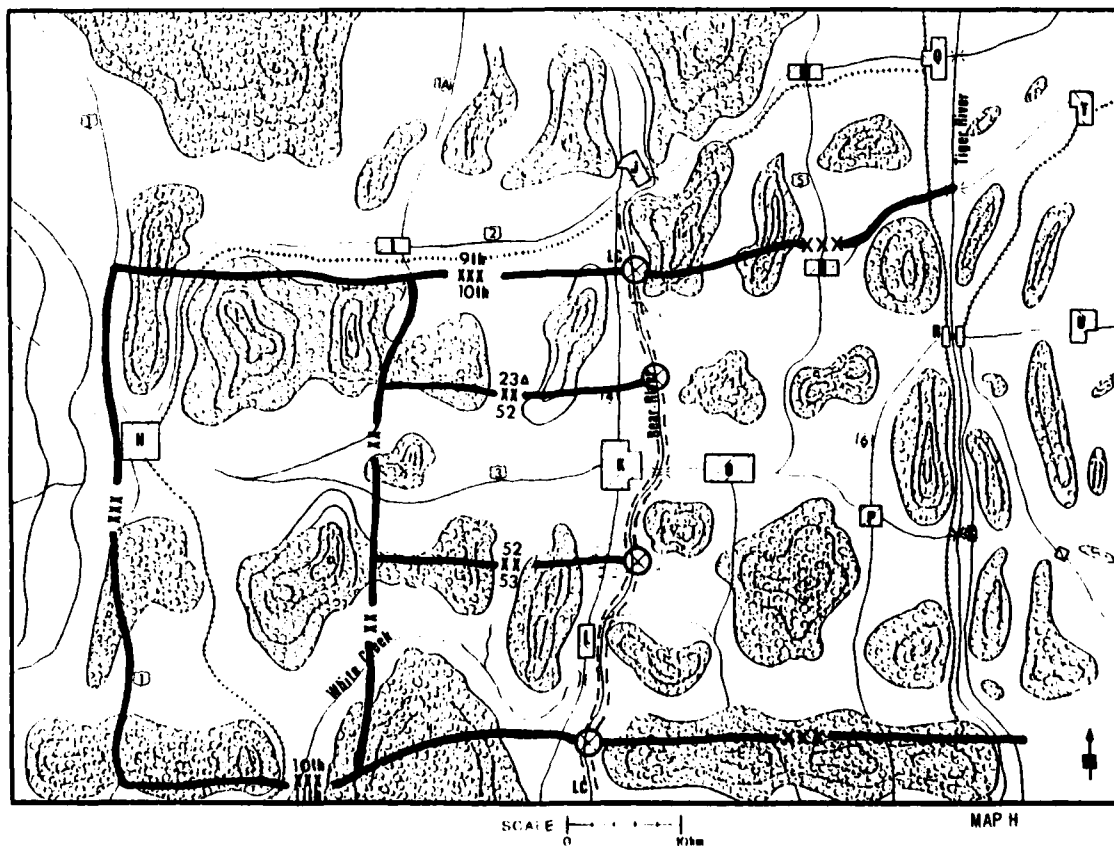
The element of WHAT, WHEN, WHERE and HOW are present in the chosen course of action (COA). The preferred COA is selected or approved by the commander, normally based on the staff's recommended COA. Before the decision is understandable as a concept, it normally must also include the elements of WHO (the command itself or, when the entire command is not involved, the appropriate elements of the command) and so much of the WHY (purpose to be attained and the reasons therefor) as are necessary for understanding.

At this point, the various steps involved in the formulation and selection of feasible courses of action and the commander's (staff's) estimate of the situation have been accomplished; refinement (and revision, where necessary) will continue throughout planning and execution.

Section VI. IDENTIFICATION OF THE WHAT, WHEN AND WHY
ELEMENTS OF AN OFFENSIVE COURSE OF ACTION

OFFENSIVE SITUATION

Map H and the situational information presented will be used to assist in demonstrating the processes of formulating and selecting offensive courses of action. Other situational, operational and environmental data that are, or can be, available to the planner are subsequently identified when such information may affect the analyses.

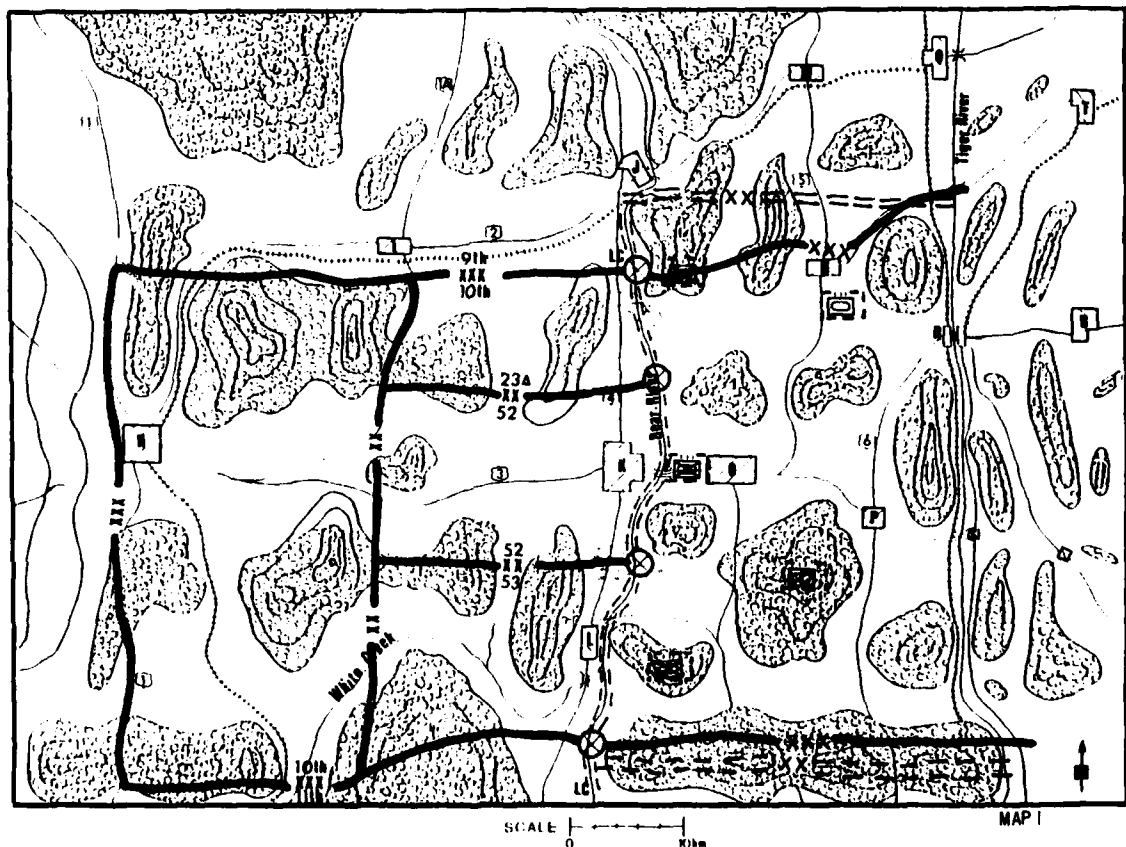


Situational Information:

- It is 23 May and Allied forces have gone over to the offensive. The 10th (US) Corps is disposed as shown on sketch map H.
- Army group, consisting of the 9th (Allied) Corps and the 10th (US) and 11th (US) Corps, has issued its operation order for continuation of the offensive.

