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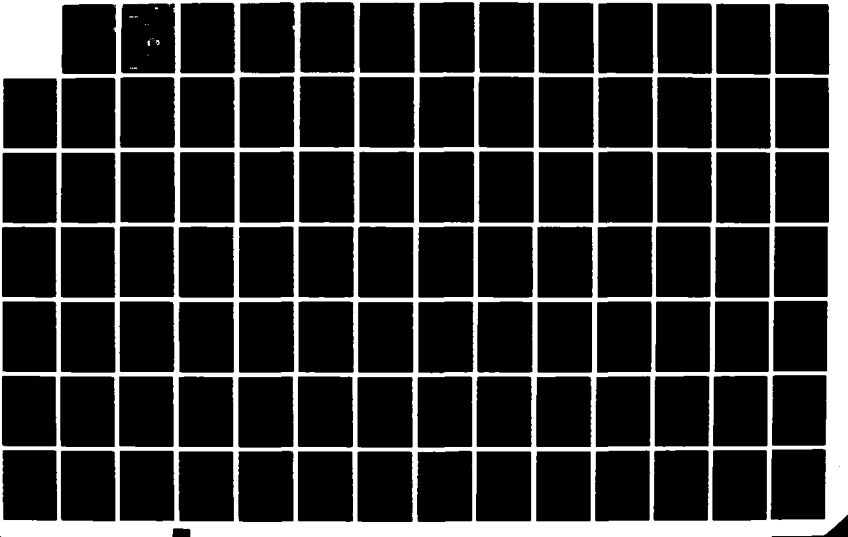

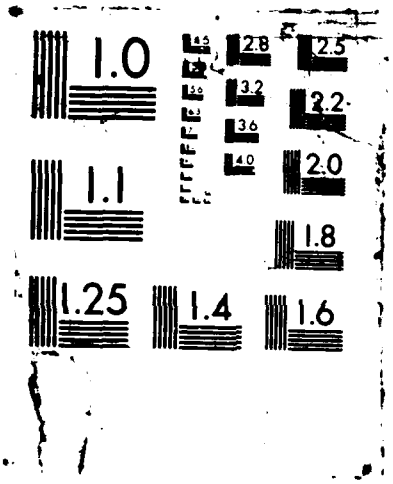
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A RAND NOTE

AD-A191 038

# Applying the National Training Center Experience: Tactical Reconnaissance

Martin Goldsmith with James Hodges

October 1987

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# A RAND NOTE

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# Applying the National Training Center Experience: Tactical Reconnaissance

Martin Goldsmith with James Hodges

October 1987

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The United States Army

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Many observers have noted shortcomings in tactical reconnaissance during battles at the National Training Center. This study systematically examines battle data from two sources: Take-home packages prepared for unit remedial training, and field data specifically collected for the present study. The author finds a clear correlation between success in offensive missions and reconnaissance. However, data indicate that essential reconnaissance tasks are accomplished in only half the battles studied. Generally, units do not exploit all the assets potentially available for reconnaissance. Task forces do not seem to give emphasis to the reconnaissance task. Review of doctrinal literature and courses of instruction indicate that added emphasis needs to be placed on reconnaissance in the Army training system. The author makes specific recommendations for changes in doctrine and for additional instruction. He also suggests several equipment changes and additions, as well as courses of action for task force commanders and staffs.

# PREFACE

This Note reports on one phase of an ongoing project at the Arroyo Center. The goal of the overall project is to apply the experience and information gained at the National Training Center (NTC) at Fort Irwin, California, to problems beyond the NTC's mission of training. Relevant matters might be doctrine, materiel development, or other factors for which the NTC "laboratory" can offer data and insights otherwise unobtainable.

Other Notes in this series have dealt with the problems of deriving and disseminating lessons from the NTC, methodologies for conducting research using the NTC data system,[1] and the problem of fratricide by indirect and direct fire as observed in training engagements.[2]

The problem examined here is battlefield reconnaissance at the battalion task force level. The study deals with the influence of reconnaissance on the battle outcome, and the methods used by task forces to gain combat information. It then examines the doctrine, training, and equipment employed by the U.S. Army to conduct reconnaissance at the battalion level. The Note concludes with recommendations intended to improve the reconnaissance capability of heavy mechanized infantry and armor task forces.

## The Arroyo Center

The Arroyo Center is the U.S. Army's Federally Funded Research and Development Center for studies and analysis operated by The RAND Corporation. The Arroyo Center provides the Army with objective, independent analytic research on major policy and management concerns, emphasizing mid- to long-term problems. Its research is carried out in

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[1]N-2461-A, *Utilizing the Data from the Army's National Training Center: Analytical Plan*, R. A. Levine, J. S. Hodges, and M. Goldsmith, June 1986.

[2]N-2438-A, *Applying the National Training Center Experience--Incidence of Ground to Ground Fratricide*, M. Goldsmith, February 1986.

five programs: Policy and Strategy; Force Development and Employment; Readiness and Sustainability; Manpower, Training, and Personnel; and Applied Technology.

The Army sponsor for the NTC project is the Combined Arms Training Activity (CATA) at Fort Leavenworth. CATA identified tactical reconnaissance as a priority issue.

Army Regulation 5-21 contains basic policy for the conduct of the Arroyo Center. The Army provides continuing guidance and oversight through the Arroyo Center Policy Committee, which is co-chaired by the Vice Chief of Staff and by the Assistant Secretary for Research, Development, and Acquisition. Arroyo Center work is performed under contract MDA903-86-C-0059.

The Arroyo Center is housed in RAND's Army Research Division. The RAND Corporation is a private, nonprofit institution that conducts analytic research on a wide range of public policy matters affecting the nation's security and welfare.

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## SUMMARY

During training exercises at the National Training Center (NTC), it has frequently been noted that Blue units enter battle with inadequate reconnaissance information. It was suspected that this lack of combat information is a factor leading to failure in offensive missions. It was the purpose of the present study to examine the importance of reconnaissance to success in the offense, and to analyze the conduct of reconnaissance by training units. Two sources of data were used: the written take-home packages prepared by the Operations Group of the NTC to guide remedial training and data taken in the field for this study by observer/controllers.

Analysis of take-home package information covering over one hundred battles showed a strong correlation between successful reconnaissance, leading to accurate knowledge of enemy defensive positions, and a favorable outcome of offensive missions. As expected, the data show that reconnaissance is more frequently successful in deliberate attacks, as compared with movements to contact/hasty attacks. In the case of opposing force (OPFOR) regimental attacks, the correlation between successful reconnaissance and successful attacks is even more pronounced. Thus the importance of reconnaissance is demonstrated, and the perception that training unit reconnaissance lacks consistency is apparently accurate.

To examine the details and causes of these results, a method of recording observer/controller observations was devised and employed in approximately fifty battles. The data show that the major targets of reconnaissance, such as enemy positions and obstacle systems, were located only about one-half the time by the training forces. Lower priority (yet important) tasks, such as route reconnaissance, were accomplished even less frequently.

Causes of inadequate reconnaissance include failure to avoid the enemy during scouting, not using task force assets such as artillery observers to supplement the scouts, and not maximizing the use of time. Overall, the data suggest that task forces fail to place adequate emphasis on the reconnaissance mission.

Because the take-home package data showed that the OPFOR were generally successful in their reconnaissance efforts, we studied and report on their methods. The value of observation posts established during reconnaissance was clearly apparent. OPFOR's constant practice and familiarity with the situation accounts for much of their success, although their use of wheeled reconnaissance vehicles (which U.S. heavy battalions do not use) offers additional advantage.

To identify how Blue unit reconnaissance problems could be overcome in training, we reviewed pertinent doctrine and individual training. In the manual basic to battalion operation, FM 71-2, we found a lack of emphasis on the importance of reconnaissance to the attack, and little guidance for the planning of reconnaissance/surveillance. The role of assets other than the scouts in reconnaissance was not underlined. In FM 34-80, the primary manual for intelligence operations at the battalion level, there was a notable lack of emphasis on methods for offensive missions. The scout platoon manual, FM 17-98, emphasized cavalry operations, as contrasted to task force reconnaissance. A review of the programs of instruction in the courses that produce the key players in the battalion reconnaissance mission revealed that little time is devoted to reconnaissance-specific skills.

Our conclusions from the various sections of the Note are summarized in the final section, together with specific recommendations for correcting some of the problems. These include suggestions for improvement of doctrinal manuals, the addition of special courses for individuals who are assigned to reconnaissance functions, and some changes and additions to equipment. Overall, we conclude that greater emphasis should be placed on the reconnaissance function by task force commanders.

## ACKNOWLEDGMENTS

The authors wish to express deep appreciation to the Operations Group of the National Training Center. It was only through their cooperation that the data for this study could be collected. In particular, Colonel Jerrod Robertson outlined what would be needed to evaluate the success of a mission. Captain Richard Ng provided a concise means of establishing the degree of success of a scouting task. Members of the mechanized infantry (Scorpion) and armor (Cobra) training teams who recorded data in the field contributed heavily to the work. Captain John Hadjis provided many insights into the problems encountered by scout platoons. The authors are grateful to the battalions composing the OPFOR regiment, the 6-31 Infantry and the 1-73 Armor, for their hospitality in the field and for the knowledge they freely shared. The advice of Lieutenant Colonel James Crowley, then of the NTC observation cell of the Center for Army Lessons Learned, was invaluable at the initiation of the project.

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# I. INTRODUCTION

It is not necessary to prove to practitioners of the military arts and sciences the value, indeed the necessity, of knowledge of the enemy if one is to prevail on the battlefield. The classic writings emphasize intelligence and the benefits of counter-intelligence (surprise) as a fundamental principle. Although these writings generally are concerned with the strategic context, the value of intelligence in tactical situations is increasingly appreciated in modern doctrinal writings.[1] Regardless of author or army, the relative priority of intelligence may vary as compared with other aspects of battle, but its worth is never denigrated. It is difficult to determine from the literature a quantification of its value. If it is an item of major importance at the tactical level, the experience of units training at the National Training Center (NTC) should reflect that fact.

The NTC may be unique among training facilities in that it pits the unit being trained (Blue) against an in-place, skilled opposing force (OPFOR) in situations where both forces are able to react to the initiatives of the other. The scenarios are only loosely set; thus the opportunity (indeed the necessity) for reconnaissance and counter-reconnaissance is present. But opportunity does not equate to actuality--is reconnaissance an important part of the NTC war game?

Fortunately, there are numerous sources to give us guidance. For example, the professional literature of the U.S. Army carries an increasing number of articles dealing with the NTC. In the past several months, a former OPFOR officer has written on the importance of reconnaissance planning and the necessity for counter-reconnaissance (Refs. I.1, I.2) at the NTC. The author mentions how often the OPFOR were able to see into Blue positions, and how seldom the reverse was the case.

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[1]For example, consider this quotation from FM 71-2J (Ref. I.3, p. 4-10): "If the attacker knows the defender's disposition, any defense will fail."

A developing series of U.S. Army Training and Doctrine Command (TRADOC) products emphasize lessons learned from the NTC, and the topic of reconnaissance is seldom overlooked. To underscore the point, in Ref. 1.4, a former commander of the NTC writes, "The importance of reconnaissance cannot be overemphasized. There is typically a battle which precedes the battle--a confrontation of opposing reconnaissance units--and the winner of that preliminary battle is most often the victor in the main event." Clearly reconnaissance is seen as a major aspect of NTC play by this experienced observer. Moreover, he indicates that reconnaissance is an important factor in the outcome of the overall battle. However, because a factor is important does not mean that there is a problem with it or that it is a worthy topic for research. What further indicators do we have?

Arroyo Center observers have been present at many battles and subsequent After Action Reviews (AARs) at the NTC. The AARs are generally organized according to the seven operating systems of FM 71-2J (Ref. I.3), and the intelligence system is covered with the others. These reviews frequently mention OPFOR reconnaissance success, whereas the regular observer receives the impression that BLUFOR (the training units) success is less consistent. Discussions with members of the observer/controller teams of the Operations Group have substantiated our impressions. These officers detect continuing failures of the BLUFOR intelligence system, and have expressed concern that the failures may result from systematic shortcomings in the doctrine and the training of our forces.

Other experienced observers have made similar judgments. In Ref. I.5, Enclosure 10, Lieutenant Colonel James Crowley begins his discussion of the offense by stating, "A frequent and major problem is a lack of reconnaissance prior to the attack, to find out enemy disposition and particularly the location and extent of the obstacles." If units are not carrying out the reconnaissance function in a satisfactory fashion, it would also be useful to study the details as seen at the NTC, to provide guidance for the future. Is there a reasonable expectation for successful accomplishment of such research?

Again, we turn to the writings of past observers. Enclosure 5 of Ref. I.5 contains specific suggestions for the conduct of battlefield intelligence operations, to overcome perceived deficiencies. Another report of NTC observations by a Combined Arms Training Activity (CATA) team (Ref. I.6) makes several recommendations for improvements in reconnaissance, and points out basic organizational and training problems. In a seminar conducted by a senior NTC observer/controller (Ref. I.7), the problem of coordination and utilization of reconnaissance assets was underlined. Reference I.8 summarizes the observations of several teams, and comes to conclusions on matters of organization, equipment, and training of the reconnaissance elements of the rotational battalions. The fact that these observers were able to analyze the problems exhibited at the NTC to some level of detail indicates that it should be possible to conduct there a methodical program of research covering the reconnaissance function.

We have determined that some experienced Army officers are convinced of the importance of reconnaissance and that our units are not doing as well as we would like in that arena. It also appears that the NTC offers the possibility of conducting meaningful research on the topic. Further, the Army system beyond the NTC shares these perceptions. The issue has surfaced in several items on BattleNet (a now-discontinued sub-net of the Army ForumNet computer system, devoted to NTC-related matters). In July 1986 the Director of the Center for Army Lessons Learned (CALL) named battalion and brigade reconnaissance a priority issue for study by his organization (Ref. I.9). Less formally, a number of senior officers, active and retired, have expressed their concern that the present Army is less able to carry out reconnaissance tasks than was the case in former times; a variety of anecdotes have been offered to support these concerns.

Thus, the basis for beginning this investigation of reconnaissance/scouting as carried out at the NTC lies in the observations and opinions of diverse members of the Army family. It is the purpose of this work to develop data which can illuminate the following sorts of questions:

- What relationship is there between battle success and reconnaissance at the NTC?
- How frequently does reconnaissance fail?
- How have Blue units carried out their scouting mission?
- What actions differentiate successful from unsuccessful reconnaissance?
- How does the OPFOR conduct reconnaissance?
- What is the current U.S. doctrine guiding reconnaissance? If there are shortcomings, what are they?
- How is training for reconnaissance/scouting accomplished?
- What equipment changes are indicated by the NTC experience?

These issues are discussed below, in approximately the order given. We analyze the first two points using data from written take-home packages prepared by the NTC Operations Group. We explored those same points, plus the following two, with field data taken for our study by members of the OPs Group.

The data clearly indicate the correlation between successful attacks and successful reconnaissance, for both the training units and the OPFOR. The field data support the take-home packages and yield an understanding of what is and is not accomplished during reconnaissance--frequently the most fundamental information needs are not satisfied. Because the units often do not exploit the assets available to them (including the asset of time), one senses that reconnaissance is not being emphasized by commanders. The root of this problem appears to lie in a lack of emphasis on the topic in doctrinal manuals and in courses of instruction, according to the reviews we have conducted. If these findings are accepted, the U.S. Army can fairly inexpensively increase its combat effectiveness.

# II. ANALYSIS OF NTC BATTLE HISTORIES

The members of the Operations Group and the OPFOR at the NTC commonly perceive that effective reconnaissance is an essential element of battlefield success. We next explore this perception using data routinely available from the NTC.

Although a great deal of information and many observations are collected during each battle at the NTC, much is used only during the After Action Review (AAR) process. Unless special measures are taken to preserve such information, it is ephemeral and not available for research. Of the great deal of useful material preserved, three rich sources immediately come to mind. The first is the taped record of the battle as seen on the Core Instrumentation Subsystem (CIS). This record deals largely with fire and maneuver, and might be useful for a study of scouting technique, but does not offer insights into the overall mission of reconnaissance (by recording what is and is not discovered). The second source is the videotape record of the Task Force AAR. Here it is quite common to find the reconnaissance mission discussed, as part of the intelligence operating system. By reviewing a large number of AAR tapes, it might well be possible to uncover the relationships between reconnaissance and battle results. The third source is the written portion of the take-home package that is prepared by the Operations Group for the use of the rotating unit in conducting remedial training. This report, which we will refer to as the THP, has evolved in format through the years, and is becoming ever more useful for research purposes.

Beginning with rotation 85-14, the format of the THP includes the following in the annex for each battle. It begins with a mission statement/commander's concept in which the scope and intent of the mission are described. This is followed by a narrative summary of mission execution. There are limitations to the utility of these sections, first because they are brief, and second because the graphics are not included in the copies available for research. If one were to try to fully understand the tactical lesson that might reside in the

battle, these shortcomings would be fatal. However, it is generally possible to discern the nature of the outcome. Fortunately, even this limited information has proven to be useful for our preliminary analysis of reconnaissance and battle results. The next section of the annex is a series of tables of forces and losses, including the sources of kills. Thus, there are quantitative data pertinent to the outcome of the battle, which are a valuable supplement. The following, and most extensive, section deals with the impact of the operating systems on the mission, in narrative form. Generally, intelligence and maneuver are the first discussed, moving on to fire support, air defense, etc. The annex ends with a summary of AAR comments organized according to the operating systems.