Extracts from the OPORD applicable to the 10th Corps appear below:

- "10th Corps is opposed by the major elements of the 103d MRD."
- "Threat units in the 10th Corps zone have been unable to fully replace their recent losses in personnel and equipment and are estimated to be at approximately 75 percent effectiveness." Threat forces retain the capability of employing chemical and nuclear weapons (with yields of 10 to 40 KT) against the army group. Current intelligence on Threat dispositions is depicted on sketch map I.



- "Army group attacks 2400 hours, 23 May 198_, to secure the high ground on the west bank of the TIGER River; prepares to continue the attack to the east 10th Corps secure the high ground on the west bank of the TIGER River in zone.... Be prepared to employ nuclear and chemical weapons."

- The major subordinate elements of the 10th Corps are as follows:

- 23 Armd Div;
- 52d Mech Div;
- 53d Mech Div;
- 201 ACR;
- 10th Corps Arty:
 - 70th FA Bde (1 155mm Bn; 2 8-in Bns; 1 Lance Bn);
 - 71st FA Bde (2 155mm Bns; 1 8-in Bn);
 - 72d FA Bde (1 155mm Bn; 1 8-in Bn; 1 Lance Bn).
- 10th Corps Support Command;
- 17th Engr Bde;
- 102d Cbt Avn Gp.

- Each division has a FA brigade reinforcing the division artillery and a combat engineer battalion and an attack helicopter company attached. (Lance Bns of the 70th and 72d FA Bdes retained under corps control.)

- 10th Corps units are 95 percent strength in personnel and equipment.

STEP 1: MISSION ANALYSIS

Using the operation order from higher headquarters, the planner (war gamer) performs a mission analysis to determine the WHAT, WHEN and WHY elements of the offensive course of action.

In our sample situation, we have been provided with pertinent extracts from the Army Group operation order to include Threat dispositions and strengths and the tasks for our corps. Therefore, we have sufficient information to perform a mission analysis by identifying the specified, implied (if applicable) and mission-essential tasks to be accomplished by the Corps.

Specified tasks:

- (1) Attack 232400 May and secure the high ground on the west bank of the TIGER River in zone.
- (2) Be prepared to:
 - Continue the attack to the east.
 - Employ nuclear and chemical weapons.

Implied tasks:

- (1) Destroy Threat forces in zone.
- (2) Maintain contact with the 54th Mechanized Division (11th Corps).

Essential tasks:

- (1) Attack 232400 May; secure the high ground on the west bank of the TIGER River in zone.
- (2) Destroy Threat forces in zone.
- (3) Prepare to continue the attack to the east.

Accordingly, the elements sought are --

WHAT: Attack; secure high ground west bank of TIGER River in zone; be prepared to continue attack to the east.

WHEN: 232400 May

WHY: To destroy Threat forces in zone.

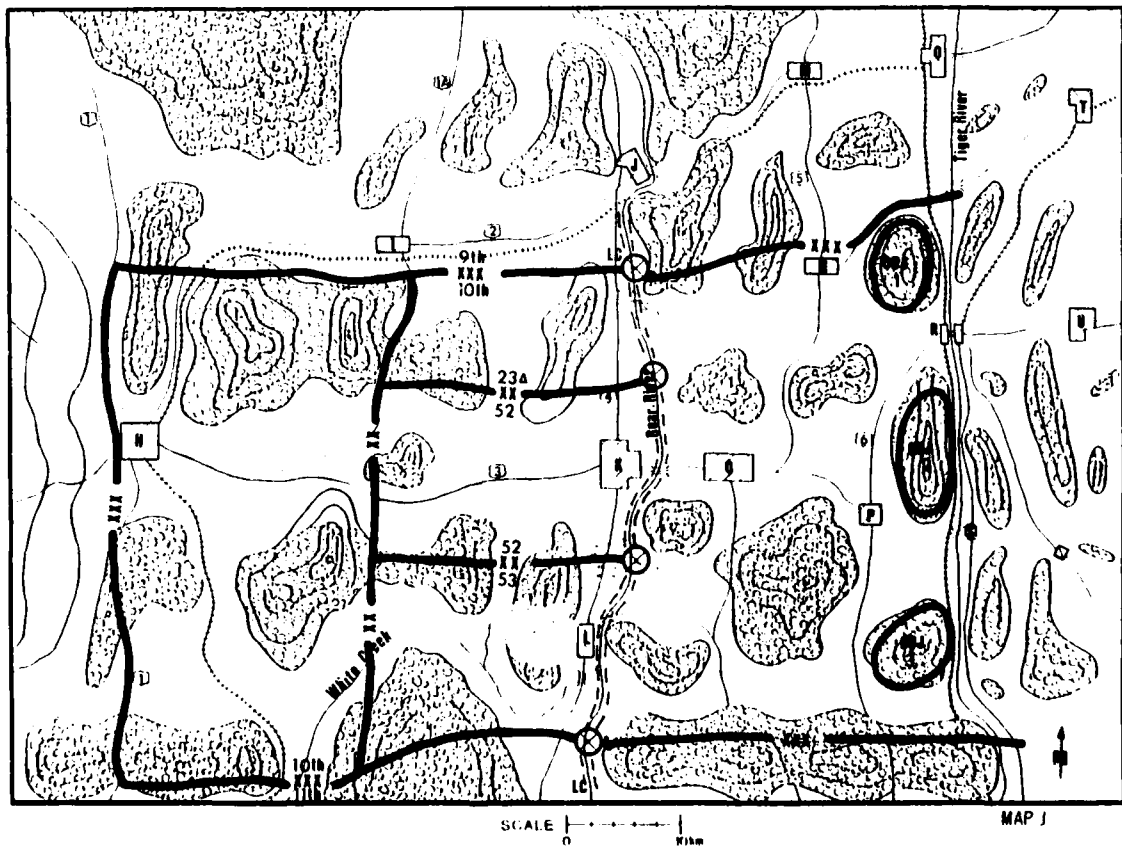
Note that while an offensive course of action (COA) worksheet has not been suggested, the planner may devise one similar to the defensive COA worksheet. Normally, however, offensive COA information is recorded directly in the format of an estimate of the situation.

Section VII. IDENTIFICATION OF THE WHERE ELEMENT
OF AN OFFENSIVE COURSE OF ACTION

STEP 2: CONDUCT A TERRAIN ANALYSIS

Substep a. Define the area of operations. For an offensive course of action, the planner analyzes the terrain within the zone between the line of contact and the final objective assigned by higher headquarters to determine suitable objectives, avenues of approach and boundaries for his major maneuver units. The area of operations is delineated by extending the corps boundaries into the objective area (map J).

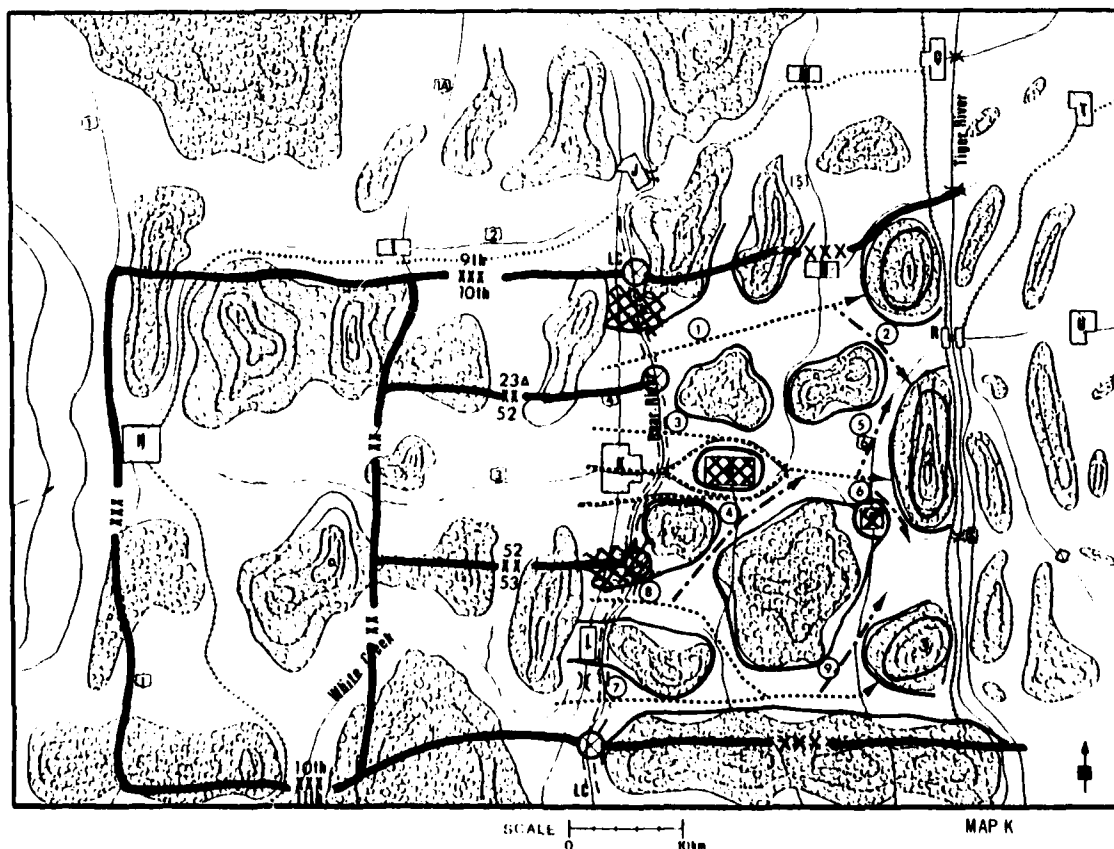
Substep b. Identify and refine objectives. In this situation, Army Group has directed our corps to secure the high ground on the west bank of the TIGER River in zone. At corps level, we are concerned with selecting objectives for our three divisions. Sketch map J shows three hills, overlooking the TIGER River, which are suitable as final objectives for our attacking divisions.



Although these are identified as objective 1, 2 and 3 from north to south, there are numerous other terrain features between the present line of contact (LC) and the TIGER River which might be designated as intermediate objectives but there does not appear to be any requirement to designate such objectives. Designation of intermediate objectives tends to slow the movement of the attack.

Substep c. Identify mobility corridors/canalizing terrain. The following discussions are keyed to sketch map K:

In the northern portion of the corps zone a mobility corridor ① approximately 5 to 6 km wide leads from the BEAR River between a series of wooded hills (and N-town on the north) almost due east some 25 km to the hill north-northwest of R-town (OBJ 1) overlooking the TIGER River. A crossover occurs in the southern portion of this corridor at its midway point. Entry into this corridor is restricted somewhat by the marshy area on both sides of the BEAR River 10 km north of K-town. A variant (regiment-size ②) of this corridor turns southeast west of R-town and leads to the northern end of the hill mass (OBJ 2) south of R-town.

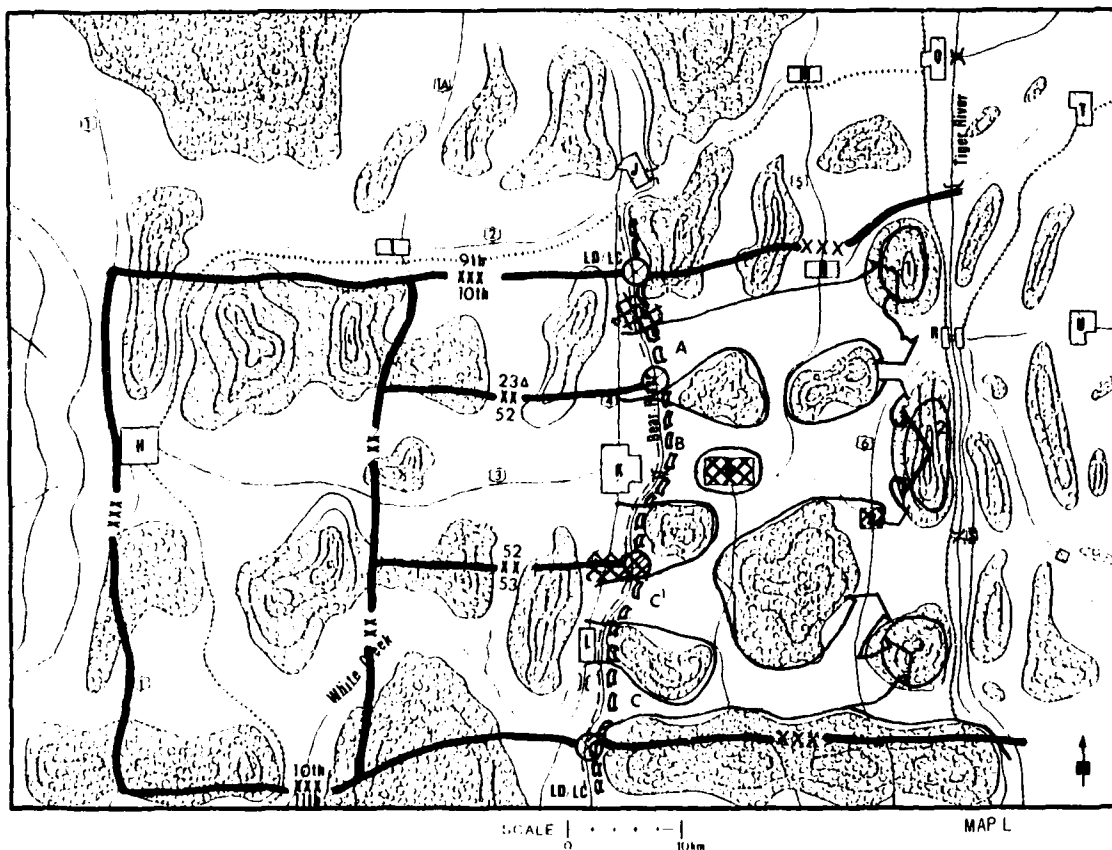


In the center of the corps zone another mobility corridor (3), formed by canalizing terrain, extends from the BEAR River, vicinity of K-town, due east to the dominant terrain feature (OBJ 2) on the TIGER River northeast of P-town, a distance of approximately 22 km. This corridor is 7 to 8 km in width; however, O-town constitutes an obstacle which restricts movement to the north and south of O-town through corridors 3 and 2 km in width, respectively. Another entry (4) into this corridor occurs between the two hills south of O-town. A battalion-size corridor along Highway 6 permits movement to (5) and south (6) adjacent to the high ground (OBJ 2) along the TIGER River.