From our examination, THPs appeared to be a prime source of data to explore the relationship between the quality of reconnaissance and the outcome of battle. However, to go beyond a simple reading of the THP narrative, a framework for correlating information is necessary. Discussion with knowledgeable NTC staff and study of military writings suggest that there is a strong relationship between success in reconnaissance and success in offensive operations. The extreme statement of this relationship is that if the reconnaissance is successful, the attack will be successful, and if the reconnaissance fails, the attack will fail. While probably no one believes that this statement is invariably true, support for the hypothesis is sufficiently strong that it was chosen as a working framework to be tested by an examination of the data.

The use of reconnaissance in the offense is emphasized for reasons that are fairly clear. The defenses we are dealing with at the NTC tend to rely on position, and are subject to pre-battle observation. The offense tends to rely more on maneuver, which can only be clearly discerned once it is under way. (This is not true of the meeting engagement, of course, where the situation is fluid for both sides.) Thus, the job of the attacker is to discover the defensive situation, and the job of the defender is to prevent the attacker from doing so. Active reconnaissance by the defense generally begins only with the initiation of the battle.

With the above hypothesis--that there is a one-to-one relationship between reconnaissance and success in the attack--it is a simple matter to devise a procedure for methodical review of the THPs. As has been previously discussed, the reconnaissance mission is associated with the attack. Conversely, the counter-reconnaissance mission is associated with the defense. (In actuality, both attack and defense must contain elements of both missions.) What we have done is to examine each battle from the point of view of the attacker; those training missions directed toward a defense by the Blue force are considered as OPFOR attacks. As well as can be done by examination of the narratives and the tables in the THPs, we determine whether the attack has been a "success."

What constitutes a success is not wholly objective. It depends on the mission statement. It depends on the final force ratios. It depends on the coherence of the unit at the end of the exercise, and its ability to continue to fight. We do not claim to have an objective measurement to be applied in a mechanical fashion to the data in the THP. Unlike the tables, after all, the THP narratives contain a measure of subjectivity themselves. Nonetheless, this process was used for both OPFOR and Blue force attacks. Success was generally considered to include placing forces on the mission's terrain objective. To be judged an offensive success, the defender should be reduced to ineffectiveness, while the attacker retains coherent combat power. If both forces are reduced to ineffectiveness, the outcome is judged a standoff.

We reviewed Blue's intelligence operating system as well. More than reconnaissance is involved. Usually there is coverage of what the command staff of the task force does with the developed intelligence. If the information has been obtained and communicated, we would class the reconnaissance as successful, even if the command and control system of the task force were such that the information was never used. We regard knowledge of the defensive positions and obstacle systems as essential. With no quantitative measures of success available, our judgments of the reconnaissance effort may be even more subjective than those of the overall mission. However, for this preliminary analysis, we believe the accuracy of the method to be satisfactory. There are only limited cross-checks to which we can subject the data. However,

the principal author personally observed certain of the battles, either in the company of the Operations Group or with the OPFOR. In every such case, the author compared his field notes against the result discerned from the THP. Also, a limited number of independent observations were compared with THP battle results. In each case where comparison was possible, the two sources agreed.

The data for OPFOR reconnaissance must be obtained in a somewhat indirect fashion. Because it is not the purpose of the THP to review OPFOR performance, it is necessary to infer information by considering the reported performance of the Blue force in conducting counter-reconnaissance. We have gained a good understanding of how the OPFOR conducts reconnaissance (see Sec. V). Their efforts seldom fail because of internal problems--if their reconnaissance fails, it is because the Blue counter-reconnaissance has killed, captured, or neutralized the OPFOR. Therefore, one can have a high degree of assurance that if it is noted in the THP that OPFOR elements penetrated the Blue sector, and were not destroyed, the OPFOR began the battle with good combat information. On the other hand, we find that when the OPFOR reconnaissance is countered, that fact seems to be noted in the THP.

With the techniques outlined above, we were in a position to record for each battle whether the attack was a success or a failure, and whether or not the reconnaissance was successful. As the collection of battles was reviewed, we found that the issues seemed fairly clear in most cases. However, in a number of battles, it was simply not possible to judge which side prevailed, and here we call the result a standoff. Sometimes it was not possible to tell from the narrative whether the reconnaissance was successful or not. In such cases we have simply recorded the results as "unclear." Such a battle cannot be used for our correlation; it is a non-data point.

A change in format occurred with the THP issued for rotation 85-14. Subsequently, further improvements have been made in the THP format, but these do not affect the extraction of the data we are concerned with here. Our data have been taken from a set of 17 THPs (17 task forces) ranging from rotations 85-14 through 86-10. This represents the total collection available to the Arroyo Center as of November 1986. One hundred thirteen force-on-force battles are included in the 17 sets. We

did not use data from the live-fire exercises in this analysis. The results are shown in the following tables.

Inspection of the tables below reveals substantial support for the hypothesis that reconnaissance and battle success are strongly correlated. The relationship is particularly noteworthy in the case of OPFOR attacks. The tables are presented from the point of view of the attacking commander. The data are displayed to show what his chances of success will be, depending on the state of his reconnaissance. Data points (battles) where the status of reconnaissance is unclear (to the researcher, not the commander!) are not considered valid data, and are included only for completeness.

Table 1

ATTACK OUTCOME ACCORDING TO RECONNAISSANCE STATUS (OPFOR)

| | | Battle Outcome | | |
|---|---|---|---|---|
| Reconnaissance Status | | Success | Failure | Standoff |
| Good | 28 | 26 | 1 | 1 |
| Poor | 5 | 0 | 5 | 0 |
| Unclear | 3 | 2 | 0 | 1 |

Table 2

ATTACK OUTCOME ACCORDING TO RECONNAISSANCE STATUS (BLUFOR)

| | | Battle Outcome | | |
|---|---|---|---|---|
| Reconnaissance Status | | Success | Failure | Standoff |
| Good | 13 | 9 | 1 | 3 |
| Poor | 50 | 4 | 38 | 8 |
| Unclear | 14 | 4 | 4 | 6 |

In this form of presentation, the results jump out with hideous clarity--the commander who must commit his forces to the attack without adequate knowledge of the enemy is facing an uncomfortable probability of defeat. This correlation seems more definite for the OPFOR side than for Blue, but one can only speculate as to the reasons.[1] (See App. B for a brief discussion of this point.) Surely the difference in doctrine and tactics must enter, as does the relative difference in experience level between the two forces. Although careful consideration of why that particular point turns out the way it does would be interesting and possibly fruitful, that is not the purpose of the present investigation.

There is a clear difference between the OPFOR data and the training force data. All OPFOR attacks listed are deliberate, regimental attacks; many of the training force attacks, however, are movements to contact (MTC), hasty attacks, or other actions not offering the opportunity for detailed reconnaissance given by a deliberate attack. Therefore, Table 3 shows values for Blue deliberate attacks only. Table 4 shows data aggregated for all other types of attack. What stands out is that the percentage of success associated with successful reconnaissance is about the same for both classes; however, the percentage of reconnaissance success is higher for deliberate attacks. This latter point is quite logical, as deliberate attack scenarios, almost by definition, provide considerably greater time to accomplish the reconnaissance function.

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[1]The argument could be made that those units which do a good job of reconnaissance also are superior at conducting the mission, and that there is no causal relationship between reconnaissance and mission success. That argument is refuted because instances of success and failure are distributed among most units. Another argument could be made that when a unit in training has a good day, it is good in all aspects. The OPFOR, however, is generally consistent in its performance, and it too shows the correlation between reconnaissance and success. We have no way, of course, to prove the causation absolutely and conclusively.

Table 3

BLUFOR DELIBERATE ATTACKS

| Reconnaissance Status | | Battle Outcome | | |
|---|---|---|---|---|
| | | Success | Failure | Standoff |
| Good | 11 | 7 | 1 | 3 |
| Poor | 34 | 2 | 26 | 6 |

Table 4

BLUFOR HASTY ATTACKS/MTC

| Reconnaissance Status | | Battle Outcome | | |
|---|---|---|---|---|
| | | Success | Failure | Standoff |
| Good | 2 | 2 | 0 | 0 |
| Poor | 16 | 2 | 12 | 2 |

A conclusion that should *not* be drawn from the above data is the relative capability of the training forces and the OPFOR to perform reconnaissance. The NTC is a training venue, not a testing course. Because of scenario differences, and the differing constraints on the two forces, their situations vis-a-vis scouting/reconnaissance are quite different. The methods of the OPFOR are discussed in Sec. V; the reconnaissance problems of the training forces are covered in Sec. IV.

We can draw two conclusions from this analysis of battle results at the NTC.[2] First, the hypothesis that was to be tested is supported by

[2]The validity of the conclusions depends on how well the battle simulations at the NTC represent the reality of battle. We know that some aspects of the training must of necessity distort reality. However, the conduct of reconnaissance and the intelligence function is generally considered to adequately replicate reality.

the data--there is a high correlation between success in the attack and success in the reconnaissance that precedes it. Second, the record of success of Blue force reconnaissance is not good. It is not fair or proper to make a direct comparison between the record of Blue and OPFOR in this regard; there are many asymmetries in the NTC situation that make the Blue problem different from the OPFOR problem. But in absolute terms, the figures indicate that something is lacking in the Blue force approach to reconnaissance. In the next section, we will explore means by which the NTC system can be used to further analyze the operation of a Blue task force intelligence system. Before turning to that analysis, however, we reemphasize the importance of the reconnaissance function, as demonstrated by these NTC battle results.

The term "combat multiplier" is frequently (and often loosely) used in the Army. According to FM 101-5-1, *Operational Terms and Symbols*, a combat multiplier is a mechanism for multiplying the combat power of units, and by implication, without an equivalent expenditure of other resources (Ref. II.1). Doubling the combat power of a company team by making an expenditure equivalent to an additional company team is not a combat multiplier!

Reconnaissance, however, would seem to be a combat multiplier in light of the above data. Reconnaissance constitutes a fairly small expenditure of resource by a task force--yet the data indicate that the success of the whole task force mission depends strongly on the success of reconnaissance. Experienced battalion commanders have claimed that good reconnaissance is worth two extra company teams to the task force. Do the data lend credence to this intuitive estimate?

How have we defined "success" or "failure" for a battalion task force attack? If at the end the OPFOR, which typically might begin the defense with a reinforced motorized rifle company, has at least a platoon in place as a coherent force, while the Blue force has no effective combat power, we class the outcome as a Blue loss. This is a fairly typical outcome for battles listed as Blue "failures" in the tables. A standoff occurs when neither force has coherent combat power remaining. Blue is clearly successful when the OPFOR has no remaining coherent combat power, while Blue retains a company team's worth of coherent strength on the objective. However, even if the OPFOR should

have a platoon in place at that point, their location and situation would in all probability be known to the Blue commander, and it is reasonable to expect that Blue would prevail. So consider again the situation where the Blue attack has failed. Blue has no coherent combat power, but has probably located ("recon by death") the OPFOR disposition. In most circumstances, the addition of a fresh company team to the Blue force at that time would overcome the standoff or bring about its success.

If the reasoning in the paragraph above is accepted, and we accept the inference from the data that successful reconnaissance makes for successful attack, the conclusion is drawn that reconnaissance is worth at least a company team. This may not support the estimate of two company teams, but it is a sure indication that task force reconnaissance is a true combat multiplier.

The THP narratives generally include coverage of the aspects of the intelligence operating system which worked well or badly during the exercise. We have not systematically reviewed these comments to develop conclusions on points requiring attention. This was accomplished, however, during Rotation 87-1 by a team of observers sponsored by the Combined Arms Training Activity (CATA) of Fort Leavenworth, and led by personnel from the Armor School at Fort Knox. Their observations are included in Ref. II.2, and address weaknesses which are consistently reported in the THP. We recommend that report, particularly for observations of staff actions relating to reconnaissance, as staff performance was not covered in detail in the present study.

# III. DEVELOPMENT OF FIELD DATA

The results in Sec. II offer fairly convincing evidence that there is a strong correlation between success in the attack and successful reconnaissance at the NTC. They also tend to show that Blue units do less well, overall, than the OPFOR at conducting reconnaissance, although asymmetries in the problems presented to each force greatly affect the outcome. These results suggest that there is great room for improvement in reconnaissance in our Army, but they offer no help in implementing improvement. For this we must gain a detailed appreciation for what should go on in the reconnaissance effort, and against that examine what does go on.

Because skilled observer/controllers (O/Cs) of the Operations Group review the actions of the training units in every battle, the NTC offers opportunity for detailed analysis. The problem facing the analyst is how to extract the needed data without inordinate expenditure of manpower (say by having analysts accompany the appropriate O/Cs during many battles) or putting an unacceptable additional workload on the Operations Group.

The solution to the problem came out of extensive discussions with a number of the O/Cs and other knowledgeable NTC observers. The basic reasoning was that if one could properly characterize the conduct of a reconnaissance effort through a set of standard questions which could be answered with yes/no type answers, then data acquisition by the O/Cs would become a reasonable course. The rationale offered by the O/Cs themselves was that if the questions were properly chosen, the questions were ones they should be answering for themselves in the preparation of their AARs. They deemed it an acceptable added task to record the answers on simple 3x5 card forms. This section will describe the development of the data cards, and how they were used.

The first piece of information needed for each battle was a characterization of its outcome. (We decided that data were to be taken only for battles involving Blue force attack missions, because we are not trying to analyze the OPFOR in detail.) Figure 1 is the Offensive

## OFFENSIVE MISSION EVALUATION

Battle Type -- MTC____ Del. Atck.____ Hasty Atck.____
Nite Atck.____ Rgmntl. Atck.____

==========

| DEFINED OBJECTIVE? | | | RESULT | | |
|---|---|---|---|---|---|
| Terrain | yes | no | secured | partially secured | not secured |
| Enemy | yes | no | over 50% destroyed | 20-50% destroyed | under 20% destroyed |
| Ability to Continue | yes | no | capable | doubtful | incapable |

---

Was the battle result affected by actions taken to enhance the training benefit?

yes no

If yes, to how great an extent? small large

---

On a scale of one to five, was the mission successful, based on its objectives and intent of the brigade commander?

One (failure) Two Three Four Five (success)

---

Fig. 1—Field data card-1

Mission Evaluation Card. The top block of information allows identification of the battle, so these data can be correlated with other information. (We state clearly at this point that all data taken at the NTC protect the identity of the training unit. In looking at broad research topics, we have no intent to evaluate units. All unit identification is excised in the presentation of the data.)

The first block of data seeks a judgment on the attainment of the mission objectives as enunciated in the brigade and task force orders. First, was it a required objective? Second, was it achieved?

- Terrain refers to specific objective points or areas, to be seized or secured. Was this required? Was it accomplished?
- Enemy refers to forces which may be required to be destroyed (as contrasted to being bypassed or fixed, for example).
- Ability to continue means termination of the primary mission with sufficient combat power remaining to be able to carry out a subsequent assigned task.

The next question on the card takes account of the fact that a particular battle segment at the NTC may be altered in length (as compared to what would probably take place in an actual battle), or otherwise adjusted to fully exploit the training value of the exercise. These adjustments may have an effect on the final outcome of the simulated battle, and we need to know if this happened to correctly understand the data.

The final question (the "bottom line") on the front of the card asks for the observer's best judgment concerning the outcome of the battle. Was the offensive mission a success, in terms of the brigade commander's intent? Because a simple yes or no answer may be misleading or incomplete, we asked that a scale of one to five be used. The observers were cautioned not to "agonize" over their answer--their first impression would probably be the best.

The second data card, shown in Fig. 2, is titled Scout Mission Evaluation--Offense. The title is a misnomer, because the mission may involve elements in addition to scouts. Afterthought suggests that the

SCOUT MISSION EVALUATION-OFFENSE

TASK FORCE _____ or OPFOR___
DATE_____
Battle -- MTC___ Del. Att.___ Has. Att.___
Nite___

MEASURES OF SUCCESS

| | Yes | No | NA |
|---|---|---|---|
| **Objective Area** | | | |
| Penetrate, survive | | | |
| Locate positions | | | |
| Describe positions | | | |
| Locate obstacles | | | |
| Breach obstacles | | | |
| Mark bypasses | | | |
| Withdraw/report | | | |
| Establish OP | | | |
| **Axis Zone** | | | |
| Recon length | | | |
| Locate enemy screen | | | |
| Locate obstacles | | | |
| Breach obstacles | | | |
| Bypass obstacles | | | |
| Mark route | | | |
| Establish OP | | | |
| Infiltration route | | | |
| Terrain recon | | | |
| Trafficability | | | |
| **Other** | | | |
| Recon beyond objec. | | | |
| Establish screen | | | |

MISSION ANALYSIS

| | Yes | No | NA |
|---|---|---|---|
| **Planning** | | | |
| Template | | | |
| Recce Plan | | | |
| Timely Plan | | | |
| All assets | | | |
| Leader-who? | | | |
| **Preparation** | | | |
| Assets ready | | | |
| Mission brief | | | |
| Rehearsal | | | |
| Commo Net | | | |
| **Execution** | | | |
| Dismount | | | |
| Status Rpt. | | | |
| Coord. | | | |
| Asset matrix | | | |
| Avoid enemy | | | |

Fig. 2—Field data card-2

title should have been Reconnaissance Mission Evaluation. Again, the top block of information identifies the battle for bookkeeping purposes.

The questions themselves were developed in large measure by the members of the O/C teams charged with observation and training of the scout elements of the task forces. The questions on the cards must of necessity be terse; their meanings are explained below. Each is to be answered with a simple yes, no, or not applicable. The purpose of the information is to develop in some detail what was and was not accomplished by the reconnaissance, in order to seek correlations with level of success in the overall offensive mission.

The first series of questions deals with reconnaissance in the area of the objective.

- Did the scouts penetrate the objective area and survive?
- Did the reconnaissance pinpoint sufficient numbers of vehicle fighting positions and orientations and individual emplacements to permit the S2 [intelligence officer] to accurately template enemy dispositions and orientations down to at least platoon level?
- Were accurate descriptions of enemy fighting positions obtained?
  a. Vehicle--hull down, turret down, hide, hasty?
  b. Individual--dug in, with or without overhead cover?
- Did reconnaissance accurately pinpoint/classify all obstacles--location, dimension, type, gaps, bypasses, etc.?
- If tasked, did reconnaissance elements breach obstacles, mark (for day or night), and report location/type marking? Did they assure maintenance of the breach/marks?
- If not tasked to breach, but only to bypass, did they mark the bypasses for both day and night, and report location/type marking?
- Did they report all of the above no later than one hour prior to main body departure time (to permit order revision, if necessary)?

- Did they withdraw successfully (and preferably undetected)?
- Was at least one observation point (OP) established off of the objective but able to maintain surveillance of the objective to assist with command and control and to make calls for indirect fire and adjustments during maneuver and assault?

The second series of questions deals with reconnaissance of the axis of advance. Again, the answers are simple yes or no (or not applicable, as appropriate). Did the reconnaissance elements cover the entire axis (or axes) from the line of departure (LD) to the objective?

- Did they detect and report the location and strength of any enemy forward screen?
- Did the reconnaissance elements detect, pinpoint, classify, and report the location, dimensions, and type of all obstacles, to include the location of existing gaps or bypasses?
- If so tasked, did they breach obstacles, provide for day/night marking, and report location/marking of the breaches? Did they assure the maintenance of the breaches/marks?
- If tasked only for bypassing, did they provide for marking and reporting the location?
- If they were tasked to do so, did they mark the routes?
- Were OPs established overlooking the axes of advance?
- Were infiltration routes located for dismounted attack?
- Did they conduct at least a hasty reconnaissance of all key terrain and suspected/probable enemy locations capable of overwatching and placing effective fire into the axis of advance?
- Was the trafficability along the axes determined?
- Was all the information reported at least one hour prior to LD?

The two last questions on the face of the card refer to matters pertinent to follow-on missions for the task force, which may or may not be assigned.

- Was reconnaissance continued beyond the objective to locate enemy positions, obstacles, possible avenues of counter-attack or reinforcement, and avenues of withdrawal?
- Was a defensive screen established beyond the objective to detect/report counterattack or reinforcement?

All of the questions discussed above are concerned with the product of the reconnaissance effort, not with the methods used by the task force. On the reverse side of the card are listed factors which may yield insights as to how the task force approached reconnaissance. These questions are divided into the phases of planning, preparation, and execution. In the category of planning, the following are included.

- The first question asks whether the S2, during his Intelligence Preparation of the Battlefield (IPB), created a realistic template for guiding the reconnaissance effort.
- Was a specific reconnaissance and surveillance (R&S) plan prepared and promulgated, either in the Operations Order (OPORD) or separately?
- Was the R&S plan prepared at the earliest possible time, and were the appropriate assets given warning orders?
- Were assets other than the scout platoon to be employed (e.g., ground surveillance radars, artillery observers, engineers, infantry, aviation).
- Was a single leader named for the reconnaissance effort? Who?

During the preparation phase, we would like to know the following:

- Were the necessary assets prepared to meet the task schedule?
- Was the mission briefed to all the participating assets?
- Was the mission rehearsed?
- Was an adequately capable communication net set up for the reconnaissance effort?

During execution, we asked about certain details.

- Were dismount techniques used to maintain stealth?
- Was there regular status reporting?
- Was there coordination between reconnaissance assets during the mission?
- Were all the assets available to the reconnaissance mission actually used? (A detailed accounting of potential assets is covered in subsequent paragraphs.)
- Did the reconnaissance elements avoid engagement with the enemy forces?

A third data card is shown in Fig. 3; it is titled Recce Asset Utilization Matrix. The matrix owes its inspiration to a seminar conducted in 1985 by (then) Lieutenant Colonel Larry Word (Ref. III.1), the senior observer/controller of the mechanized infantry training team at the NTC at that time. During the seminar, Lieutenant Colonel Word emphasized the importance of reconnaissance, and pointed out that the assets of the scout platoon alone were seldom sufficient to carry out the mission. He then spoke of how other assets could be employed to supplement the scouts. This discussion led to our creation of the asset utilization matrix.

The purpose of the matrix is simply to list the various tasks that may have to be accomplished in the reconnaissance effort, and to place against those tasks the assets potentially available to the task force commander to carry them out. Thus, the list of tasks closely resembles those outlined on the reconnaissance mission evaluation card. They are, in order: In the objective area:

1. Locate enemy positions
2. Locate obstacles
3. Breach and mark the obstacles
4. Establish an OP overlooking the objective

## RECCE ASSET UTILIZATION MATRIX

Date ---

Task Force---

A check indicates asset named was employed in the listed task.

| Tasks | Assets: Scout platoon | GSR | Vision Aids | FO | Infantry | Armor | Aviation | Engineer | Signal/EW |
|---|---|---|---|---|---|---|---|---|---|
| Objective | | | | | | | | | |
| Locate enemy positions | | | | | | | | | |
| Locate objective obst. | | | | | | | | | |
| Breach/mark obstacles | | | | | | | | | |
| Establish objective OP | | | | | | | | | |
| Direct fires | | | | | | | | | |
| Assist C&C | | | | | | | | | |
| Route | | | | | | | | | |
| Locate screen | | | | | | | | | |
| Locate route obst. | | | | | | | | | |
| Breach/mark obst. | | | | | | | | | |
| Mark assault route | | | | | | | | | |
| Infiltration route | | | | | | | | | |
| Establish route OP | | | | | | | | | |
| Terrain recce | | | | | | | | | |
| Trafficability | | | | | | | | | |
| Timely communication | | | | | | | | | |

Fig. 3—Field data card-3

5. Direct artillery fires against the enemy
6. Assist in command and control during the attack

Along the route:

1. Locate the enemy screen
2. Locate obstacles
3. Breach and mark obstacles
4. Mark the assault route
5. Locate infiltration routes
6. Establish OPs overlooking the route
7. Perform terrain reconnaissance
8. Determine route trafficability
9. Maintain timely communications (reporting).

Just the bare listing of these tasks makes it clear that the conduct of reconnaissance is a formidable undertaking. It is not surprising that a scout platoon, consisting of six vehicles (or fewer, considering maintenance and reconstitution problems) and no more than 30 soldiers, is often unable to accomplish all that is desired. That is why task force commanders might be urged to look beyond the scout platoon for reconnaissance assets. What might these be?

Across the top of the utilization matrix are listed a number of assets that could be considered for reconnaissance purposes. First, there are the ground surveillance radars (GSR), which are very commonly attached to a task force. (They are actually assets of the divisional electronics warfare battalion, which arrive at the NTC with the brigade as a part of the division "slice.") Among the tasks with which the GSRs might assist are locating the enemy screen, or helping the scouts with navigation under limited visibility conditions.

The next asset is vision aids. Although there never seems to be enough vision aids in the task force to satisfy all needs, the reconnaissance effort should be of high priority. The scouts may need extra night vision goggles for help in dismounted patrol, and frequently would benefit from thermal viewers to permit effective operation of OPs at night.

The scouts are often in a good position to call indirect fires on the enemy, both before and during the assault. For this purpose it may be advisable to supplement the scouts with trained artillery forward observers (FOs), provided with whatever specialized navigational, spotting, and communication equipment is available.

The addition of infantry to the reconnaissance effort can be useful, particularly in locating and marking infiltration routes for dismounted attack. If the scouts must concentrate their efforts on the objective area, the infantry could be tasked for route reconnaissance. Less frequently, tank units may be able to protect the reconnaissance force, although the use of supplemental tanks is far more common in the counter-reconnaissance role.

Opportunities to use aviation assets can be overlooked. For example, during the preparations for battle, there are often helicopter flights into and out of the battalion sector. Any of those flights could be tasked with an observation mission. Sometimes the scarce aviation assets are unused for short periods, and the task force staff could request the opportunity for personal observation of the potential battlefield. Helicopters can be particularly useful for the insertion of OPs in a timely manner.

The reconnaissance elements are frequently charged with the location and breaching of obstacles, or the evaluation of trafficability. Engineers are trained in those functions, and make useful additions to the scouting force. They can be added as individual advisors, or as complete units with their own equipment.

The last item, Signal/EW, is added for two reasons. First, there are frequent problems with communications during reconnaissance. Those due to the long distances covered by scout routes can be solved by the addition of relay or retransmission stations. Second, EW intercept, jamming, and direction-finding capabilities at the NTC are generally located with the brigade, and the task forces may tend to overlook their potential. Direct tasking of those assets might be considered as part of the task force R&S plan.

The O/C is simply to mark the appropriate matrix intersection when the task force tasked one or another of the assets to accomplish one of the listed items. This does not necessarily mean that they succeeded, but only that they were tasked.

These three cards then provide the data which we will use to analyze how the task forces accomplish reconnaissance, and how the reconnaissance effort correlates with mission success. The data and the analysis are presented in the following section.

# IV. ANALYSIS OF ROTATIONAL UNIT RECONNAISSANCE

Since the late summer of 1986 we have obtained data for 63 offensive operations carried out by 14 battalion task forces. We have taken no data on OPFOR regimental attacks. The data cards described in Sec. III have been filled out by members of the Blue and Green teams (for armor and mechanized infantry task forces, respectively) of observer/controllers in the NTC Operations Group. In almost every case, the card data are complete; in a few cases, single data points are missing. The data have been entered into a general computer data processing program at RAND, for ease in reduction and computation. Among the operations that the program easily performs, beyond the summing and averaging of various entries, is the correlation of disparate data bits. Thus, we are able to determine in which battles, or in how many battles, one specific class of recorded behavior is correlated with another. The details of the data (stripped of unit identification) and the data processing appear in App. A. This section will concentrate on summaries of data and the results and conclusions to be drawn therefrom.

## MISSION ANALYSIS

We first summarize the data obtained from the Fig. 1 cards, concerned with the battle outcome. This is shown in Fig. 4. (The data are displayed as percentages and omit those battles for which, for whatever reason, that particular data point was not recorded. Entries of NA are also omitted from the numerical base.) We see that in nearly all cases, a terrain objective was assigned to the task force, and in three-fourths of the battles a specific assignment dealing with enemy forces was given. In less than one-fourth was a specific follow-on requirement levied. We will return to further consideration of the data depicting the accomplishment of those missions.

It is interesting that in the opinion of the controllers recording these data, none of the battle outcomes were affected by mid-battle decisions made by the Operations Group in the interest of enhancing the

OFFENSIVE MISSION EVALUATION

(Percentages)

Battle Type -- MTC 26 Del. Atck. 62 Hasty Atck. 5 Ctr.Atck. 1
Nite Atck. ____ Rgmntl. Atck. ____ Other 6

==========

| DEFINED OBJECTIVE? | | | RESULT | | |
|---|---|---|---|---|---|
| Terrain | 95 yes | 5 no | 35 secured | 22 partially secured | 43 not secured |
| Enemy | 75 yes | 25 no | 51 over 50% destroyed | 35 20-50% destroyed | 14 under 20% destroyed |
| Ability to Continue | 20 yes | 80 no | 15 capable | 38 doubtful | 48 incapable |

---

Was the battle result affected by actions taken to enhance the training benefit?

| yes | 100 no |
|---|---|

If yes, to how great an extent? small large

---

On a scale of one to five, was the mission successful, based on its objectives and intent of the brigade commander?

| 13 | 38 | 26 | 23 | 0 |
|---|---|---|---|---|
| One (failure) | Two | Three | Four | Five (success) |

---

Fig. 4—Field data results-1

training value of the exercise. This question had been included because of concerns originally expressed by Operations Group personnel: the concerns seem unfounded (or perhaps we did not formulate the question correctly).

The last data block indicates that in no case did the controller think that a battle was an unqualified success (a score of 5). On the other hand, only 13 percent were judged unqualified failures. If we take score one and two as failure (in the sense that the term was used in Sec. II, three as standoff, and four as success, we can compare the results of this data sample and methodology with the one employed in Sec. II. These are shown as category percentages in Table 5, below. The results are consistent, although they were determined for different sets of battles, and by different means.

Returning to the field data, one observation leaps out from the numbers of Fig. 4. In about half the cases, the task force was successful in taking the assigned terrain or destroying the enemy force. Yet only infrequently did they have the capacity to continue--is this the reason the attack was judged less than successful? The correlation shown in Table 6 shows that this is so. It would appear that even though a follow-on mission was not assigned, an attack was less likely to be judged successful without unit coherent combat power at the end.

Table 5

CONSISTENCY OF TAKE-HOME PACKAGE REVIEW AND FIELD DATA

| | Mission Results (percent) | |
|---|---|---|
| Battle Outcome | THP | Data Cards |
| Success | 22 | 23 |
| Standoff | 22 | 26 |
| Failure | 56 | 51 |

Table 6

CORRELATION OF BATTLE SUCCESS WITH ABILITY TO CONTINUE
(Entries are in number of missions)

| Ability to Continue | Mission Rating | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Capable | 1 | 1 | 2 | 5 |
| Doubtful | 0 | 10 | 6 | 6 |
| Incapable | 7 | 12 | 7 | 2 |

## RECONNAISSANCE ANALYSIS

We move on to consider the data obtained from Field Data Card-2, concerned with the conduct of the reconnaissance effort. We would expect that the results would differ between deliberate attack missions and those for which less time is available for reconnaissance. Thus, in Fig. 5 we show the results for deliberate attacks, and in Fig. 6 we show the results for hasty attacks and movements to contact. The numbers express the percentage of missions in which the listed task was or was not accomplished. If the task was marked NA (not applicable), that entry was excluded from the statistics. In virtually all points of execution, the task forces accomplished the named operation more often for deliberate attacks. This is quite understandable, of course, owing to the greater reconnaissance time available, and greater emphasis on reconnaissance in deliberate attacks.

The same comment does not hold for those items relating to planning, preparation, and execution from the back of the card. For most tasks, the rate of accomplishment is quite similar for deliberate and hasty attacks. One notable exception occurs for the item denoting timely development of the reconnaissance plan. There the rate of accomplishment is higher for hasty attacks. This seemingly contrary result arises in part from scenario differences; while the total time

SCOUT MISSION EVALUATION-OFFENSE
-DELIBERATE ATTACKS-

(Percentages-Excluding NA)

## MEASURES OF SUCCESS

| | Yes | No |
|---|---|---|
| Objective Area | | |
| Penetrate, survive | 37 | 63 |
| Locate positions | 63 | 37 |
| Describe positions | 52 | 48 |
| Locate obstacles | 51 | 49 |
| Breach obstacles | 20 | 80 |
| Mark bypasses | 4 | 96 |
| Withdraw/report | 31 | 69 |
| Establish OP | 30 | 70 |
| Axis Zone | | |
| Recon length | 42 | 58 |
| Locate enemy screen | 40 | 60 |
| Locate obstacles | 30 | 70 |
| Breach obstacles | 10 | 90 |
| Bypass obstacles | 17 | 83 |
| Mark route | 5 | 95 |
| Establish OP | 39 | 61 |
| Infiltration route | 12 | 88 |
| Terrain recon | 6 | 94 |
| Trafficability | 6 | 94 |
| Other | | |
| Recon beyond objec. | 7 | 93 |
| Establish screen | 5 | 93 |

## MISSION ANALYSIS

| | Yes | No |
|---|---|---|
| Planning | | |
| Template | 65 | 35 |
| Recce Plan | 83 | 17 |
| Timely Plan | 42 | 58 |
| All assets | 49 | 51 |
| Leader-who? | 93 | 7 |
| Preparation | | |
| Assets ready | 44 | 56 |
| Mission brief | 87 | 13 |
| Rehearsal | 19 | 81 |
| Commo Net | 83 | 17 |
| Execution | | |
| Dismount | 66 | 34 |
| Status Rpt. | 52 | 48 |
| Coord. | 22 | 78 |
| Asset matrix | 27 | 73 |
| Avoid enemy | 23 | 77 |

Fig. 5—Field data results-2

SCOUT MISSION EVALUATION-OFFENSE
MTC/HASTY ATTACKS
(Percentages-Excluding NA)

## MEASURES OF SUCCESS

| | Yes | No |
|---|---|---|
| **Objective Area** | | |
| Penetrate, survive | 18 | 82 |
| Locate positions | 52 | 48 |
| Describe positions | 39 | 61 |
| Locate obstacles | 29 | 71 |
| Breach obstacles | 18 | 82 |
| Mark bypasses | 0 | 100 |
| Withdraw/report | 26 | 74 |
| Establish OP | 30 | 70 |
| **Axis Zone** | | |
| Recon length | 58 | 42 |
| Locate enemy screen | 43 | 57 |
| Locate obstacles | 17 | 83 |
| Breach obstacles | 12 | 88 |
| Bypass obstacles | 12 | 88 |
| Mark route | 0 | 100 |
| Establish OP | 50 | 50 |
| Infiltration route | 10 | 90 |
| Terrain recon | 10 | 90 |
| Trafficability | 14 | 86 |
| **Other** | | |
| Recon beyond objec. | 5 | 95 |
| Establish screen | 5 | 95 |

## MISSION ANALYSIS

| | Yes | No |
|---|---|---|
| **Planning** | | |
| Template | 46 | 54 |
| Recce Plan | 87 | 13 |
| Timely Plan | 67 | 33 |
| All assets | 54 | 46 |
| Leader-who? | 96 | 4 |
| **Preparation** | | |
| Assets ready | 58 | 42 |
| Mission brief | 87 | 13 |
| Rehearsal | 17 | 83 |
| Commo Net | 83 | 17 |
| **Execution** | | |
| Dismount | 43 | 57 |
| Status Rpt. | 68 | 32 |
| Coord. | 29 | 91 |
| Asset matrix | 5 | 95 |
| Avoid enemy | 27 | 73 |

Fig. 6—Field data results-3

available for planning between a previous mission and a new attack mission is often the same for either a deliberate or hasty attack (which is often the outcome of a movement to contact), the reconnaissance for a MTC/hasty attack cannot begin until late in the preparation. Thus, units are more likely to have the plan completed in a timely fashion. The same apparent anomaly is noted in the preparation data, where recon assets are more likely to be ready in a timely way for MTC. In the execution phase, the most notable, but not unexpected, disparity concerns the frequency of dismounted operation by scouts. In a fast-moving hasty attack or movement to contact, opportunity for time-consuming dismounted reconnaissance is less.