In the south, a mobility corridor (7) leads east from the BEAR River south of L-town to the hill south-southeast (OBJ 3) of S-town, a distance of about 28 km. This corridor narrows to a width of 2 km (battalion-size) at a point 5 km east of the river, then widens to about 5 km (brigade-size) as it continues to the east. Another entry (8) into this corridor from the north is provided by a cross-over between the hills east of L-town and southwest of P-town. A variant (9) of this corridor turns northeast in the vicinity of Highway 6 and proceeds to the hill mass (OBJ 2) south of R-town; this variant will accommodate brigade formations.

Substep d: Identify avenues of approach. Having identified objectives, mobility/crossover corridors and canalizing terrain, the planner now turns to the selection of avenues of approach for his major maneuver formations; i.e., divisions. Thus, he is seeking avenues conforming to attack frontages for divisions, i.e., 6 to 10 kilometers (Table 4, page 2-10) and which have the additional characteristics shown below. (For ease of reference, the avenues are indicated by letter designation from north to south, in zone, where they cross the proposed LD, Map L.)

- A reasonable degree of mobility, a direct approach to the objective and few, if any obstacles.
- Little or no canalization of movement.
- Acceptable intervisibility conditions (e.g., observation and fields of fire).
- Some cover.
- As much concealment as possible.
- Good communications.



(1) In the north, avenue A crosses the line of contact (LC), BEAR River, between two hills (northeast of K-town and southeast of J-town. Entry into this avenue is restricted on the north by a marsh. The avenue, which is 5 to 6 km wide, proceeds due east for a distance of 25 km to Objective 1. A crossover corridor, 2 km wide, will permit lateral movement between avenues A and B. A variant of this avenue turns southeast approximately 5 km west of R-town and leads to the northern end of Objective 2. This avenue will accommodate two brigades abreast with somewhat less than the optimum space for maneuver.

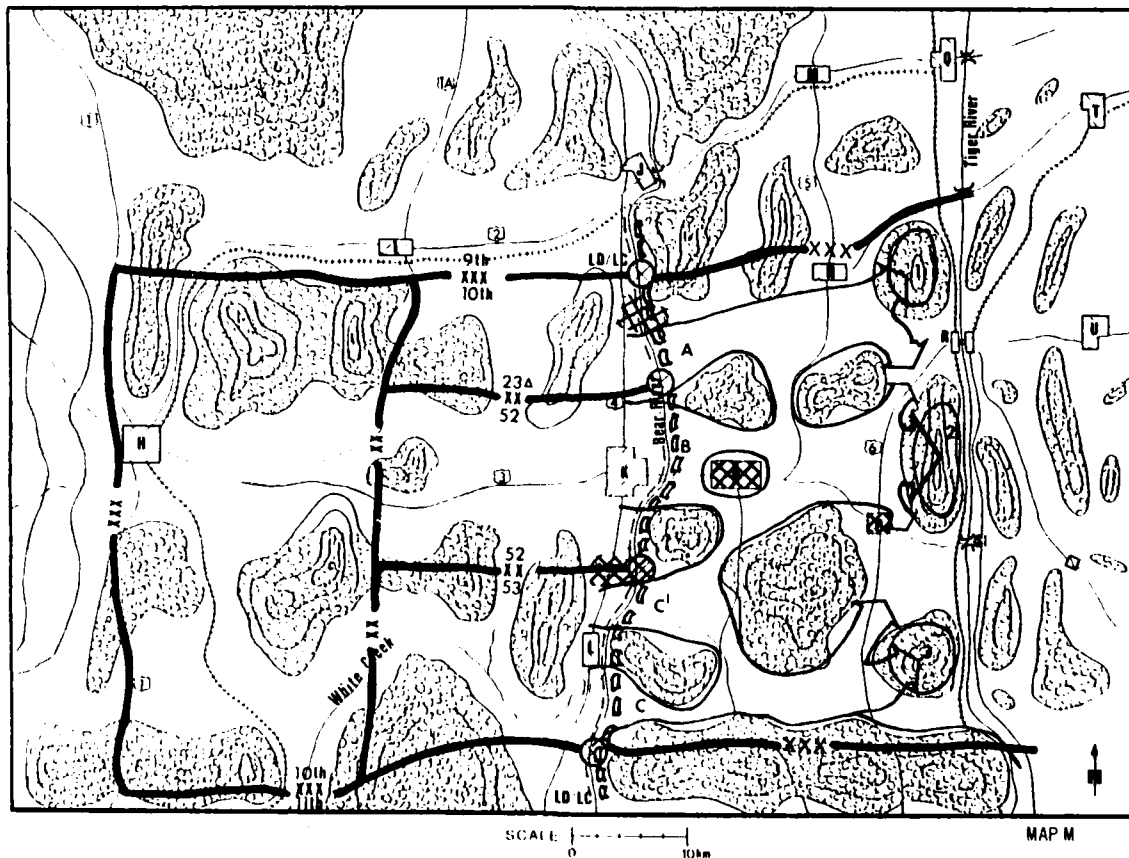
(2) In the center of the corps zone, avenue B crosses the LC vicinity of K-town and proceeds due east to Objective 2, a distance of 23 km. This avenue is 8 km wide from the LC to the vicinity of the objective where it widens to 10 km

along Highway 6. However, O-town sits almost squarely in the middle of the valley and canalizes movement to the north and south of the town through corridors 3 and 2 km wide, respectively. Two crossover corridors on this avenue, each about 2 km in width, permit lateral movement between this avenue and the northern and southern avenues. Immediately west of Objective 2 the avenue widens to approximately 10 km and a north-south corridor astride Highway 6 permits movement between all three objectives. This avenue will accommodate no more than two brigades abreast, with little room for lateral maneuver, until it reaches Highway 6 where there is room for the commitment of a third brigade.

(3) In the south, avenue C crosses the LC south of L-town and leads east approximately 28 km to Objective 3. This avenue narrows to a width of only 2 km about 4 km east of the LC. Immediately north of L-town there is a supplemental approach (C') feeding into avenue C, providing a second battalion-size corridor of about 3 km width. At this point, avenue C becomes about 5 km wide until it approaches Highway 6 where the corridor running to the north will permit deployment on a 10 km front. Thus, initially, C or C' will accommodate no more than a deployed battalion task force until about midway to Objective 3 where avenue C permits two battalions abreast. In the vicinity of Objective 3 there is sufficient maneuver room to permit the deployment of at least two brigades. Also, the corridor astride Highway 6 will permit movement to the north and south between Objectives 2 and 3.

STEP 3: ANALYZE EACH AVENUE OF APPROACH

The relative merits of each avenue of approach are assessed from the attacker and defender points of view. (Refer to sketch map M.)



(1) Observation (overwatch) and fire. The terrain at and to the east of the LC allows good observation and fields of fire for our forces on avenue A. On the other two avenues our observation and fields of fire are initially somewhat restricted by O-town on avenue B and the defile on avenue C but are good from about the midway point of the objective on both avenues. On the other hand, Threat forces have good observation and fields of fire along all three avenues.

(2) Concealment and cover. None of the essentially valley avenues offer much in the way of concealment and cover to our forces. Conversely, Threat forces occupying the high ground along the BEAR River and the other prominent terrain features in our zone are afforded good cover and concealment.

(3) Obstacles. The BEAR River presents a significant obstacle to our attack all across our zone. The two marshes astride the river north and south of K-town restrict our choice of crossing sites to some extent. O-town presents a significant obstacle in the center of avenue B. while it can be bypassed on the north and south, it prevents the optimum deployment of maneuver units on this avenue. The other towns (N and P) constitute relatively minor obstacles. Avenue C has a narrow (2 km) defile on which Threat forces could emplace supplemental obstacles. Threat employment of nuclear weapons against friendly forces in K-town would effectively block our movement along Highway 3 through that locality; however, the town can be by-passed. Threat nuclear strikes elsewhere on the three avenues would have little effect insofar as terrain alteration is concerned. Avenue A is rated as best for our forces, with B the next best and C the poorest.

(4) Identification and utilization of key terrain. From the 10th Corps standpoint, the key terrain features are the three dominant hills on the west bank of the TIGER River which constitute the objective assigned by Army Group. The most prominent of these three terrain features is the large hill mass between R-town and S-town; this is the decisive key terrain feature. Avenue B leads directly to this high ground and thus is the best avenue in this context. Avenues A and C each lead to less decisive key terrain features. Employment of nuclear weapons against Threat forces on any or all these three hills would effectively prevent their occupation by friendly forces until possible forest fires has subsided and trails are cleared through the fallen timber. At the same time, friendly forces would still control these terrain features and deny their use to the Threat.

(5) Adequacy of maneuver space. All three avenues are less than ideal in this regard. Avenue B is the widest (8 to 10 km) except when it is canalized into two narrow corridors by O-town. Avenue C is restricted initially by a defile 2 km in width. Avenue A, on the other hand, while only 5 to 6 km wide, has no canalizing features and is considered the best of the three, with B the next best

and C the poorest. Crossover corridors will permit north-south movement between each of the three avenues or to shift forces between divisions if appropriate. On the negative side, however, crossover corridors can be used by Threat forces to strike our flanks.

(6) Ease of movement. Avenue B offers the shortest route (22 km) to a final objective; avenue A is 3 km longer and avenue C covers the greatest distance, 28 km. Trafficability is essentially the same on all three avenues except in the marshes along the BEAR River at the northern entrances to Avenues A and C; these can be bypassed in each case. Therefore, the avenues are rated in terms of their length; B, A and C in that order.

From the above assessment it is concluded that Avenue A is the best avenue of approach, followed in order by B and C.

The planner must also consider air avenues of approach for attack helicopters, close air support aircraft and airmobile forces. A good air avenue provides terrain masking from air defense radars and air defense weapons. From the standpoint of terrain and threat, air avenues A and C are equally desirable; B is less desirable.

STEP 4: CONDUCT A WEATHER ANALYSIS

Once avenues of approach are analyzed based on terrain, the forecast weather conditions are applied to assess the effects of weather on the operations in general and the avenues of approach in particular. For our situation, the following conditions apply.

- The month of May is characterized by a series of intermittent high and low pressure systems with the latter bringing periods of rain lasting from a few hours to one or two days. The average rainfall for the month is 7.6 centimeters thus far (as of 23 May) rainfall has amounted to 6.9 centimeters.
- Currently the area is under the influence of a high pressure system which is expected to prevail for another 48 hours. The probability of significant precipitation is less than 20 percent for the next 48 hours, and 50 percent for the ensuing 24 hours.
- Temperatures will range from lows around 2 to 4° Celcius (C) to highs of about 15° C; average daily humidity is expected to be about 65 percent; winds 8 to 15 km per hour, predominately from the southwest.
- Fog occurs occasionally during the early morning hours in the river valleys during this month.

In this regard --

(1) Fog, if it occurs on the morning of the first day of our attack, will prevent the enemy from bringing observed fire on our crossing sites over the BEAR River.

(2) Heavy rains would:

- Make our river crossing operations more difficult, particularly if they were sufficiently prolonged to cause flooding.

- Result in worsened trafficability in the vicinity of the river and impede cross-country movement.
- Degrade both our own and the Threat's surveillance and target acquisition capabilities.

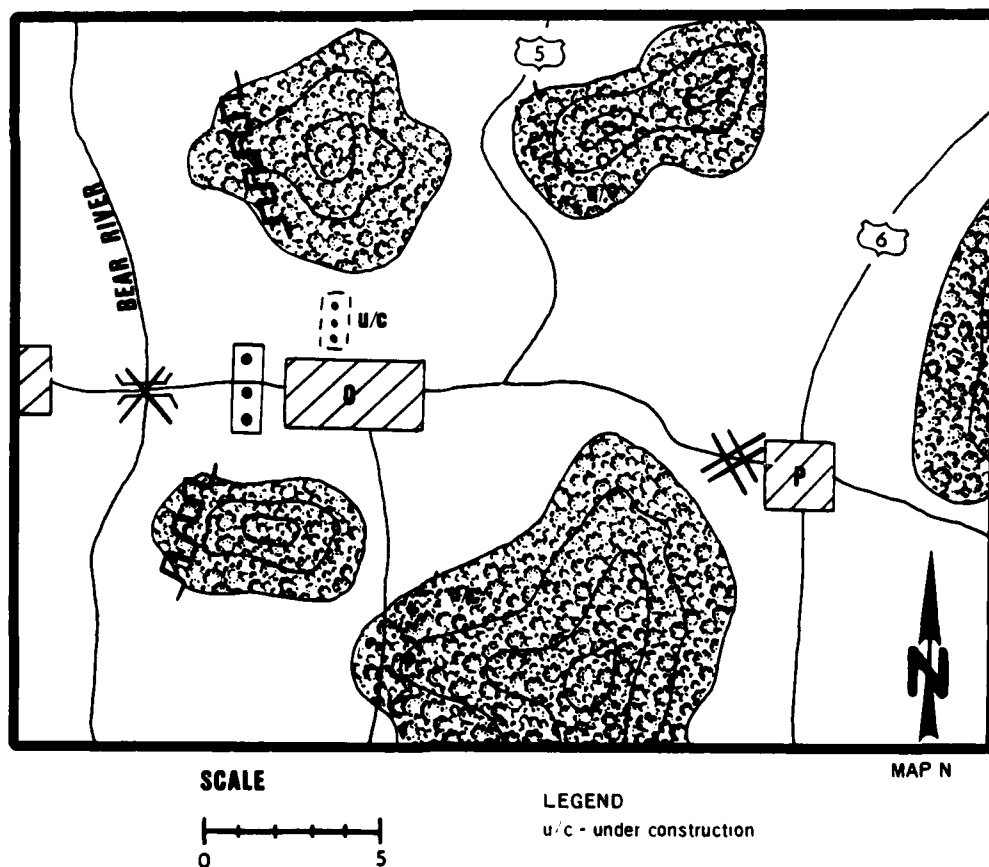
(3) The wind direction favors our use of smoke to screen our movements as well as our employment of non-persistent chemicals; it does not favor the Threat's use of either.

(4) In summary, the expected weather will have an equal effect on all three avenues of approach. The wind direction is in our favor.