At this point we can make another check for consistency between the results obtained from take-home package review and the field data. The THPs indicated that there is a strong correlation between successful reconnaissance and success in the attack. From the field data, we have constructed Table 7. To characterize the reconnaissance, we have simply calculated the fraction of the reconnaissance tasks (from the face of data card in Fig. 2) accomplished for an attack, and compared it with the rating given the mission by the controllers. The fraction is shown on the left, and the mission rating breakout, by percentage of battles with that fraction, is shown across the row. The table includes all attacks, and we have added Table 8 to show the data for deliberate attacks only. In both cases, the correlation between successful reconnaissance and task force mission success is quite pronounced. Thus, the THP findings are confirmed, and a major finding of the study is confirmed.

## Asset Utilization

The results from the third data card (Fig. 3), which deals with the use of assets, are shown in Figs. 7 and 8; the results for deliberate attacks in Fig. 8 are extracted from the overall average data in Fig. 7. There is little variation between the two figures, indicating that task force behavior with regard to asset utilization is about the same for hasty and deliberate attacks. This suggests, but certainly does not prove, that asset utilization is more a function of command style than

Table 7

TASK FORCE MISSION SUCCESS VS. RECONNAISSANCE SUCCESS

| Fraction of Recon Tasks Accomplished | Mission Rating 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 0 - 0.2 | 18[a] | 50 | 21 | 11 |
| 0.2 - 0.4 | 14 | 29 | 29 | 29 |
| 0.4 - 0.6 | 0 | 27 | 27 | 45 |
| 0.6 - 1.0 | none | | | |

[a]Percentage of missions, across.

Table 8

TASK FORCE MISSION SUCCESS VS. RECONNAISSANCE SUCCESS: DELIBERATE ATTACKS ONLY

| Fraction of Recon Tasks Accomplished | Mission Rating (Percent) 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| 0 - 0.2 | 22 | 61 | 11 | 6 |
| 0.2 - 0.4 | 8 | 15 | 38 | 38 |
| 0.4 - 0.6 | 0 | 22 | 22 | 56 |
| 0.6 - 1.0 | none | | | |

## RECCE ASSET UTILIZATION MATRIX

(All Attacks)

The number in a box is the percentage of missions that ASSET was used for that task.

| Tasks | Assets: Scout platoon | GSR | Vision Aids | FO | Infantry | Armor | Aviation | Engineer | Signal/EW |
|---|---|---|---|---|---|---|---|---|---|
| **Objective** | | | | | | | | | |
| Locate enemy positions | 94 | 58 | 27 | 13 | 37 | 8 | 15 | 2 | |
| Locate objective obst. | 92 | 7 | 15 | 2 | 33 | 8 | 7 | 8 | |
| Breach/mark obstacles | 43 | | | | 23 | 2 | | 61 | |
| Establish objective OP | 75 | 16 | 11 | 2 | 15 | | 2 | | |
| Direct fires | 35 | | | 21 | 16 | 10 | 8 | | |
| Assist C&C | 47 | 3 | 2 | | 11 | 6 | 3 | | |
| **Route** | | | | | | | | | |
| Locate screen | 82 | 48 | 15 | 2 | 10 | 2 | 8 | | |
| Locate route obst. | 79 | | 2 | | 11 | 3 | 5 | 5 | |
| Breach/mark obst. | 39 | | | | 7 | 3 | | 49 | |
| Mark assault route | 8 | | | | | | | | |
| Infiltration route | 21 | 3 | 2 | | 3 | 3 | | | |
| Establish route OP | 31 | 8 | | 2 | 3 | | | | |
| Terrain recce | 19 | | | | 2 | | | | |
| Trafficability | 18 | 2 | | | | | | | |
| Timely communication | 56 | 21 | 8 | 2 | 13 | 5 | 3 | | |

Fig. 7 Field data results-4

## RECCE ASSET UTILIZATION MATRIX

(Deliberate Attacks)

The number in a box is the percentage of missions that ASSET was used for that task.

| Tasks | Scout platoon | GSR | Vision Aids | FO | Infantry | Armor | Aviation | Engineer | Signal/EW |
|---|---|---|---|---|---|---|---|---|---|
| Assets | | | | | | | | | |
| Objective | | | | | | | | | |
| Locate enemy positions | 95 | 56 | 31 | 13 | 44 | 3 | 10 | 3 | |
| Locate objective obst. | 95 | 3 | 21 | 3 | 36 | 3 | 3 | 10 | |
| Breach/mark obstacles | 54 | | | | 31 | | | 64 | |
| Establish objective OP | 79 | 13 | 15 | | 21 | | | | |
| Direct fires | 36 | | | 15 | 15 | 5 | 5 | | |
| Assist C&C | 44 | | | | 10 | 3 | | | |
| | | | | | | | | | |
| Route | | | | | | | | | |
| Locate screen | 79 | 46 | 15 | | 10 | | | | |
| Locate route obst. | 79 | | 3 | | 10 | | | 8 | |
| Breach/mark obst. | 49 | | | | 8 | | | 49 | |
| Mark assault route | 5 | | | | | | | | |
| Infiltration route | 18 | 5 | | | 3 | 3 | | | |
| Establish route OP | 26 | 3 | | | 3 | | | | |
| Terrain recce | 13 | | | | 3 | | | | |
| Trafficability | 8 | | | | | | | | |
| Timely communication | 51 | 23 | 10 | | 13 | 3 | | | |

Fig. 8—Field data results-5

of opportunity. (In Sec. VI we will show that there is not much doctrinal guidance on this point.)

### Scouts

For discussion, let us confine our attention to Fig. 8, the data for deliberate attacks. It is clear that the scouts are called upon for almost all of the tasks except those which seem to be consistently overlooked by the task forces. For example, the tasks of evaluating terrain, determining trafficability, or marking assault routes are seldom assigned to anyone, including the scouts. A question these data do not answer is whether the failure to assign these tasks contributes materially to the difficulty commonly experienced by the task forces of maintaining synchronization of movement.

### Engineers

The data show that the engineers are used in about half the battles for locating or breaching obstacles during reconnaissance. However, task forces seldom accomplish the breaching task. One might wonder if the use of engineers increases the probability of breaching. From a correlation of data points, as shown in Table 9, we see that there is correlation; however, even with the use of engineers, the task forces seem unable to routinely breach obstacles on the objective during reconnaissance. The results are essentially the same if examined for breaching along the axis. It is noted in this connection that OPFOR scouts frequently are able to breach BLUFOR obstacles. Whether this is due to OPFOR scout efficiency, or BLUFOR counter-reconnaissance inefficiency, has not been determined. We do know, however, that the OPFOR is very careful about guarding their obstacles, and the low rate of Blue scout penetration is not surprising.

### Artillery Observers

One feature of Fig. 8 is of particular interest in light of results from an earlier Arroyo Center study. Artillery observers are only seldom tasked to help the scouts with fire direction or the manning of OPs overlooking the objective. In an earlier study of fratricide (Ref.

Table 9

CORRELATION OF SUCCESS IN BREACHING OBSTACLES WITH USE OF ENGINEERS DURING RECONNAISSANCE: BATTLE COUNTS

| | Was Breaching Successful | |
|---|---|---|
| Were Engineers Used | Yes | No |
| Yes | 9 | 26 |
| No | 2 | 17 |

IV.1), NTC data indicated that only about one-third of artillery fires were effective against the OPFOR. It is possible that greater artillery effectiveness (particularly during artillery preparation, when the maneuver units are not always in good position for fire adjustment) could be achieved if greater use were made of FOs accompanying the scouts.

### Aviation

Another potential asset that is seldom tasked is aviation. Commanders express a great reluctance to risk these valuable assets in reconnaissance missions. This risk must be balanced, however, against the great value of reconnaissance. One valuable reconnaissance-related mission comes immediately to mind. In a time-constrained situation, the ability to insert OP teams by air, at least along the route of advance, could have high payoff, while bearing acceptable risk.

### Signal/EW

It seems notable that task forces do not levy reconnaissance requirements against signal or EW assets, according to the data. An example would be assistance by the communications platoon in establishing retransmission capability. It is true that communication, electronic warfare, intelligence (CEWI) assets are commonly under brigade control; nonetheless they may be available to help with

communications as well as intelligence gathering. We did not measure the effectiveness of either Blue or OPFOR EW assets at direction-finding or other functions. This point suggests a follow-on topic for investigation--the intelligence and reconnaissance functions of the brigade as practiced at the NTC.

## Cross Correlations

How important is it to use multiple assets for reconnaissance? Clearly every asset could not be reasonably applied to every task of the matrix of Fig. 3. However, if appropriate assignments only are considered, a reasonable "fill level" for the matrix might amount to 30 percent, for assets other than the scout platoon. What is actually achieved by task forces, and how does this value relate to success in reconnaissance? Table 10 divides the use of assets into three ranges of percentage of "matrix fill" of non-scout assets, during deliberate attacks. The distribution of reconnaissance success (using our previous fraction of reconnaissance tasks accomplished) is shown for each range.

The data show a clear value for the use of non-scout assets in reconnaissance, which is to be expected. The results also show, however, that simply tasking assets is not the total solution to the reconnaissance problem.

Table 10

RECONNAISSANCE SUCCESS VS. ASSET UTILIZATION
(Number of battles)

| Percentage of Non-Scout Assets Used | Fraction of Recon Tasks Accomplished | | | |
|---|---|---|---|---|
| | 0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1.0 |
| 0-3 | 15 | 7 | 2 | 1 |
| 3-6 | 7 | 3 | 3 | 0 |
| >6 | 6 | 12 | 6 | 0 |

A large number of cross correlations can be made between the various queries in our data set. We have explored a number of those, and for many the correlation is too weak to yield a useful message. However, for some key points, the data do provide interesting results.

For example, the criticism is often levied by observers that the scouts tend to engage the enemy, with negative effects on the recon mission. The data we have shown indicate that in about three-fourths of the battles, the scouts fail to avoid the enemy. This fraction does not vary markedly between hasty and deliberate attacks. How does this affect the reconnaissance mission? The results are shown in Table 11.

The data show that in terms of reconnaissance results there is indeed an apparent advantage in avoiding the enemy. In a data set to be shown in (Sec. VIII), we will demonstrate the consequences to the scouts of failing to avoid the enemy. It will be seen that roughly half the scout vehicles are destroyed, on average, during each battle.

In some cases, avoiding the enemy can be related to the use of dismounted movement. How does dismounting, a question on the data card shown in Fig. 2, correlate with scouting success? We correlated the card report on dismounting with each of the individual tasks of the recon mission. The interesting result is that at the NTC, dismount techniques clearly pay off for tasks associated with the objective, but there is not a positive correlation for tasks associated with the axis of advance (See App. A). This result may be NTC-peculiar. The

Table 11

RECONNAISSANCE SUCCESS VS. AVOIDING ENEMY
(Number of battles)

| Did the Scouts Avoid the Enemy? | Fraction of Recon Tasks Accomplished | | | |
|---|---|---|---|---|
| | 0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1 |
| Yes | 6 | 4 | 5 | 1 |
| No | 24 | 19 | 6 | 1 |

advantage of dismounted reconnaissance in areas where the enemy is located is clearly shown by the data; the axis areas at NTC are frequently free of OPFOR.

In post-rotation interviews (Ref. IV.2), some scout units have indicated that their ability to accomplish reconnaissance was constrained by time. At issue is how the rotational units make use of the time available for reconnaissance. As previously discussed, the data cards record whether the recon plan and assets were available in a timely fashion. For hasty attacks, the plan was timely 67 percent of the time, and 58 percent timeliness was achieved in having the recon assets ready. However, for deliberate attacks, these percentages decrease to 42 percent for the plan and a similar number for the assets. As was pointed out, these results are consistent with the fact that while the total time between missions is often about the same in NTC scenarios, the initiation of reconnaissance generally is restricted to occur much later in the preparation time for movements to contact and hasty attacks.

The data show that units are often late in getting started with the reconnaissance process; the question is whether this is important. We examined the correlation between timely planning and mission success for deliberate attacks. The correlation is very strong, as shown in Table 12. It could be argued that more capable units get ready on time, and do their work well. The raw data show, however, that nearly all units have a distribution of success and less-than-success.

As would be expected, a similar strong correlation holds between timely reconnaissance planning and success in its execution. It is clearly very important to make the best use of the time available for reconnaissance at the NTC (and presumably in combat). The command staff of a task force should make a great effort to begin reconnaissance as quickly as possible. This may require several initiatives, such as:

- Begin reconnaissance with only a partial plan, updating later, and issuing FRAGOs (fragmentary orders)

Table 12

CORRELATION OF MISSION SUCCESS WITH TIMELY RECONNAISSANCE PLANNING (DELIBERATE ATTACKS)
(Number of battles)

| Was the Recon Plan Available in a Timely Fashion? | Mission Rating | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Yes | 0 | 2 | 3 | 8 |
| No | 5 | 13 | 6 | 3 |

- Apply available alternative assets until scouts are reconstituted and resupplied (e.g., have a cross-trained infantry platoon begin axis reconnaissance at the earliest time)
- Appoint alternative reconnaissance leadership while scout platoon leader and S2 are occupied with orders preparation and other duties.

The data for still further correlations appear in App. A. In many cases, strong correlations are seen, but are to be expected. For example, it is no surprise that there is a correlation between locating enemy positions and obstacles, and success in the attack. On the other hand, one would not expect correlations between essentially unrelated factors, and the fact that they are not seen is unremarkable. We have confined our coverage in this section to those points from which a useful lesson might be learned.

# V. OPFOR RECONNAISSANCE METHODS

The data developed in Sec. II show the importance of reconnaissance to OPFOR success. Do the OPFOR commanders share this sense? To answer the question, past and present OPFOR commanding officers were interviewed, with a simple series of queries. (See Refs. V.1, V.2.) Their answers were similar, and the dialogues were essentially as reported in the following synthesis:

Q. Do you feel that accurate intelligence concerning the Blue defense is essential in mounting a successful regimental attack?

A. Yes.

Q. Our data suggest that in almost all cases in which the OPFOR has good intelligence, the regimental attack succeeds, and in those few cases where the OPFOR does not have good intelligence, the attack fails. Do you believe that this is a correct conclusion?

A. Yes.

Q. Taking off your OPFOR training hat and putting yourself in the place of an actual enemy regimental commander, consider the following situation. You have been ordered to attack a U.S. battalion within forty-eight hours. As the time approaches that you have set for the attack, it is clear that your reconnaissance has not been successful. Sensing that there may be some leeway in time in your commander's intent, would you choose to attack immediately, giving the U.S. battalion no further time for preparation, or would you request a delay in the attack in order to continue your reconnaissance?

A. I would seek a delay to accomplish reconnaissance.

It is clear from these interviews that OPFOR commanders consider correct intelligence vital in carrying out attacks, even though their offensive doctrine differs from U.S. doctrine, and their troops have the

advantage (at the NTC) of familiarity with terrain and a great deal of practice at conducting their mission. One might suppose that the OPFOR doctrine of speed and concentration, with echeloned formations, might make detailed reconnaissance less important; that is not the opinion of the OPFOR commanders. In fact, the opposite may be true; see App. B.

Let us turn from the value of combat intelligence for the OPFOR to the means by which they acquire it. The OPFOR modify their methods over time, as their own equipment (patterned after that of the Warsaw Pact) and U.S. equipment and training change. For example, the Soviet reconnaissance company organic to a motorized rifle regiment (MRR) contains a motorcycle section (Ref. V.3). Whether the Soviet section is intended for scouting or for communication, it is no longer replicated at the NTC (for reasons of safety), although personnel who were in the OPFOR at the time the motorcycles were used felt that they were effective for scouting. Another doctrinal departure, imposed by circumstance, is the lack of engineers in reconnaissance. Reference V.3 states (p. 14-2) "Engineers are included in all reconnaissance elements of tank and motorized rifle units." However, engineers are not generally included in OPFOR reconnaissance, perhaps because, at least in the past, the OPFOR had no organic engineers. As another example of how things change, with the inclusion of added night fighting capability in modernized U.S. units (particularly with the Bradley), OPFOR scouts find it necessary to adopt more cautious methods of penetration.

As of spring 1987, the OPFOR conducts reconnaissance prior to a regimental attack in the following general fashion, according to our observations. The regiment is given an offensive mission, usually to an objective area, through a defined sector. The regimental attacks usually are initiated shortly after dawn, on a day we will call D, at hour H for departure. The Blue training unit receives its defensive order from its brigade usually about mid-day (at change of prior mission) on D-2. Sometime after that on D-2 the OPFOR will send forward BRDM scout cars to emplace dismounted observation teams in the objective area. These cars must remain in sector on the way to the objective, but may return by any route as they are replicating OPFOR divisional reconnaissance assets. Doctrinally, those cars are presumed to continue to roam forward, perhaps 50 km in advance of the division. One to four dismounted teams are commonly emplaced.

Day D-1 is a day of preparation for the Blue forces. Units are positioned, and engineers are at work. More often than not, these activities are being observed by the OPFOR's dismounted reconnaissance teams. From the information returned by these teams during D-1, the OPFOR intelligence section prepares its estimate, and the OPFOR command staff prepares its plan for attack. This is commonly issued at an orders briefing toward dusk of D-1. As part of the orders, a reconnaissance and surveillance plan with some quite specific information requirements is given to the regimental reconnaissance company.

The OPFOR reconnaissance company assets include two platoons, one consisting of four BMPs (a replicated Soviet infantry fighting vehicle) and one consisting of four BRDMs. Within a few minutes, the recon company commander (who is actually the scout platoon leader from one of the two U.S. battalions composing the OPFOR) back-briefs the regimental commander on his newly-hatched scout plan, to see that the intent is fully matched. Before it is completed, the backbrief frequently involves considerable interaction and war gaming. The company commander then meets again with his second-in-command (usually the scout platoon leader from the other of the two U.S. battalions) and prepares the final details of the plan, including coordination requirements. A series of checkpoints and specific information requirements are usually included, and those checkpoints appear on the graphics of the S2 section. Both through planning and practice, the OPFOR scouts seem able to maintain accurate and succinct communication with the regiment.

The scouting effort is generally organized into two sections, each with two BRDMs and two BMPs. Usually the OPFOR plan of attack includes two axes (sometimes with subvariations) and a section will generally orient on one of the two axes, with its sister section taking the other. Before the start of the mission, the section leader briefs his entire group (not just the vehicle commanders) on the plan. Because each vehicle will often have an independent role, care is taken that routes, timing, and mission are understood by all. (We note here that the level of planning attained by the OPFOR scouts, particulary regarding choice of routes and movement technique, is not attainable by most Blue units

simply because OPFOR has experience and knowledge of the terrain and trafficability.) There is little possibility that the speed of movement and accurate positioning exhibited by the OPFOR could be duplicated by Blue. Here local knowledge is the key.

MILES (Multiple Integrated Laser Engagement System) boresighting and weapons checks are usually undertaken by the scouts shortly before they depart the assembly areas. (This is something of an OPFOR characteristic, and accounts in part for their generally superior gunnery.) Sometime in the early evening the scout elements advance to forward positions, but usually do not attempt deep penetration of the Blue positions until after midnight. This seems to be based on two considerations. First, the OPFOR hope that the counter-reconnaissance screen will be less alert, and second, they may not wish to spend unnecessary time in dangerous territory. However, the plan is always based on METT-T. The elements of METT-T (Mission, Enemy, Terrain, Troops-Time) are specifically addressed by the OPFOR scouts in arriving at their reconnaissance plan, informal as the process may seem to be.

Usually the BMP crews are assigned tasks that may involve clearing or securing areas, while the BRDM crews assume tasks requiring greater stealth. The missions are those typically assigned to scout elements, and are essentially the same as those discussed earlier on Blue scouting. It is quite common for OPFOR scouts to penetrate to the rear of Blue positions, and once the battle has begun, to assist with spot reports and even command and control functions. The OPFOR scouts avoid engagement, if possible, and will bypass lucrative targets in order to avoid compromise of their mission. Except for self-defense, they are expected to engage targets only on order. However, once the reconnaissance is complete, TOCs (Tactical Operations Centers) and trains sometimes fall prey to marauding OPFOR scouts.

No later than H-2, all scouting reports are digested, and the regimental commander holds an intelligence update for his orders group. By this time OPFOR reconnaissance is usually quite detailed. Revisions to the commander's plan are communicated before the commanders disperse to prepare to move to the line of departure. If intelligence gaps or uncertainties still exist, they are noted, and decision points for settling between alternative courses of action are made clear. The

OPFOR makes considerable effort to ensure that each leader understands the intent of the plan; an incidental effect is that it becomes easier for all levels of command to understand and use late arriving intelligence.

During the battle, spot reports continue from all OPFOR intelligence sources, and their command and control system seems to make good use of the information flow. Their system of C&C and communications, while not appropriate for inclusion in this work, deserves further investigation by the "lessons learned" community.

One must not assume that OPFOR reconnaissance is uniformly successful. The intelligence flow in two succeeding regimental attacks is instructive. The following narratives are taken directly from field notes recorded at the OPFOR Tactical Operations Center. The details are of no consequence here; what is illuminating is the level of detail.

1500, D-1--The orders brief for an MRR attack on a mechanized infantry task force, known to have three M2 (Bradley) heavy teams and one M1 (Abrams) heavy team. "Intelligence firm in the North, but still being worked in the South." Two OPs are in place. The M2 positions are largely unknown, but an M1 was seen on Goat Trail. An M1 platoon is located at southern edge of hill mass Brown. Dismounted infantry spotted by helicopter (six digit grid). Seven M1s apparently being repaired at Hill 910. Commander concludes that the task force will defend forward with M2s, with tanks in back. The regimental commander orders that the scouts go forward on both the northern and southern axes, but they "were not to die on the Goat Trail," and were to leave an anti-tank missile launcher team there. The main recon effort was to be in the South.

At the intelligence update at 0300, D-Day, the locations of the following elements were reported, in terms of six-digit grids: M2 platoon, 2 M1, M1, 4 M2, M2s, M1 + M2, 2 M2 oriented north, 6-7 M2, M1 dug in, 3 M2 oriented east + TOW weapon bunkers, 3 M2 and 4 M1, which may have moved, tank ditch with dead BMP alongside--can be easily breached, concertina + mine obstacle, minefield with old OPFOR wire and mines still there. Commander knows where the scouts had *not* been, and knows also that the TOWs and half the tanks were not located. He made his decisions based on these data, and the attack was successful.

The following regimental attack against a tank battalion task force presents a contrast. At the orders brief at 1500, D-1, the three operating OPs had located all company teams, and most of the TOWs in the anti-tank section. The composition of the teams was known. The engineer assets were all identified, to the level of a count of all Class IV supplies delivered to them. This rather complete report was to be supplemented by the mounted scouts (8 vehicles), which were to go forward at about 2300. Those scouts all died at the hands of the M2 screen by 0100. The regimental attack essentially failed, as the Blue units had relocated in several key respects.

It is easy to draw hasty and possibly erroneous conclusions from isolated observations such as these. These narratives could be interpreted to suggest that mounted reconnaissance is more effective than dismounted OPs, yet experienced OPFOR S2 officers believe the reverse is true, that "90% of the intell comes from the OPs." The objective truth could only be determined by a careful study of many battles. The only conclusion that should be drawn from these paragraphs is that the OPFOR generally attacks with fairly detailed combat intelligence in hand.

The OPFOR reconnaissance company equipment is worth a brief description. The BMPs are visually modified (vismod) M551 Sheridan tanks. As such they can carry only four crew, but may run with an empty loader hole. The BRDMs are vismoded High-Mobility Multipurpose Wheeled Vehicles (HMMWVs). (Until recently they were based on M880 pick-up trucks.) They carry a crew of four--a driver, a commander, and two scouts. One or two anti-tank missile launchers (represented by Dragons) are carried for dismounted use, and co-axial 7.62 and 14.5 machine guns (represented by a single M60, using appropriate MILES) are vehicle mounted. Night vision devices are limited to goggles. The OPFOR scouts find that the vismod HMMWV is faster than the BMP (nee M551) or even the Bradley in the actual conduct of their missions. Their leaders express the opinion that they would far prefer to be equipped solely with the BRDM vismod. The stealth of that vehicle exceeds in value the firepower of the BMP, as far as reconnaissance is concerned. These conclusions, or opinions, should not be applied to the actual Soviet equipment, of course.

Other assets are employed by the OPFOR to gain intelligence. Their helicopters make frequent spot reports, and often locate enemy positions or actions. They also make effective use of EW assets. Blue nets are monitored, and often yield critical information, particularly if communications security discipline slips during the heat of battle. For example, Blue situation reports often given the OPFOR commander a good picture of how his battle is going. The OPFOR jamming effort is well known to Blue units. They may be less aware that OPFOR direction-finding frequently is able to determine positions of key elements, such as TOCs and fire direction centers (FDCs). Their first clue may be a rain of OPFOR artillery. There is also a GSR available to the reconnaissance company.

This appendix deals largely with actions that must be taken, with less attention to the nature of the information which must be collected. The focus of the discussion of IPB is almost entirely on defensive operations. Without question IPB is important in the planning of a defense; our data clearly demonstrate, however, that intelligence is vital for the conduct of the offense, and IPB is our doctrinal approach to tactical intelligence. Thus, one would wish to see illustrative material devoted to IPB for the offense. Perhaps it is this lack of guidance that explains why all too often, in practice, the reconnaissance plan does not support the commander's intent, and why the results of reconnaissance are not incorporated into the plan for attack.

Another appendix deals with the scout platoon. One is struck by its second paragraph. Of the 13 capabilities of the scout platoon listed only two deal with reconnaissance. Perhaps this is the root of the tendency to treat the scout platoon as a general-purpose utility unit, instead of a specialized team devoted to being the "eyes and ears." Although the reconnaissance mission is covered in the balance of the discussion, there are many places in which the "utility" function is emphasized. In addition, the treatment tends to concern itself with actions and procedures, with less coverage of what information is being sought.

A small but serious error, as demonstrated by the data of this study, is in section 21 of this appendix, dealing with use of the scouts. In the subsection on offense, there is the following sentence, "If possible, scouts reconnoiter the objective area and assist in the movement of the battalion." This creates the impression that detailed knowledge of the enemy situation is an optional matter. Our data indicate the contrary, and indeed in the body of the manual, in Section 3-32, the clear statement is made, "It is critical for the commander to collect detailed information about the enemy ...." That section goes on to delineate examples of the information that is necessary. Thus, the appendix on scouting seems to lack emphasis on a vital point.

In the treatment of observation posts, in Section 19, the orientation is once more entirely on the defensive mission, with no hint of OP's utility in the attack. Again, the NTC experience shows otherwise. It is surely an oversight, moreover, that in the subsection

on defense, the list of potential tasks for the scout platoon does not include manning of OPs. Our review indicates that the appendix dealing with the scout platoon may need revision to adequately support the more general guidance found in the body of the manual.

The data developed in our study indicate that many units training at the NTC fail to use assets other than the scouts for reconnaissance, in spite of the fact that added assets generally improved recon performance. The question is "Why?" Review of FM 71-2J gives a partial answer--the use of multiple assets to support the reconnaissance mission receives almost no emphasis. Likewise, ARTEP 71-2 (Ref. VI.6) places no specific training requirements for that aspect of operations. Here again, omissions from basic doctrine appear to be reflected in the performance of units.

Considering that it is the basic manual for the guidance of the battalion commander and his staff, we conclude overall that FM 71-2J falls short on several counts. The first is failure to stress the importance of reconnaissance to the success of offensive missions. The second is the absence of illustrative coverage of IPB for the attack. The third is inadequate depth of treatment of the preparation of the R&S Plan (to include emphasis on the role of assets other than scouts) and how reconnaissance must support the commander's intent. The final point seems to be a lack of clarity, if field performance is an indicator, in the concept that the commander's plan must reflect the facts as developed by reconnaissance.

### FM 34-80

The second key manual for task force intelligence operations is FM 34-80. One might expect that the S2 would use this as his primary guidance. Interestingly, we find again some of the same shortcomings as exhibited in FM 71-2J. In the detailed treatment of IPB, the weight of the examples is once more on the defense. Coverage of R&S planning lacks detail, although the overall requirements are set forth. The manual does mention many of the assets that a task force might employ as part of its intelligence operating system. It also makes clear what electronic warfare assets are employed at brigade and division level, and how they might be used for support of the task force.

Considering that FM 71-2J is still in coordinating draft form, while FM 34-80 is recently published in final form, it may be most expedient to add to the former.

### FM 17-98

The third key manual for task force reconnaissance operations is FM 17-98 (Ref. VI.5). This manual is undergoing a complete revision, and a coordinating draft (Ref. VI.7) has been prepared. The difficulty with the old version was that it concentrated on cavalry combat operations, with less attention given to the vital reconnaissance function. The problem posed for the manual's authors is that it is to serve all scout platoons--those part of divisional and regimental cavalry as well as those organic to battalion task forces. These functions differ in many ways (see App. C), thus the manual must adopt multiple viewpoints. Because the Cavalry Branch of the Tactics Department of the Armor School, which is charged with the preparation of the manual, recently led an investigation of reconnaissance at the NTC, we expect that many of the NTC lessons will be incorporated into the new version. Additionally, the findings of the present study have been made available to the Armor School team.

We note that many of these points on doctrine have been made by the Army Training Board in their White Paper 4-86 (Ref. VI.8). In addition that paper deals with a number of other topics related to reconnaissance. The findings of our study frequently directly support the viewpoints expressed in the White Paper, and whereas our conclusions may differ in emphasis, there does not appear to be any conflict between them.

# VII. THE TRAINING OF KEY PLAYERS

Our data indicate that most of the heavy battalions training at the NTC experience difficulties in carrying out a proper reconnaissance mission before a battle. Improvements in unit training are undoubtedly part of the solution to this important problem, but interviews with battalion officers have led us to believe that changes in individual training may also be necessary. This prompted us to review the reconnaissance training that is provided to some of the key players in the task force structure, as they move through their military career. In particular we have considered the schoolhouse training usually given to scout platoon leaders, task force S2s, and task force S3s and commanders.

The scout platoon leader is usually a first lieutenant who has attended the officer's basic course in his branch, either infantry or armor. Because armor officers often serve in cavalry units, the armor school is thought to lay greater emphasis on reconnaissance than the infantry school might, particularly in the so-called cavalry track.[1]

We have reviewed the program of instruction (POI) for the Armor Officers Basic Course (OBC) curriculum (Ref. VII.2), and have tried to identify those program hours which are directly applicable to scout platoon reconnaissance. We found that out of the 16-week course, four hours were devoted to a description of the battlefield threat, three hours to battlefield information reporting, and sixteen hours to cavalry platoon operations, only a portion of which is applicable to the task force scout platoon mission. Further on in this section we will discuss the knowledge which our research suggests that the scout leader must have; twenty-three hours of instruction does not appear to be enough time in which to cover the complex job of scouting.

We have made a similar survey of the infantry Officers Basic Course, and found that approximately eighteen hours are devoted to topics

[1]We understand that the separate armor and cavalry tracks are being combined into a single program (Ref. VII.1).

specific to reconnaissance. While many basic combat skills are necessary in scouting, this limited exposure to scouting problems and skills is not sufficient.

We do not wish to be critical of the courses. Only so many topics can be covered in a course of finite length. Also, probably no more than one in ten armor or infantry lieutenants will ever be assigned to a scout platoon. There are, after all, only 100 scout platoons in all of the heavy battalions of the United States Army, and there are approximately 2000 armor lieutenants and 3000 infantry lieutenants. Intense scout training is necessary for only a few.

A solution to the problem was recommended by the Army Training Board (Ref. VII.3), which suggested that a special course be offered by the Armor School to officers, both infantry and armor, at the time they are designated to be scout platoon leaders. According to our most recent understanding, the Armor School is planning an add-on to the OBC for those officers scheduled to be assigned to cavalry scout platoons. It is also intended that designated scout platoon leaders from maneuver battalions attend the course on a temporary duty basis. According to our present information, this resident course will be of two or three weeks duration. As always, the limitations of resources restrict what is possible; nonetheless, we argue that this period is insufficient for a matter of such demonstrated importance, and we have previously argued that cavalry scouting and task force scouting differ substantially.

Let us consider what topics the scout platoon leader must have at his fingertips, going beyond what is generally required of maneuver platoon leaders.

1. General reconnaissance procedures, as outlined in FM 17-98.
2. Scout platoon operations, including such topics as resupply and evacuation, considering that the parent unit (headquarters company) is not likely to be close at hand.
3. Mounted movement techniques, emphasizing stealth.
4. Dismounted movement techniques, maintaining contact with the mounted elements.

5. Setting up, maintaining, and retrieving OPs.
6. Recognition of enemy equipment and units.
7. Enemy doctrine and tactics.
8. The IPB process, leading to reconnaissance and surveillance planning, with emphasis on support of the commander's intent.
9. Land navigation and distant point survey.
10. Fire observation--calling and adjustment (to include smoke and illumination).
11. Engineer obstacle breaching and marking techniques.
12. Operations and communications security--in proximity to the enemy.
13. GSR employment and support.
14. Use of radio relays.
15. Use of observational aids and equipment (thermal viewers, etc.)

The above list is formidable, yet each item is essential. Even assigning reasonable minimum estimates of the time required to cover such a POI, classroom plus field training would require between four and five weeks. The instructional material should include exercises that the new leader can employ in training his unit, because he will have to go beyond the individual training given to the 19D scouts in some instances, and additionally will have special unit training problems.

We have also considered the training available to scout NCOs. Review of the 19D BNCOC POI (Ref. VII.4) shows that out of 324 hours, six are devoted to fundamentals of cavalry operations, and two to reconnaissance overlays. These are the only hours that might be considered recon-oriented. In the 688 hour 19D ANCOC POI (Ref. VII.5), zero hours are devoted to reconnaissance. According to Ref. VII.3, the Armor School is changing these programs to place greater emphasis on reconnaissance.

Another possibility is on-the-job training (OJT) for the scout leader. But who will train him? When a new platoon leader enters a company or troop, there are other lieutenants, and a commander and an executive officer who share a common experience. As all students know, we learn from our peers as well as our mentors; the company and the

battalion can be a fruitful schoolhouse. But scouting may not be a shared experience. The scout leader's direct "boss," the HHC commander, is unlikely to have been a scout. Perhaps no other officer in the battalion has had that job--we cannot rely on OJT.