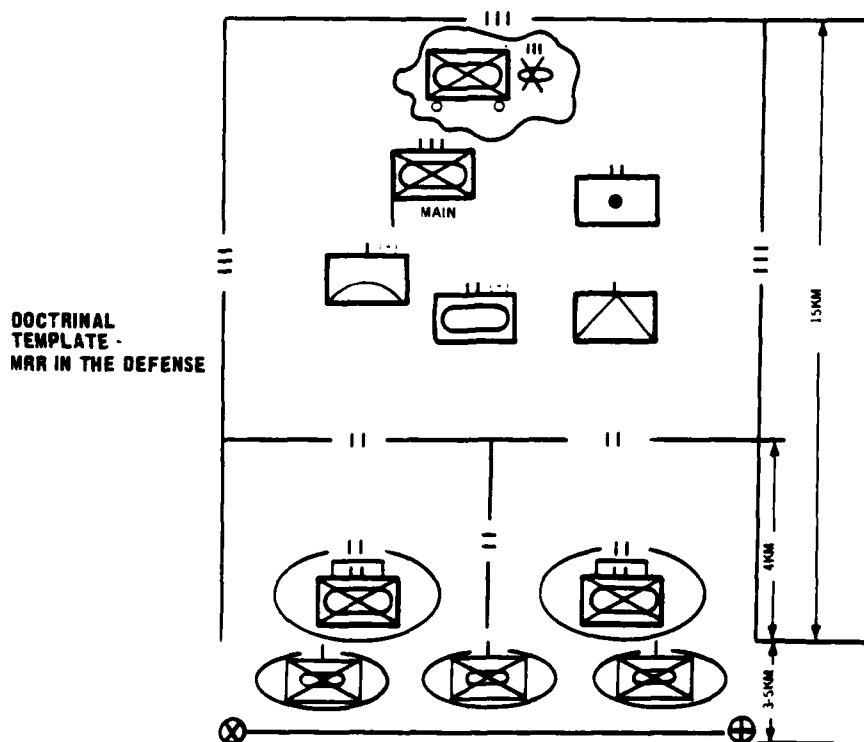
STEP 5: TEMPLATE THE THREAT

Having completed the analysis of terrain and weather, the planner now integrates Threat information, known and estimated (templated), to assess the effects on avenues of approach, to adjust avenues of approach and/or to weigh avenues of approach, when probable Threat strong points cannot be avoided.

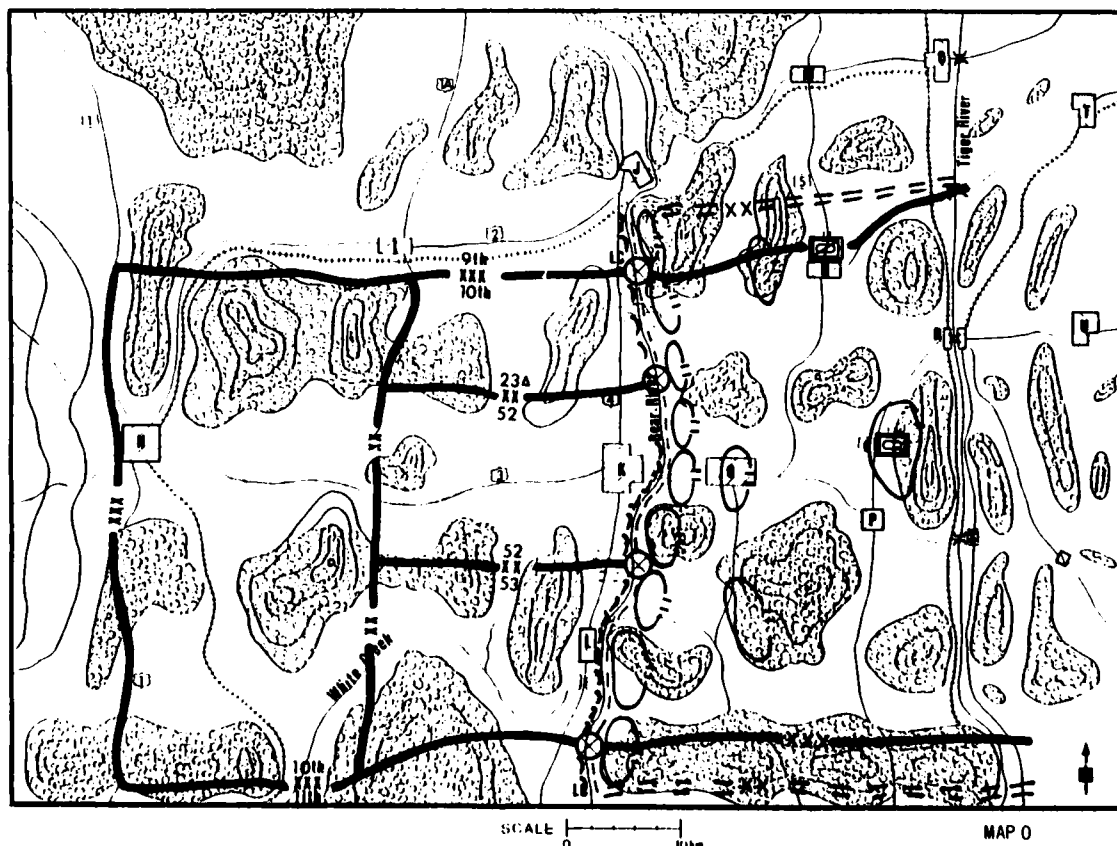
Substep a. Plot known Threat locations. Since the Threat is on the defensive, he is likely to be in static positions and contact is probably being maintained with him. Consequently, some known Threat locations (positions, weapons, minefields and other obstacles; (e.g., sketch Map N) are available through the intelligence annex of the higher headquarters OPLAN/OPORD; determined at planner's level through own collection resources; or found in reports from lower units, units currently in contact and adjacent units.



Substep b. Apply doctrinal templates. Doctrinal templates are nothing more than graphic illustrations of how the Threat would like to fight, according to his doctrine, if he were not restricted and influenced by terrain. They are usually available to the planner as a result of evaluation of Threat doctrine and tactics by intelligence analysts in his unit. However, the planner should also have a thorough knowledge of Threat doctrine and carry a "mental template" in his head of how the Threat is likely to defend in various circumstances. In this regard, Threat defense is usually predictable, in that it consists of fixed belts and echelons, with reserves, artillery and antitank weapons doctrinally positioned. Thus, doctrinally, each forward MRR in the defending Threat MRD, would be expected to be disposed in accordance with the doctrinal template presented below. (NOTE: A corps planner, as does a subordinate planner, templates a minimum of two levels down, i.e., corps planner templates Threat regiments. However, offensive planners, at all levels, should template at least one additional level lower, in an attempt to identify and avoid possible Threat strong points, or to identify areas requiring additional resources to overcome Threat strengths when such strengths are unavoidable.)



Substep c. Develop a situation template. The planner develops a situation template by adjusting the doctrinal template -- about known Threat locations -- to the terrain. At this point it is necessary for the planner to put himself in the place of the Threat commander and consider where he would put his defensive positions if he were defending on this terrain. The known Threat locations provide clues on which the planner can base his situation template development; the Threat order of battle tells him which units are unknown and need to be templated; and the doctrinal template provides guidance as to where unknown units should be under ideal conditions. The planner's task is to use tactical judgment to adjust the positioning to deal with terrain constraints, recognizing that the Threat (as would any defender) will most likely be positioned to reinforce natural and/or artificial obstacles, to provide good observation and fields of fire and to provide reinforcements on an equal basis to any endangered sector of the defense. The end result is the probable situation template depicted by sketch map 0.



The planner has now obtained a different perspective of the avenues of approach, based on the Threat situation and terrain factors, as may be modified by weather. Thus, when he war games his courses of action, he will reassess the avenues accordingly by considering the desirability of each avenue on the basis of terrain and weather and the Threat forces defending each avenue. A conflict in this reassessment will be normal. It will not be unusual to find that the best avenue of approach, based on terrain factors, is also the most heavily defended, since the Threat will have made a similar analysis. As a rule, Threat strength should be avoided. It is usually better to attack Threat weakness on an avenue with less desirable terrain than to try to attack Threat strength on the avenue offering the best terrain advantages, unless some significant combat multiplier, such as surprise, deception or limited visibility, can be used to neutralize the Threat advantage. If two avenues of approach offer equal, or similar, terrain advantages, the Threat situation should predominate as the deciding factor.