Turning now to the S2 training problem, we find that the battalion S2 is frequently an O-2 MI (military intelligence) officer, although the billet calls for an O-3. (The fill rate for tactical intelligence captains was 71 percent of authorized as of 31 March 1986 (Ref. VII.6).) Therefore, we should look only to the content of the Military Intelligence OBC for the training a maneuver battalion S2 will have. That course includes a total of 916 hours; those topics that appear to apply specifically to the S2 job are shown below (Ref. VII.7):

| | |
|---|---|
| Enemy threat | 67 hours |
| S2 Operations | 1 |
| Bttn Staff Planning | 8 |
| Map reconnaissance | 3 |
| GSR/NODS | 7 |
| Rembass | 7 |
| IPB | 40 |
| All-source exercise | 96 |

In the MI course we see considerable time devoted to skills of direct application, yet pieces are missing. The methods of ground reconnaissance and the background needed for R&S planning are not specifically identified. Also, a course cannot substitute for the experience in battalion operations that maneuver platoon leaders receive in their initial assignments. Therefore, it may be appropriate for the MI school to consider the creation of a special S2 course to be given only to those officers selected for such duty. Again, probably fewer than one in ten MI officers will be called on to serve in that capacity, and it is unreasonable to expect that those special skills will be adequately covered in the common course.

Two other officers in the battalion are key players in successful reconnaissance--the commander and the S3. What particular knowledge might they bring from their schooling? From the armor OAC (Ref. VII.8),

of 897 hours, three are given to terrain analysis, three to tactical intelligence, and six to cavalry troop reconnaissance. On the infantry side, the IOAC POI shows about 32 hours devoted to matters specifically associated with reconnaissance, and most of those hours are specific training objectives included in topics of broader application.

Staff courses beyond the advanced course (e.g., Command and General Staff College) include little material dealing with the methods of tactical reconnaissance, so what the senior battalion officers know must derive from their experience (Ref. VII.3). Pre-command course will touch on important aspects of reconnaissance, but of necessity the treatment must be brief. Their situation might be eased if there were some method-oriented reference material available, particularly in the area of R&S planning.

None of the above discussion deals with the problem of unit training of recon elements. It is well understood that much of the training benefit of the NTC derives from the OPFOR, and this is as true of reconnaissance as of maneuver. It is a significant challenge for the Army to provide adequate opponents for home station training; we urge that the necessity for appropriate counter-reconnaissance as a foil for reconnaissance not be overlooked.

# VIII. EQUIPPING THE RECONNAISSANCE ELEMENT

In the conduct of this research, we have encountered expressions of opinion from many sources concerning the equipment used by the reconnaissance elements of Blue task forces. Differences of viewpoint exist, but in many cases there is consensus among rotational unit officers, members of the NTC Operations Group, and the OPFOR staff. Even without supporting data the viewpoints seemed of sufficient interest to seek corroboration. We began with a review of some background.

First, the vehicular equipment of the task force scout platoon: In the J series Table of Organization and Equipment (TOE), the non-modernized units are mounted in three Improved TOW Vehicles (ITV) and three M113 Armored Personnel Carriers (APCs). Except for night-vision goggles, used for night driving, no supplementary vision aids are provided. In a modernized unit, the scouts are mounted in six M3 Cavalry Fighting Vehicles (CFVs). In both cases, there are 30 personnel in the platoon.

Criticisms of the scout vehicles, based on observations at the NTC, include:

- Scouts are generally instructed to avoid engagement. Thus the use of the ITV by scouts seems inappropriate for their prime reconnaissance role.
- The Bradley CFV is difficult to use in a stealthy manner, and its significant firepower is not required in the reconnaissance mission.
- Wheeled vehicles are better suited than tracked vehicles for reconnaissance.

We used the data card shown in Fig. 9 to gather information on how this equipment is actually employed. The scout platoon observer/controllers of the Operations Group fill out a card for the task force scout platoon after each battle. The purpose of the data is to determine how many of the scout vehicles were customarily available

Unit _____ Date _____

SCOUT VEHICLE DATA

How many vehicles were available at start of mission?

M-113_____ ITV_____ M3_____

How many rounds were fired by scout vehicles?

Cal.50_____ 25mm_____ TOW_____

How were scout tracks killed? Number?

Arty_____ T-72_____ BMP_____ RPG_____

How many more scout vehicles would have died had they been soft-skinned?

Fig. 9—Scout vehicle data card

at the start of the mission (the issue of vehicle reliability); how often and to what degree the armament of the scout vehicles was used; and information useful for assessing the necessary level of ballistic protection for scout vehicles.

The results of the survey, covering 63 battles, are shown in Fig. 10, where the average values determined in the survey are entered. Several messages emerge. First, the scout vehicles, like all vehicles in combat conditions, have less than one hundred percent availability. The problem is probably exacerbated in the case of the scouts by their extended operating times, and sometimes the inaccessibility of maintenance support. Thus, the average availability shown represents expected performance in this regard. We noted, however, that some commanders would proceed on the recon mission with only one to three scout vehicles (15 percent of all battles). This is striking evidence of lack of emphasis on the reconnaissance mission.

Next, it is clear that the scouts do not fire a great deal. This should not be surprising--they are generally not supposed to engage the enemy. This point is well established for M113 and ITV; the Bradleys fire more. In most missions, no TOW rounds are fired; in a few, a few firings occur. Overall, the average for TOW fired is 1.03. These data include both offensive and defensive missions; the CFV is a prime counter-reconnaissance asset, and we can expect the 25-mm gun to be used in that role.

The scout vehicles have a high mortality rate to fire from OPFOR armored vehicles, particularly the BMP, which commonly performs the security mission for the OPFOR. Because nothing less than a tank offers protection from such fire, to avoid scout losses the answer must be stealth, not armor. The data in Sec. IV relating to the importance of avoiding the enemy during reconnaissance underscores this point. These results underline the potential value of a specialized stealthy reconnaissance vehicle. The last point on the card shows that ballistic protection for the crew from artillery fire is a fairly negligible factor. There are no specific data relating to small arms. An alarming number of scout kills are shown due to fratricide. This finding corroborates a previous Arroyo Center Note on fratricide (Ref. VIII.1)

Scout Vehicle Data
(Average Per Mission in 63 Misions)
(Includes Offensive and Defensive Missions)

How many vehicles were available at start of mission?

M-113 **2.7(90%)** ITV **2.3(77%)** M3 **4.1(68%)**

How many rounds were fired by scout vehicles?

Cal.50 **48(11/40m)** 25mm **536(17/23m)** TOW **1.03(17/63m)**

How were scout tracks killed? Number? [In **54** missions.]

Arty **0.28** T-72 **0.61** BMP **0.91** RPG **0.31**

Other **0.15** Fratricide **0.37**

**248** vehicles start; **122** killed by OPFOR; **20** killed by fratricide [**12** tank, **4** arty, **4** misc]

How many more scout vehicles would have died had they been soft-skinned? **0.12**

Fig. 10—Vehicle utilization

which indicated that fratricide was more common in hours of darkness, although there were few data for the periods in which reconnaissance is often done.

These data support several suggestions for change in the way task force scout platoons are equipped. Consider first the non-modernized unit. The three ITVs do not seem to be a good match for the scout mission. They are slower and somewhat less mobile than a basic APC, and their firepower capability is essentially unused. Their most useful feature to the scouts is the thermal sight for observation, but this capability could be supplied by a separate thermal device better suited for surveillance. Thus, even before a possible change in TOE could be considered, task force commanders might wish to put the scout ITVs into a more useful position, and replace them with other APCs. This has been practiced by at least one task force commander at the NTC (Ref. VIII.2).

In the modernized units, the use of the M3 in the scout platoon, instead of the M2, appears counter-productive. We have made two points in this Note that support that statement. First, as was discussed earlier, it is often advantageous to reinforce the scouts with engineers, or artillery forward observers, or extra infantry to man observation points. To do so requires extra seating space in the scout vehicles, unless the attachments come with their own organic vehicles. We have now also determined that the scouts use relatively little ammunition. Thus, the extra ammunition capacity and reduced personnel capacity of the M3 are the opposite of what is needed. We emphasize that this finding applies only to task force scout platoons, and not to the cavalry, whose mission is usually different. (We discuss this point in App. C.)

A major, and controversial, point is the present total reliance of task force reconnaissance on tracked vehicles. There is little doubt that stealth is an important factor in scouting. The experience of the OPFOR confirms this, and their scouts indicate a clear preference for the "BRDM" (wheeled) over the "BMP" (tracked). The BRDM vehicle they use is a visually modified HMMWV for their cavalry elements. Therefore, we suggest that the HMMWV should be considered as a supplement to the present scout tracks in U.S. heavy divisions. This could be tried on an

experimental basis at little cost by some of the units training at the NTC.

The data indicate that ballistic protection may be a worthwhile feature, and one such kit exists for the HMMWV, although the existing kit is probably not suitable for a scout vehicle. The question of armament is less clear, but a medium machine gun, at minimum, seems appropriate. A TOW weapon is not indicated, but the 25-mm chain gun installation for the HMMWV is a possibility, provided that vehicle performance is not seriously compromised by the addition. Further experience may indicate that other features are desirable, or that a specialized armored reconnaissance car should be considered. A number of "off-the-shelf" vehicles exist and could be tried. However, to experiment with such a solution initially would be much more costly and disruptive.

In our review of take-home packages, problems of communication from the scout element were frequently mentioned. Considering the depth of the sectors that the scouts must cover at the NTC (which fall within doctrinal guidance), and the nature of the terrain, it is not unexpected that the FM radio nets will fail unless relay or retransmission methods are practiced. Artillery units have similar problems to contend with, but they are usually provided with a retransmission (retrans) capability. The reconnaissance elements have the same need, and should be provided with the requisite hardware. Otherwise the less reliable method of having a net station pass on calls must continue. We have considered the problem of implementation, and recognize that adding special vehicles (and crews) for this purpose may not be feasible. But there is another means, although it is operationally less effective.

It is almost a universal practice that ground surveillance radars (GSR) mounted in M113s are attached to the task force at the NTC, and are often placed with the scout platoon. The GSRs are part of the division's electronic warfare battalion and come to the NTC as part of the brigade's "slice" of division assets. These units are generally employed in forward positions, but not as far forward as the scouts are expected to move. They could therefore effectively operate as retrans stations. We suggest as a minimum step the necessary retrans control and radio units be installed in the GSR vehicles to support the scouting

activity and that the communication electronic operating instructions (CEOI) be modified to add the necessary frequencies. Still another alternative is to add high frequency (HF) radio equipment to the scout elements. Aside from cost, this suffers from the disadvantage of preventing other units of the task force from eavesdropping on the scout reports.

The following is not an equipment issue, but an organizational one; we mention it here as a fallout of the discussion on the GSRs. Army policy urges units to train as they will fight. At the NTC, the GSRs are generally under task force control. If they are not attached to the scout platoon, they often experience difficulties with logistics and other support, being isolated "orphans." There is the equally serious problem of their placement and protection on the battlefield. For these reasons it is common to attach them to the scouts. There would be significant advantages to making them organic to the task force scout platoon, in terms of developing habitual relationships. But there are also advantages to having them consolidated at the division, mostly in technical training and support while in garrison. In field exercises, it is not common to have the GSR company act as a cohesive unit; rather the platoons are parceled out to the brigades. The maximum range of the GSRs (~10 km) make them most useful and appropriate in covering task force sectors, and that is why they are usually attached to the task forces. The task force is therefore responsible for their employment, and the Forward Support Battalion must provide for their technical maintenance, regardless of who "owns" them. Thus, the garrison advantage goes to division assignment, and the field advantage goes to battalion assignment. We suggest that the Army consider dispersion of the division GSRs to the battalions (as they once were), making them organic, or at least attached, to the scout platoon. Some modification in the allocation of types of GSRs to the division may be necessary if this step is taken (Ref. VIII.3).

The scouts are frequently hampered in night surveillance operations, both mounted and dismounted, owing to a lack of night vision devices. Aside from goggles, useful only at short range, they must rely on the TOW sight (or the Bradley thermal sight), or on Dragon sights. While the TOW sight on the ITV can be effectively used when dismounted

from the vehicle, the Bradley sight cannot be so used, and the Dragon sight is clumsy when used in that mode. Each scout vehicle should be provided with a night vision device (dismountable thermal surveillance unit), with at least three additional units available to the scout platoon for use in setting up observation points. That number strikes a balance between the number of OPs a commander might like to have, and the number that his assets will support. Careful attention should be given to the power supplies and the means of cooling employed in the sights, particularly those used in the dismounted mode, because of recurrent problems with these items. Scouts also mention that they need additional binoculars and night vision goggles. (The monocular-laser rangefinder, AN/GVS 5, may be an even better choice.)

Although we have no data on the problem, we have observed that scouts may become lost or disoriented at night, and frequently report incorrect locations (for themselves and the enemy). Navigation is difficult and can be time-consuming at critical junctures. Modern technology offers a variety of solutions, and several systems are being used or planned by the Army. It is recommended that scout elements be provided with appropriate equipment at an early time.

Considering all of the results of this study, we suspect that the six vehicle scout platoon is simply too small to cover the sectors being assigned to battalion task forces. We believe that careful consideration should be given to enhancing recon assets at either the brigade or battalion level.

# iX. CONCLUSIONS AND RECOMMENDATIONS

Data from take-home packages and from field observations demonstrate that there is a strong correlation between successful reconnaissance and successful offensive operations. Beginning an attack, even with doctrinally acceptable force ratios, but without appropriate intelligence, is apt to lead to failure. This was shown to be as true for the OPFOR as for rotational training units, and holds for both hasty and deliberate attacks.

The data indicate that training units are beginning attacks with adequate intelligence only about one-fourth of the time. The question of adequacy is subjective, of course, but reconnaissance performance is far enough from one hundred percent to be of major concern.

Why does this situation come about? The task force scout platoon alone is apparently insufficient to cover the assigned sector and to accomplish the tasks inherent in complete reconnaissance, in the time available. The data show that task forces frequently fail to apply sufficient additional assets to the reconnaissance task. Moreover, task forces frequently squander the precious asset of time. These manifestations probably reflect a lack of appreciation for the importance of reconnaissance on the part of task force commanders and staff. Improvement in reconnaissance will only come about when commanders place greater emphasis on the whole intelligence operating system.

What are the shortfalls contributing to the problem with reconnaissance? First, the "working" doctrinal manuals do not identify reconnaissance as an essential factor. Second, the manuals lack specificity for the conduct of scouting/reconnaissance. Further, the key players in the task force have not had adequate opportunity for individual training in reconnaissance skills. Owing to limited individual training and experience, and lack of specific guidance for collective training, unit training in the reconnaissance function suffers. This apparently is as true for the staff as it is for the scouts themselves. Finally, the capability of the equipment available to the scouts does not meet their minimum requirements.

In summary, although reconnaissance has been shown to be of vital importance, the topic does not seem to receive adequate attention in our operational system. Our recommendations are:

## DOCTRINE

In the version of FM 71-2J presently being prepared, emphasize the importance of reconnaissance in the conduct of the attack; elaborate on the use of assets other than the scout platoon for reconnaissance. Add specificity to the sections covering the planning of reconnaissance and surveillance, and include illustrative material on Intelligence Preparation of the Battlefield in offensive situations. In the appendix on the Scout Platoon, stress their role in reconnaissance, over other functions.

While not strictly a matter of doctrine, add a textbook or handbook on reconnaissance to the training material available.

## TRAINING

Develop a course for scout platoon leaders, to be taken at the time they are assigned to that position. Detailed recommendations for the content of that course were made earlier in this Note. Assets must be provided to the schoolhouse to support the course, and to units to permit attendance by designees.

Similarly, develop a course for battalion S2s, to be taken by officers at the time they are assigned to that position. The course should emphasize battalion operations, and the relation of reconnaissance/surveillance planning to the commander's needs.

Develop unit training methods supporting reconnaissance planning and execution for the guidance of battalion leaders.

During training at the NTC, various persistent problems have been encountered in combat operations; attention to these problems by the NTC trainers have yielded positive results. It is recommended that attention be given to the intelligence operating system at the NTC, until the persistent problems identified in this report have been solved.

## EQUIPMENT

Scout efficiency could be improved by equipment changes and additions. The following recommendations are a minimum; more costly additions have the potential for greater gains, as has been discussed. The M3 Cavalry Fighting Vehicle appears to be inappropriate for task force scouts; their needs would be better served by the M2 Infantry Fighting Vehicle. This would be an essentially no-cost substitution.

For non-modernized units, the use of ITV in the scout platoon is inappropriate. They can be replaced by M113, possibly at a cost saving.

A small number, perhaps two, wheeled vehicles should be added to the scout platoon for the purpose of adding stealth and numbers. The HMMWV chassis has proven its utility to the OPFOR at NTC. That vehicle, possibly with a ballistic-protective shell kit and/or an armament installation, is suggested as a candidate for exploratory use.

Provide a dismountable thermal viewer to each scout vehicle, with sufficient power and cooling capacity to permit extended use. Additional binoculars for day use and night goggles for the scouts are needed.

Add two sets of radio relay equipment to the scout platoon, making provision for their installation in the GSR vehicles commonly attached to the scouts.

Provide position/location (navigational and spotting) equipment to the scout platoon.

# Appendix A

## SCOUT CARD DATA AND DERIVED QUANTITIES

James S. Hodges

This appendix presents the field data from the cards described in Sec. III, in compiled formats. The computations made in analyzing the data are summarized and the computed tables given. To preserve confidentiality, we have removed all data items that could be used to identify task forces or individual missions. We have preserved the grouping of missions by task forces, so that readers can reconstruct the analyses we did on task forces. The task forces are not presented in chronological or any other particular order; the sequential labels 1, 2, up to 19 for the task forces have no meaning. However, within task forces, the missions are in chronological order.

## DATA AND FORMATS

The data in Table A.1 are from the card titled "Offensive Mission Evaluation," with the unit and mission identifiers removed. Each row in the table corresponds to a mission, and the columns in the table are as below. For each item, the entry "Z" means that the corresponding blank on the data card was not filled out; the data item is missing.

Col.

(1) Battle type: MT - Movement to Contact
DA - Deliberate Attack
HA - Hasty Attack
D - Defensive Mission
CA - Counterattack

(2) Terrain objective: Y or N

(3) Terrain result: 1 = not secured, 2 = partially secured, 3 = secured

(4) Enemy objective: Y or N

(5) Enemy result: 1 = <20% destroyed, 2 = 20-50% destroyed, 3 = >50% destroyed

(6) Ability to continue objective: Y or N

(7) Ability to continue result: 1 = incapable, 2 = doubtful, 3 = capable

(8) Battle result affected by actions taken for training benefit? Y or N

(9) Overall rating: 1 (failure), 2, 3, 4, or 5 (success).

Table A.1

TASK FORCE SUCCESS MEASURES

| Col. | battle type | tee rrr aii nn | tee nre mmm aay | eee nnn mmm yyy | ccc ooo nnn ttt iii nnn | cto ora nti ina lil ril | ovr ver air ail iin gng |
|---|---|---|---|---|---|---|---|
| 1 | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| 2 | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| | | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z | Z Z Z |
| 3 | | MT Y 2 | N 2 | N 2 | N 2 | N 2 | |
| | | DA Y 1 | N 2 | N 1 | N 1 | N 1 | |
| | | MT Y 2 | N 3 | N 2 | N 2 | N 2 | |
| | | DA Y 1 | N 1 | N 1 | N 1 | N 1 | |
| 4 | | MT Z Z | N 2 | N 2 | N 2 | N 2 | |
| | | DA Z Z | Y 2 | N 2 | N 2 | N 2 | |
| | | HA Y 2 | Y 2 | Y 2 | Y 2 | N 3 | |
| | | MT Y 3 | Y 3 | Y 3 | Y 3 | N 4 | |
| | | DA Y 3 | Y 3 | Y 3 | Y 2 | N 4 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 | DA | Z | Z | Z | Z | Z | Z | Z | Z |
| | DA | Z | Z | Z | Z | Z | Z | Z | Z |
| | DA | Z | Z | Z | Z | Z | Z | Z | Z |
| | D | Z | Z | Z | Z | Z | Z | Z | Z |
| | MT | Z | Z | Z | Z | Z | Z | Z | Z |
| | DA | Z | Z | Z | Z | Z | Z | Z | Z |
| | D | Z | Z | Z | Z | Z | Z | Z | Z |
| 6 | MT | Y | 3 | Y | 2 | Y | Z | N | 4 |
| | DA | Y | 2 | Y | 2 | N | 2 | N | 2 |
| | DA | Y | 1 | Y | 2 | N | 1 | N | 2 |
| 7 | DA | Y | 3 | Y | 3 | N | 1 | N | 2 |
| | MT | N | Z | Y | 3 | N | 1 | N | 2 |
| | MT | N | Z | Y | 3 | Z | 2 | N | 4 |
| | DA | Y | 3 | Y | 3 | Z | 2 | N | 4 |
| | DA | Z | Z | Y | 3 | Y | 3 | N | 4 |
| 8 | DA | Y | 1 | Y | 1 | Y | 3 | N | 1 |
| | DA | Y | 1 | Y | 1 | N | 1 | N | 2 |
| | DA | Y | 3 | Y | 3 | Y | 3 | N | 4 |
| | DA | Y | 3 | Y | 3 | Y | 3 | N | 4 |
| | MT | Y | 3 | Y | 2 | N | 2 | N | 3 |
| 9 | DA | Y | 2 | Y | 3 | N | 1 | N | 3 |
| | DA | Y | 2 | Y | 3 | N | 1 | N | 3 |
| | MT | Y | 1 | Y | 2 | N | 1 | N | 2 |
| | MT | Y | 2 | Y | 3 | N | 2 | N | 3 |
| | DA | Y | 1 | Y | 2 | N | 1 | N | 2 |
| 10 | MT | Y | 1 | Y | 1 | Y | 3 | N | 2 |
| | DA | Y | 1 | N | 1 | N | 1 | N | 1 |
| | DA | Y | 1 | N | 3 | N | 1 | N | 3 |
| | MT | Y | 2 | Y | 3 | N | 1 | N | 3 |
| | DA | Y | 1 | Y | 2 | N | 1 | N | 2 |
| 11 | MT | Y | 3 | N | 3 | N | 1 | N | Z |
| | HA | Y | 3 | N | 3 | Z | 2 | N | Z |
| 12 | DA | Z | Z | Z | Z | Z | Z | Z | Z |
| | MT | Z | Z | Z | Z | Z | Z | Z | Z |
| | DA | Z | Z | Z | Z | Z | Z | Z | Z |
| | D | Z | Z | Z | Z | Z | Z | Z | Z |
| | DA | Z | Z | Z | Z | Z | Z | Z | Z |
| | D | Z | Z | Z | Z | Z | Z | Z | Z |
| | DA | Z | Z | Z | Z | Z | Z | Z | Z |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 13 | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 14 | MT | Y | 1 | Y | 1 | N | 2 | N | 2 |
| | DA | Y | 1 | Y | 3 | N | 2 | N | 2 |
| | DA | Y | 3 | Z | 3 | N | 2 | N | 4 |
| | DA | Y | 3 | N | 3 | N | 1 | N | 3 |
| | DA | Y | 3 | Z | 3 | N | 3 | N | 4 |
| 15 | MT | Y | 2 | Y | 2 | Y | 3 | N | 3 |
| | DA | Y | 1 | Y | 2 | N | 1 | N | 2 |
| | DA | Y | 1 | Y | 3 | N | 1 | N | 2 |
| | DA | Y | 1 | Y | 3 | N | 1 | N | 3 |
| | DA | Y | 2 | Y | 2 | N | 1 | N | 2 |
| 16 | MT | Y | 1 | N | 1 | Y | 3 | N | 3 |
| | DA | Y | 1 | Y | 1 | N | 1 | N | 2 |
| | DA | Y | 2 | Y | 2 | N | 2 | N | 2 |
| | DA | Y | 3 | Y | 3 | N | 2 | N | 3 |
| | DA | Y | 2 | Y | 3 | N | 1 | N | 3 |
| 17 | DA | Y | 2 | N | 2 | N | 2 | N | 2 |
| | DA | Y | 3 | N | 3 | N | 2 | N | 3 |
| | MT | Y | Z | Y | 3 | N | Z | N | 3 |
| | DA | Y | 3 | N | 3 | N | 1 | N | 4 |
| | DA | Y | 3 | N | 3 | N | 2 | N | 2 |
| 18 | MT | Y | 1 | Y | 2 | N | 1 | N | 1 |
| | DA | Y | 1 | Y | 2 | N | 1 | N | 1 |
| | HA | Y | 1 | Y | 1 | N | 1 | N | 1 |
| | HA | Y | 1 | Y | 2 | N | 1 | N | 1 |
| | DA | Y | 3 | Y | 3 | Y | 2 | N | 4 |
| 19 | CA | N | 1 | Y | 2 | N | 1 | N | 2 |
| | DA | Y | 3 | Y | 2 | N | 2 | N | 3 |
| | DA | Z | Z | Y | 3 | N | 1 | N | 4 |
| | DA | Z | Z | Y | 3 | Z | 2 | N | 4 |

The data in Table A.2 are from the face and reverse of the Scout Mission Evaluation card. They capture success or failure at specific reconnaissance tasks and in the planning, preparation, and execution of the scout mission. Each row in Table A.2 corresponds to an offensive battle (and to the same row in Table A.1) and has the following columns:

(1) - (8): The eight questions about activities related to the objective area.

(9) - (18): The ten questions about activities related to the axis zone.

(19) - (20): The two questions about other missions.

(21) - (25): The five questions about recon planning.

(26) - (29): The four questions about recon preparation.

(30) - (34): The five questions about execution of the recon mission.

For all questions, Y = Yes, N = No, I = Not Applicable ("Inapplicable"), and Z indicates that the question was not answered.

Table A.2

TASK SUCCESS AND PLANNING, PREPARATION, AND EXECUTION SUCCESS

| | Objective | | | | | | | Area | | | | | | | Axis | | | | | | | Zone | | | | | | | Other | | | | | | | Plan | | | | | | | Prepar-ation | | | | | | | Execution | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | p | l | d | l | b | m | w | O | r | l | l | b | b | m | O | i | t | t | b | e | t | r | t | a | l | a | m | r | c | d | s | c | a | a |
| | e | o | e | o | r | a | i | P | e | o | o | r | y | a | P | n | e | r | e | s | e | e | i | l | e | s | i | e | o | i | t | o | s | v |
| | n | c | s | c | e | r | t | | c | c | c | e | p | r | | f | r | a | y | t | m | c | m | l | a | s | h | m | t | s | a | o | s | o |
| | e | a | c | a | a | k | h | | o | a | a | a | a | k | | i | r | f | o | | p | e | e | a | d | s | e | m | o | m | t | r | e | i |
| | t | t | r | t | c | | d | | n | t | t | c | s | | | l | a | f | n | s | l | l | l | e | e | e | t | a | r | o | u | d | t | d |
| | r | i | | e | h | b | r | | | e | e | h | s | r | | t | t | i | d | c | a | a | y | s | r | | i | o | s | | s | | | |
| | e | b | | | | y | a | | l | | | | | o | | | i | c | | r | t | p | | s | | | | n | n | | | | m | | e |
| | a | e | o | o | p | w | | | e | s | o | o | o | u | | r | r | a | o | e | e | l | p | e | | | s | a | e | n | t | r | | a | n |
| | t | p | | b | a | | | | n | c | b | b | b | t | | o | o | r | e | e | | a | l | t | | | e | b | l | t | | p | | t | e |
| | e | o | b | s | s | s | r | | g | r | s | s | s | e | | u | e | b | b | e | | n | a | s | | | a | r | | | | t | | r | m |
| | | s | p | s | | s | p | | t | n | | | | | | t | l | e | j | n | | | n | | | | d | f | | | | | | i | e |
| | | n | o | | | | t | | h | | | | | | | e | c | | | | | | | | | | y | | | | | | | x | m |
| | | s | s | | | | | | | | | | | | | | e | | | | | | | | | | | | | | | | | | y |
| Col. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 2 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 3 | N | N | N | N | N | N | N | N | N | N | Y | Y | N | N | N | N | N | N | N | N | N | Y | Y | Y | Y | Y | Y | Y | Y | N | N | Y | N | N | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | Y | N | N | Y | N | N | N | N | I | N | I | I | I | I | Y | Y | N | I | N | N | Y | Y | N | Y | Y | N | Y | N | Y | Y | N | Y | N | N | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | N | N | Y | I | I | I | N | N | Y | Y | I | I | I | I | N | N | N | N | N | N | N | Y | Y | Y | Y | Y | Y | N | Y | N | N | I | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | Y | N | I | I | I | I | N | N | I | I | N | N | Y | Y | N | Y | Y | N | Y | N | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| 4 | N | N | N | N | N | N | N | N | Y | Y | N | N | N | N | N | N | N | N | N | N | N | Y | Y | N | Y | Y | Y | N | N | N | Y | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | Y | Y | Y | Y | N | N | Y | N | N | N | Y | N | N | N | N | N | N | N | N | N | N | Y | N | N | Y | Y | N | Y | Y | Y | Y | Y | N | Y | Y | Y | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | N | Y | Y | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | Y | Y | Y | Y | N | Y | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | N | Y | Y | Y | Y | N | N | N | Y | N | N | N | N | N | N | N | N | N | N | N | N | Y | Y | N | Y | Y | Y | Y | N | N | Y | Y | N | Y | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | N | Y | Y | Y | Y | Y | N | N | N | Y | Y | Y | N | N | N | N | N | N | N | N | N | Y | Y | N | Y | Y | Y | Y | N | N | Y | Y | N | N | Y | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |

| | | |

13

Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z  Z Z Z Z  Z Z Z Z Z
Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z  Z Z Z Z  Z Z Z Z Z
Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z  Z Z Z Z  Z Z Z Z Z
Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z  Z Z Z Z  Z Z Z Z Z
Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z  Z Z Z Z  Z Z Z Z Z
Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z  Z Z Z Z  Z Z Z Z Z
Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z  Z Z Z Z  Z Z Z Z Z

14

N N N N I I N Y  Y Y I I I N Y N N Y  N I  Y Y Y N N  N Y N Y  Y N N Y N
N N N N N N N N  Y N N N N N Y N I I  N I  N Y N Y Y  N N N Y  Y N N Y N
N N N N N N N N  Y Y N N N N N Y N N  N N  Y Y Y N Y  N N N Y  N N N Y N
Y Y Y Z Z Z N Y  N N N N N N Y N I I  N N  Y Y N Y Y  N N N Y  N N N Y N
Y Y Y N N N Y Y  Y I I I I Y N N N N  N N  Y Y Y Y Y  N N N Y  N N N Y N

15

N N N N N N N N  N Y N N N N Y N N N  N N  N Y Y Y Y  N Y N Y  N Y N N N
N N N N N N N N  N N N N N N N N N N  N N  N N N N Y  N Y N Y  Y N N N N
Y N N N N N N Y  N N N N N N N N N N  N N  N Y N N Y  N Y N Y  Y N N N Y
N Y N Y N N Y Y  N Y N N N N N N N N  N N  N N N N Y  N Y N Y  Y N N N N
Y Y Y Y Y N Y N  N N N N N N N N N N  N N  Y Y Y Y Y  Y Y N Y  Y Y N N N

16

Y Y Y Y Y N Y Y  Y I I I I N N Y Y Y  N N  N Y Y Y Y  Y Y N Y  Y Y N N Y
N N N N N N N N  N N N N N N N N N N  N N  N Y N N Y  N Y N Y  N N N N N
N Y N Y Y N N N  Y N N N N N N N N N  N N  Y Y N Y Y  Y Y N Y  Y N N N N
N Y Y Y Y N N N  N Y N N N N N N N N  N N  Y Y N Y Y  Y Y N Y  Y N N N N
N Y Y N N N N N  Y N N N N N N N N N  N N  Y Y Y N Y  Y Y N Y  N N N N N

17

N N N N N N N N  N Y Y N N I N I I I  N N  Y Y Y Y Y  Y Y Y Y  N Y N Y N
N N N N N I N Y  Y N N N I I Y I I I  N N  Y N N Y Y  N N N Y  N N Y N N
N N N I I I N N  N N I I I N N N N N  I N  N Y Y Y Y  N N N Y  N N Y N N
N N N Y Y Y N Y  N Y Y Y Y N Y I I I  N N  Y Y Y Y Y  Y Y N Y  N N N Y N
N Y N Y N I N N  Y Y Y Y N I Y I I I  N N  N N N Y Y  N Y N Y  N Y N N N

18

N N N N N N N N  Y N N N N N Y N N N  N N  N Y N N Y  N Y N Y  N Y Y N N
N Y Y N N N N N  N N N N N N N N N N  N N  N Y N N Y  N Y N Y  N N N N N
N Y Y N N N Y Y  N N N N N N Y N N N  N N  N Y Y N Y  N Y N Y  Y Y N N Y
Y Y Y Y N N Y N  Y N N N N N N N N N  N N  Y Y Y N Y  Y Y N Y  N Y N N Y
Y Y Y Y N N Y Y  Y N N N N N Y N Y Y  N N  Y Y N N Y  Y Y Y Y  Y Y N N Y

19

N Y N I I I N N  N I I I I I Y Y N N  Y Y  N Y Y N Y  N Y N Y  N N N N Y
Y Y Y N N N Y Y  N N N N N N N N N N  N N  N Y Y Y Y  N Y N Y  Y Y N Y N
Y Y Y Y N N N Y  Y N N N N N N N N N  N N  Y Y Y N Y  N Y N Y  Y Y N Y N
N Y Y Y N N Y Y  N Y N N N N N N N N  N N  Y Y Y Y Y  Y Y N Y  Y Y N Y Y

Table A.3 has four parts, Tables A.3a, A.3b, A.3c, and A.3d, which contain the entries in the Asset Utilization Matrix. The four subtables contain the following activities from the asset utilization matrix:

| Subtable | Activity |
|---|---|
| Table A.3a | Locate enemy positions<br>Locate objective obstacles<br>Breach/mark obstacles<br>Establish objective OP |
| Table A.3b | Direct fires<br>Assist C&C<br>Locate screen<br>Locate route obstacles |
| Table A.3c | Breach/mark obstacles<br>Mark assault route<br>Infiltration route<br>Establish route OP |
| Table A.3d | Terrain recon<br>*Trafficability*<br>Timely communication |

For each mission (row), each activity includes nine columns, one for each of the assets that could have been used for that activity. In order, the columns correspond to the scout platoon, the ground surveillance radar (GSR), vision aids, forward observers, infantry, armor elements, aviation, engineers, and signal/electronic warfare assets. The columns can contain Y for Yes, N for No, or I for Inapplicable. Thus, if the first nine columns in a row in Table 3a are

Y N N N N N Y N N

it means that the scout platoon and aviation assets were assigned to that activity (locate enemy positions) for that battle, but no other assets were so assigned.