On the other hand, on the integrated battlefield, since the Threat must also disperse to reduce his vulnerability, a smaller force, e.g., a battalion task force, supported by effectively integrated nuclear fires and other reserves can accomplish missions which in the past were assigned to larger forces. Stated another way, the availability (and authority to employ) nuclear weapons may result in a course of action being feasible; whereas, in a non-nuclear situation it would not be.

STEP 6: CONSIDER FRIENDLY FORCES

Substep a. List available resources. The planner lists the resources available -- organic, attached and OPCON from higher formations.

(1) Maneuver forces:

- 1 Armored Div;
- 2 Mechanized Divs;
- 1 Cav Regt.

(2) Fire support:

- 10th Corps Arty:
 - 2 FA Bdes (1 155mm Bn; 2 8-in Bns; 1 Lance Bn);
 - 71st Fa Bde (2 155mm Bns; 1 8-in Bn);
- 1 Atk Hel Bn;
- Close Air Support:
 - oo 80 sorties per day.

(3) Combat multipliers: (tangible and intangible)

- Combat service support -- ability to preposition based on a known attack date should enhance our sustainability and staying power as compared to a weakened threat in corps' sector.
- Nuclear and chemical weapons -- the large number of nuclear delivery systems and a wide range of yields favor friendly forces. The wind direction hampers Threat use of non-persistent aerosols.
- Smoke -- wind direction favors friendly use of smoke on flanks and along the high ground to decrease Threat observation and fire capabilities.
- FASCAM -- can be used in economy of force operation on flanks.
- STANO devices -- enables attack at night increasing surprise effects and hindering enemy fires.
- Deception -- dummy radio traffic, radio silence, staggering division attack times, et al, aid in deceiving enemy concerning the avenue containing main attack.

Substep b. Force capability. Identify the combat capability and effectiveness of friendly forces in the following areas:

- (1) Personnel and materiel strengths;
- (2) Types of equipment available;
- (3) Degree of mobility possible;
- (4) Availability of nuclear and chemical ammunition;
- (5) Combat service support status;
- (6) Effectiveness of command control headquarters;
- (7) Level of training in units;
- (8) Ability of subordinate commanders;
- (9) Morale and condition of the soldiers.

Substep c. Draw tentative (general) conclusions concerning relative combat power. Having completed Threat and own capability assessments, back-to-back, the planner may mentally draw some tentative conclusions concerning relative combat power, at this time, to be considered in war gaming COAs.

Section VIII. IDENTIFICATION OF THE HOW ELEMENT OF
AN OFFENSIVE COURSES OF ACTION

STEP 7: FORMULATION OF FEASIBLE COURSE OF ACTION

The ability to formulate feasible courses of action depends on the planner's tactical judgment applied to his analysis of the mission, enemy, terrain and weather and troops available (METT).

The planner, in this example, might formulate two courses of action.

COA "1".

Attack with 3 divisions abreast with the main attack in the center (avenue B) and supporting attacks in the north and south (avenues A and C); the corps ACR is attached to the center division.

COA "2".

Attack with three divisions abreast with the main attack in the north (avenue A) and supporting attacks on the center and southern avenues (B and C); the corps ACR attached to the division in the north.

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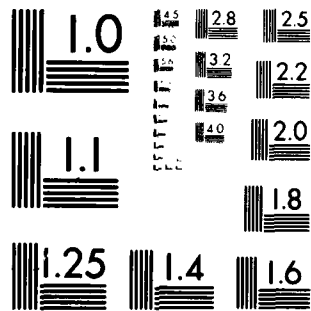
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STEP 8: ANALYZE (WAR GAME) EACH COURSE OF ACTION

Each feasible course of action must undergo analysis and be subjected to possible refinements to enhance - the strengths and/or reduce - the weaknesses. In addition to the positioning of the maneuver divisions and the ACR, the other elements that contribute to overall combat power (e.g., combat support, combat service support and the other combat multipliers).

COA "1".

Substep a. Mission-essential tasks. The mission-essential tasks are derived from analysis of the mission.

(1) TASK: Attack at 232400 May and secure the high ground on the west bank of the TIGER River in zone.

DISCUSSION: The planner allocated a US division of 12 Bns to each avenue guarded by a Threat MRR (3 Bn) equivalent). The corps ACR (3 battalion equivalents) supplements the 52d Mech Div in the main attack on avenue B. The initial force ratios (before commitment of the Threat Tank regiment) is 4:1 on avenues "A" and "C" and 5:1 on avenue "B". The main attack and the resultant concentration of firepower assets on the center avenue should allow the 52d Mech to advance on both sides of O-town bypassing (penetrating) the MRR and subsequently engaging the Threat tank regiment. At worst, the friendly to Threat force ratio will be 3:1; at best (assuming penetration of the MRR with most of the 52d Mech) about 4.5:1. The force ratios of 4:1 on avenues A and C allow progress on both avenues. If the Tkr can be deceived into commitment on A or C, the 52d Mech will have a relatively easy route to Objective 2.

EVALUATION: Ø (neutral)

(2) TASK: Destroy the enemy in zone.

DISCUSSION: The 52d Mech can anticipate some difficulty in bypassing O-town and in the destruction of forces in the town. While this task must be accomplished regardless of the COA selected, its accomplishment on the main attack avenue will tend to dilute the efforts of the division in attaining Objective 2.

EVALUATION: - (weak)

(3) TASK: Prepare to attack to the east.

DISCUSSION: COA "1", with the main attack on avenue B results in the seizing of Objective 2. After consolidation, the 52d Mech and ACR would be well positioned for attack to east.

EVALUATION: Ø

Substep b. Other key (significant) factors. Various other key factors affecting the overall course should also be evaluated.

(1) FACTOR: Can the COA be accomplished without the use of nuclear and/or chemical weapons?

DISCUSSION: The friendly forces have an overall force ratio of about 39 battalions to 10 battalions or 4:1. Accordingly, unless the Threat employs nuclear and/or persistent chemical weapons, the COA can be successfully accomplished without reliance on friendly use of nuclear/chemical weapons.

EVALUATION: Ø

(2) FACTOR: Does the COA provide all-around security?

DISCUSSION: The use of organic and attached attack helicopter assets, organic divisional cavalry squadrons and the use of FASCAM and other hastily emplaced obstacles should provide adequate security against the flank and crossover approaches on each avenue.

However, Threat forces have a strong defensive point at O-town from whence they can engage the flanks of the divided attacking forces. Risks due to anti-tank weapons are greatest on avenue B.

EVALUATION: Ø

(3) FACTOR: Does the COA provide opportunity for deception? Surprise?

DISCUSSION: Surprise could be attained in two possible areas: time of attack and location of main attack. The timing of the attack could surprise the Threat if the preparation fires are limited (and perhaps preceeded by several similarly sized artillery and air strikes during the period of 24-36 hours before the attack). The enemy could be deceived regarding the main attack axis by orienting preparatory fires on avenues A or C; minimizing use of radios on main attack axis; employing dummy or decoy radio transmissions on avenues A or C; etc. Attacking during hours of darkness will also add element of surprise.

EVALUATION: +

(4) FACTOR: Does the COA afford sufficient flexibility to provide a balance between mass and dispersion?

DISCUSSION: The COA affords flexibility to provide the requisite balance between mass and dispersion. The formations likely to be adopted by the attacking divisions, i.e., two brigades abreast on Avenues A and B and a column of brigades initially on Avenue C are inherently flexible. Further, the corps zone contains numerous mobility corridors which facilitate movement into and out of each avenue of approach. However, care must be exercised during the attack to insure that battalion task forces concentrate only as required by the factors of METT; concentration must be accomplished rapidly and dispersion just as rapidly.

EVALUATION: +1

(5) FACTOR: Does the COA afford sufficient flexibility to address various threat arrays?

DISCUSSION: As noted under mission-essential tasks, the worst anticipated force ratio would be about 3:1.

EVALUATION: +1

(6) FACTOR: Can the COA be accomplished effectively in darkness and/or adverse weather conditions?

DISCUSSION: Friendly armor and mechanized forces equipped with night vision equipment possess a significant advantage over Threat forces. In addition, attacking during darkness (the attack commences at 2400) will serve both to surprise the defender and to reduce the effectiveness of his weapon systems.

EVALUATION: +

(7) FACTOR: Does the COA allow decentralized execution?

DISCUSSION: The attack by the corps consists essentially of three independent battles, one on each axis of advance.

EVALUATION: +

STEP 9: COMPARE COAS AND SELECT BEST ONE

The foregoing analysis is repeated for COA "2" and the compliance with or satisfaction of essential tasks and key factors compared. The main attack on the least restrictive avenue of approach, A, has a greater likelihood of quick penetration of the Threat than did COA "1" with the main attack on avenue B. Further, there is no single strong defensive position on avenue A (as compared to O-town on avenue B); the losses on avenue A should be less for COA "2" than for COA "1". Accordingly, mission-essential task 1 is increased to + because the mission of attaining the objective can be accomplished more quickly and with fewer losses. All-around security is also upgraded to +. The remainder of the factors for COA "2" are rated essentially the same as for COA "1".

The foregoing factors (representative but not all inclusive) can be summarized on a matrix as shown below.

FACTORS	COURSE OF ACTION	
	1	2
MISSION-ESSENTIAL		
(1) Secure high ground	Ø	+
(2) Destroy enemy	-	-
(3) Prepare to attack east	Ø	Ø
OTHER KEY		
(1) Need nuclear/chemical?	Ø	Ø
(2) All-around security?	Ø	+
(3) Deception, surprise?	+	+
(4) Balance between mass and dispersion?	+	+
(5) Flexibility?	+	+
(6) Darkness?	+	+
(7) Decent. execution?	+	+

STEP 10: REFINE CHOSEN COURSE OF ACTION AND ISSUE
CONCEPT AND PLANS/ORDERS

The elements of WHAT, WHEN, WHERE and HOW are present in the chosen course of action (COA). The preferred COA is selected or approved by the commander, normally based on the staff's recommended COA. Before the decision is understandable as a concept, it normally must also include the elements of WHO (the command itself or, when the entire command is not involved, the appropriate elements of the command) and so much of the WHY (purpose to be attained and the reasons therefor) as are necessary for understanding.

At this point, the various steps involved in the formulation and selection of feasible courses of action and the commander's (staff's) estimate of the situation have been accomplished; refinement (and revision, where necessary) will continue throughout planning and execution.

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U.S. Army Infantry School

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U.S. Army Intel Threat Analysis Detachment

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U.S. Army Intelligence Ctr & School

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U.S. Army Materiel Dev & Readiness Cmd

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U.S. Army Materiel Sys Analysis Actvy

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U.S. Army Mobility Equip R&D Cmd

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U.S. Army Nuclear & Chemical Agency

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ATTN: MONA-ZB, D. Panzer
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U.S. Army TRADOC Sys Analysis Actvy

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USAMICOM

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V Corps

Department of the Army

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ATTN: Commander
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VII Corps

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DEPARTMENT OF THE NAVY

Anti-Submarine Warfare Sys Proj Ofc

Department of the Navy

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Charleston Naval Shipyard

ATTN: Commanding Officer

Cruiser Destroyer Group One

Department of the Navy

ATTN: N321

David Taylor Naval Ship R&D Ctr

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ATTN: Code 1750, W. Conley
ATTN: Code L42-3
ATTN: Code 174
ATTN: Code 1750, J. Sykes

Joint Cruise Missiles Project Ofc

Department of the Navy

ATTN: JCMG-707

Marine Corps

Department of the Navy

ATTN: DCS (P&O) Strategic Plans Div
ATTN: DCS (P&O) Requirements Div
ATTN: Code OT00-31

Marine Corps Dev & Education Command

Department of the Navy

ATTN: Commander

Naval Air Development Ctr

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Naval Air Systems Command

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Naval Intelligence Command, HQ

ATTN: NIC-01

DEPARTMENT OF THE NAVY (Continued)

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ATTN: MAT-00N
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Naval Research Lab
ATTN: Code 2627

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ATTN: SEA-06H2
2 cy ATTN: SEA-6431G, H. Seguire

Naval Submarine Base
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ATTN: Commanding Officer

Naval Surface Force, Atlantic
ATTN: Commander

Naval Surface Force, Pacific
ATTN: Commander

Naval Surface Weapons Ctr
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ATTN: Code X211
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ATTN: Code F32, W. Emberson

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Naval War College
ATTN: Code E-11, Tech Service
ATTN: I2
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Naval Weapons Ctr
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ATTN: Code 32607, L. Thompson

Naval Weapons Evaluation Facility
ATTN: G. Binns
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Newport Lab
Naval Underwater Systems Ctr
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Department of the Navy
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Nuclear Weapons Tng Group, Atlantic
Department of the Navy
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Sixth Fleet
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ATTN: Commander

Surface Warfare Development Group
Department of the Navy
ATTN: Commander

DEPARTMENT OF THE NAVY (Continued)

Surface Warfare Officers School Cmd
Department of the Navy
ATTN: Combat Systems Dept

Commander-in-Chief
U.S. Atlantic Fleet
Department of the Navy
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ATTN: Code N-3
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U.S. Naval Air Forces
Pacific Fleet
ATTN: Commander

U.S. Naval Air Forces
Atlantic Fleet
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Commander-in-Chief
U.S. Naval Forces, Europe
ATTN: N326
ATTN: N54

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ATTN: Commander
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U.S. Navy Seventh Fleet
ATTN: Commander

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U.S. Submarine Force
Atlantic Fleet
Department of the Navy
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U.S. Submarine Force
Pacific Fleet
Department of the Navy
ATTN: Commander

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Air Force Academy
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DEPARTMENT OF THE AIR FORCE (Continued)

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Air Force Weapons Lab
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Air University Library
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Intelligence
Department of the Air Force
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Studies & Analyses
Department of the Air Force
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Ballistic Missile Office
Air Force Systems Command
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Department of the Air Force
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Department of the Air Force
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Rapid Deployment Joint Task Force
Department of the Air Force
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Tactical Air Command
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Tactical Air Command
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ATTN: TAC/OR

Tactical Air Command
Department of the Air Force
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DEPARTMENT OF THE AIR FORCE (Continued)

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Department of the Air Force
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Department of the Air Force
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Tactical Air Command
Department of the Air Force
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Tactical Air Command
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Tactical Air Command
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Commander-in-Chief
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Commander-in-Chief
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Sandia National Lab
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