Table A.3a

ASSET UTILIZATION FOR LOCATING ENEMY POSITIONS, LOCATING OBJECTIVE OBSTACLES, BREACHING/MARKING OBSTACLES, AND ESTABLISHING AN OBJECTIVE OP

| | Locate Positions | | | | | | | | | Locate Obstacles | | | | | | | | | Breach/Mark Obstacles | | | | | | | | | Objective OP | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Scout Platoon | GS Radios | Vic Aids | FO | Infantry Platoon | Armor Platoon | Aviation Assets | Engineer Squad | Smoke Generator | Scout Platoon | GS Radios | Vic Aids | FO | Infantry Platoon | Armor Platoon | Aviation Assets | Engineer Squad | Smoke Generator | Scout Platoon | GS Radios | Vic Aids | FO | Infantry Platoon | Armor Platoon | Aviation Assets | Engineer Squad | Smoke Generator | Scout Platoon | GS Radios | Vic Aids | FO | Infantry Platoon | Armor Platoon | Aviation Assets | Engineer Squad | Smoke Generator |
| Col. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 2 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 3 | Y | Y | Y | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| | Y | N | Y | N | N | N | N | N | N | Y | N | Y | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | Y | N | N | N | N | N | N | N |
| | Y | Y | Y | Y | Y | N | N | N | N | Y | Y | Y | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | Y | Y | N | Y | N | N | N | N |
| 4 | Y | Y | N | N | N | N | N | N | N | Y | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | N | N |
| | Y | N | N | N | Y | N | N | N | N | Y | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | Y | N | Y | N | N | N | Y | N | N | N | N |
| | Y | Y | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | Y | Y | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | Y | N | N | Y | N | N | N | N | N | N | N | N |

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Table A.3b

ASSET UTILIZATION FOR DIRECTING FIRES, ASSISTING COMMAND AND CONTROL, LOCATING THE SCREEN, AND LOCATING ROUTE OBSTACLES

| | Direct Fires | | | | | | | | | Assist C&C | | | | | | | | | Locate Screen | | | | | | | | | Locate Route Obstacles | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sct Plt | GS R | vi s | FO | ia nf ar mt ao ry | aa ri ot ne | ae ni ig EW | sc ni gg | Sct Plt | GS R | vi s | FO | ia nf ar mt ao ry | aa ri ot ne | ae ni ig EW | sc ni gg | Sct Plt | GS R | vi s | FO | ia nf ar mt ao ry | aa ri ot ne | ae ni ig EW | sc ni gg | Sct Plt | GS R | vi s | FO | ia nf ar mt ao ry | aa ri ot ne | ae ni ig EW | sc ni gg |
| Col. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 2 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 3 | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | Y | Y | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | Y | Y | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| | Y | N | N | Y | N | N | Y | N | N | Y | N | N | N | N | N | Y | N | N | Y | Y | Y | N | N | N | Y | N | N | N | N | N | N | N | N | N | N | N |
| | Y | N | N | Y | N | N | N | N | N | Y | N | N | N | Y | N | N | N | N | Y | Y | Y | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| 4 | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | N |

5

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6

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7

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Table A.3c

ASSET UTILIZATION FOR BREACHING AND MARKING ROUTE OBSTACLES, MARKING ASSAULT ROUTE, MARKING THE INFILTRATION ROUTE, AND ESTABLISHING ROUTE OPs

| | Breach/Mark Route Obstacles | | | | | | | | | Mark Assault Route | | | | | | | | | Infiltration Route | | | | | | | | | Route OP | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | s c t p l t | G S R a i d s | v i s | F O | i n f a t r y | a r m o r | a v i n e r | e n i g | s e s | s c t p l t | G S R a i d s | v i s | F O | i n f a t r y | a r m o r | a v i n e r | e n i g | s e s | s c t p l t | G S R a i d s | v i s | F O | i n f a t r y | a r m o r | a v i n e r | e n i g | s e s | s c t p l t | G S R a i d s | v i s | F O | i n f a t r y | a r m o r | a v i n e r | e n i g | s e s |
| Col. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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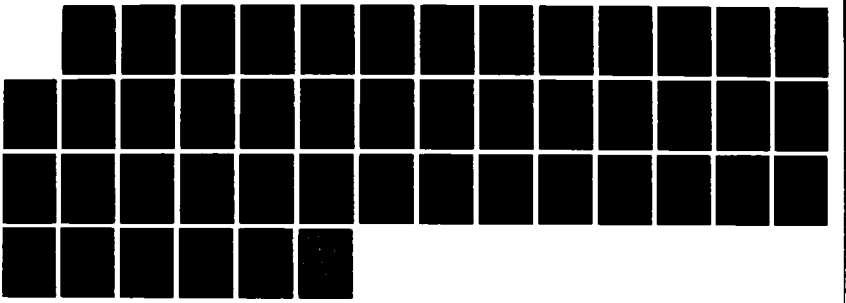

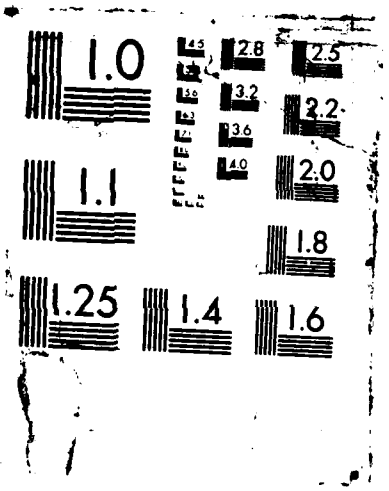
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0

5

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14
N N N N N N N N N  Y N N N N N N N N  Y N N N N N N N N  Y N N N N N N N N
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Y N N N N N N N N  N N N N N N N N N  Y N N N N N N N N  N N N N N N N N N
Y N N N N N N N N  N N N N N N N N N  Y N N N N N N N N  Y N N N N N N N N
Y N N N N N N N N  N N N N N N N N N  Y N N N N N N N N  N N N N N N N N N

15
Y N N N N N N N N  N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N  N N N N N N N N N
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16
Y N N N N N N Y N  N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
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Y N N N N N N Y N  N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
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17
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Y N N N Y N N N N  N N N N N N N N N  N N N N N N N N N  Y Y N N N N N N N

18
N N N N N N N Y N  N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
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N N N N N N N Y N  N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N Y N  N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N Y N  N N N N N N N N N  N N N N N N N N N  N N N N N N N N N

19
I I I I I I I I I  N N N N N N N N N  Y N Y N Y Y N N N  N N N N N N N N N
Y N N N N N N Y N  N N N N N N N N N  N N N N Y Y N N N  N N N N N N N N N
Y N N N N N N Y N  N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N Y N  N N N N N N N N N  Y N N N N N N N N  N N N N N N N N N

Table A.3d

ASSET UTILIZATION FOR TERRAIN RECONNAISSANCE ON THE AXIS, TRAFFICABILITY, AND TIMELY COMMUNICATION

| | Terrain Recon | | | | | | | | Trafficability | | | | | | | | Timely Communication | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | sector | GSR | vis | Fog | ian | aor | ave | esn | sector | GSR | vis | Fog | ian | aor | ave | esn | sector | GSR | vis | Fog | ian | aor | ave | esn |
| | plt | | air | | ant | | ien | EW | plt | | air | | ant | | ien | EW | plt | | air | | ant | | ien | EW |
| | | | ds | | ry | | or | | | | ds | | ry | | or | | | | ds | | ry | | or | |
| Col. | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 2 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 3 | Y | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N |
| | Y | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N |
| | Y | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N | Y | N | N | N | N | Y | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | Y | N | N | Y | N | N | N |
| 4 | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | Y | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N |
| | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | N | Y | N | N | N | N | N | N | N |

5

Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z

6

N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N

7

N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N

8

N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N

9

N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N

10

N N N N N N N N N  N N N N N N N N N  Y N N N Y Y N N N
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Y N N N N N N N N  Y N N N N N N N N  N N N N N N N N N
Y N N N N N N N N  Y N N N N N N N N  Y N N N Y Y Y N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N

11

N N N N N N N N N  Y Y N N N N N N N  Y Y N N Y N N N N
Y N N N N N N N N  Y N N N N N N N N  Y Y N N N N N N N

12

Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z

13
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z
Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z  Z Z Z Z Z Z Z Z Z

14
Y N N N N N N N N  Y N N N N N N N N  Y Y N Y N N N N N
N N N N N N N N N  N N N N N N N N N  Y Y N N N N N N N
Y N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N Y N N Y N N N
Y N N N N N N N N  Y N N N N N N N N  Y N N N Y N N N N

15
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N

16
Y N N N N N N N N  Y N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y N N N N N N N N

17
N N N N N N N N N  N N N N N N N N N  Y Y N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y Y N N N N N N N
Y N N N N N N N N  Y N N N N N N N N  Y N N N N N N N N
N N N N N N N N N  N N N N N N N N N  Y Y N N Y N N N N
N N N N N N N N N  N N N N N N N N N  Y Y N N Y N N N N

18
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
N N N N N N N N N  N N N N N N N N N  N N N N N N N N N
Y N N N Y N N N N  N N N N N N N N N  N N N N N N N N N

19
N N N N N N N N N  N N N N N N N N N  Y Y Y N N N N N N
N N N N N N N N N  N N N N N N N N N  Y Y Y N N N N N N
N N N N N N N N N  N N N N N N N N N  Y Y Y N N N N N N
N N N N N N N N N  N N N N N N N N N  Y Y Y N N N N N N

Table A.4 contains the data from the Scout Vehicle Card. The rotations covered by these cards overlap the rotations covered by the other three data cards, but contain some additional missions. As with Tables A.1-A.3, the missions (rows) in Table A.4 are grouped by rotation, but the rotations are in random order. Defensive missions were included in some rotations.

Each record (row) in this file contains the following columns:

(1) Number of M113s available at start of mission: one digit
(2) Number of ITVs available at start of mission: one digit
(3) Number of M3s available at start of mission: one digit
(4) Number of Cal.50 rounds fired by scout vehicles: three digits
(5) Number of 25-mm rounds fired by scout vehicles: four digits
(6) Number of TOW rounds fired by scout vehicles: two digits
(7) Number of scout vehicles killed by artillery: one digit
(8) Number of scout vehicles killed by T-72s : one digit
(9) Number of scout vehicles killed by BMPs : one digit
(10) Number of scout vehicles killed by RPG : one digit
(11) Number of scout vehicles killed by other Red weapons: one digit
(12) Number of scout vehicles killed by fratricide: one digit
(13) How many more scout vehicles would have died had they been soft-skinned? one digit

Z = question was not answered.

Table A.4

SCOUT VEHICLE CARDS

| | Vehicles Available | | | Rounds Fired | | | Killed by OPFOR | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | M 1 1 3 | I T V | M 3 | Cal .50 | 25 mm | T O W | a r t y | T 7 2 | B M P | R P G | o t h e r | f r a t | How many more dead if soft skinned? |
| Col. | | | | | | | | | | | | | |
| 1 | 3 | 2 | 0 | 25 | 0 | 0 | 1 | 0 | 3 | 1 | 0 | 0 | 0 |
| | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | 3 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 2 | 3 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 3 | 2 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 2 | 1 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 2 | 0 | 0 | 5 | 0 | 400 | 2 | 0 | 1 | 0 | 1 | 1 | 0 | 0 |
| | 0 | 0 | 4 | 0 | 200 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | Z |
| | 0 | 0 | 3 | 0 | 500 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | Z |
| | 0 | 0 | 6 | 0 | 2600 | 4 | 0 | 3 | 0 | 0 | 0 | 1 | 0 |
| | 0 | 0 | 6 | 0 | 400 | 0 | 0 | 1 | 0 | 0 | 0 | 3 | 1 |
| | 0 | 0 | 5 | 0 | 700 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| 3 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 4 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 5 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 1 | 0 | 25 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 4 | 0 | 2400 | 4 | 0 | 0 | 1 | 1 | 0 | 0 | 0 |
| | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 3 | 0 | 100 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 |
| | 3 | 3 | 0 | 350 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 | 0 |
| | 3 | 3 | 0 | 200 | 0 | 8 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| 7 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 8 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 100 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 3 | Z |
| | 3 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 2 | Z |
| | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 1 | 0 |
| 9 | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| | 3 | 2 | 0 | 500 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 3 | 3 | 0 | 100 | 0 | 0 | 0 | 1 | 2 | 1 | 0 | 0 | 0 |
| | 3 | 2 | 0 | 0 | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 0 | 0 |
| | 3 | 2 | 0 | 100 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |
| 10 | 0 | 0 | 6 | 0 | 100 | 0 | 0 | 1 | 3 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 6 | 0 | 200 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 4 | 0 | 1000 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| | 0 | 0 | 5 | 0 | 1000 | 4 | 0 | 1 | 2 | 0 | 0 | 0 | 0 |
| 11 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 12 | 2 | 2 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 3 | 2 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 3 | 0 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 3 | 0 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 3 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |
| | 4 | 0 | 0 | 0 | 0 | 0 | Z | Z | Z | Z | Z | Z | Z |
| | 4 | 2 | 0 | 50 | 0 | 7 | 2 | 0 | 0 | 2 | 0 | 0 | 2 |
| 13 | 2 | 2 | 0 | 0 | 0 | 4 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| | 2 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| | 2 | 3 | 0 | 75 | 0 | 0 | 2 | 0 | 0 | 0 | 1 | 0 | 2 |
| | 3 | 3 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 | 11 | 0 | 1 | 3 | 0 | 0 | 0 | 0 |
| | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 1 |
| | 3 | 3 | 0 | 0 | 0 | ^ | 1 | 0 | 2 | 0 | 2 | 1 | 0 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 14 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 15 | 3 | 3 | 0 | 200 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 1 | 0 |
| | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| | 3 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 3 | 1 | 0 | 200 | 0 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 |
| | 3 | 2 | 0 | 0 | 0 | 1 | 2 | 2 | 1 | 0 | 0 | 0 | 0 |
| 16 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 5 | 0 | 200 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 4 | 0 | 1000 | 2 | 0 | 1 | 1 | 2 | 0 | 0 | 0 |
| | 0 | 0 | 4 | 0 | 1000 | 4 | 0 | 2 | 0 | 2 | 0 | 0 | 0 |
| | 0 | 0 | 4 | 0 | 500 | 6 | 0 | 2 | 0 | 0 | 1 | 1 | 0 |
| 17 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 18 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| 19 | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |
| | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z | Z |

## QUANTITIES AND TABLES COMPUTED

The remainder of App. A details the quantities and tables computed from the data listed above. In some cases, we have developed correlations between selected items from the field data cards. We have omitted some of the possible quantities and tables. For example, task forces reconnoitered beyond the objective so infrequently that no purpose is served by displaying cross-tabulations of success at reconnoitering beyond the objective.

### Raw Tabulations

This subsection contains the raw counts of responses for each of the questions in Tables A.1 and A.2. In addition, we constructed two new variables from the data; these constructed variables will be described below and tabulated as well. Some percentages below and in subsequent sections of App. A do not add to 100 because of rounding error. Percentages do not include missing data (those marked "Z") or those not applicable ("I").

*Task force measures of success*

| battle type: | CA | D | DA | HA | MT | Z |
|---|---|---|---|---|---|---|
| counts | 1 | 4 | 48 | 4 | 20 | 21 |
| percent | 1 | 5 | 62 | 5 | 26 | |

| rating: | 1 | 2 | 3 | 4 | Z |
|---|---|---|---|---|---|
| counts | 8 | 23 | 16 | 14 | 37 |
| percent | 13 | 38 | 26 | 23 | |

| terrain obj: | N | Y | Z |
|---|---|---|---|
| counts | 3 | 55 | 40 |
| percent | 5 | 95 | |

| terrain result: | 1 | 2 | 3 | Z |
|---|---|---|---|---|
| counts | 23 | 12 | 19 | 44 |
| percent | 43 | 22 | 35 | |

| enemy obj: | N | Y | Z |
|---|---|---|---|
| counts | 15 | 46 | 37 |
| percent | 25 | 75 | |

| enemy result: | 1 | 2 | 3 | Z |
|---|---|---|---|---|
| counts | 9 | 22 | 32 | 35 |
| percent | 14 | 35 | 51 | |

| continue obj: | N | Y | Z |
|---|---|---|---|
| counts | 47 | 12 | 39 |
| percent | 80 | 20 | |

| continue result: | 1 | 2 | 3 | Z |
|---|---|---|---|---|
| counts | 29 | 23 | 9 | 37 |
| percent | 48 | 38 | 15 | |

*Success at specific reconnaissance tasks*

Tasks related to the objective

| penetrate: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 2 | 49 | 22 | 25 |
| percent | | 69 | 31 | |

| describe pos: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 1 | 38 | 34 | 25 |
| percent | | 53 | 47 | |

| locate pos: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 1 | 29 | 43 | 25 |
| percent | | 40 | 60 | |

| locate obst: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 4 | 38 | 30 | 26 |
| percent | | 56 | 44 | |

| breach obst: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 9 | 50 | 12 | 27 |
| percent | | 81 | 19 | |

| wthdrw/rprt: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 1 | 51 | 21 | 25 |
| percent | | 71 | 29 | |

| mark bypass: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 9 | 61 | 2 | 26 |
| percent | | 97 | 3 | |

| set up OP: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 1 | 44 | 28 | 25 |
| percent | | 61 | 39 | |

Tasks related to the axis zone

| recce length: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 3 | 37 | 33 | 25 |
| percent | | 53 | 47 | |

| mark route: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 15 | 54 | 2 | 27 |
| percent | | 96 | 4 | |

| locate screen: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 5 | 40 | 28 | 25 |
| percent | | 59 | 41 | |

| set up OP: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 3 | 38 | 29 | 28 |
| percent | | 57 | 43 | |

| locate obst: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 12 | 45 | 16 | 25 |
| percent | | 74 | 26 | |

| infiltration rte: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 10 | 54 | 8 | 26 |
| percent | | 87 | 13 | |

| breach obst: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 16 | 51 | 6 | 25 |
| percent | | 89 | 11 | |

| terrain recce: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 15 | 53 | 4 | 26 |
| percent | | 93 | 7 | |

| bypass obst: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 14 | 50 | 9 | 25 |
| percent | | 85 | 15 | |

| trafficability: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 15 | 51 | 5 | 27 |
| percent | | 91 | 9 | |

Other reconnaissance tasks

| rec past obj: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 4 | 62 | 5 | 27 |
| percent | | 93 | 7 | |

| establish screen: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 5 | 63 | 4 | 26 |
| percent | | 94 | 6 | |

Planning reconnaissance

| template: | N | Y | Z |
|---|---|---|---|
| counts | 31 | 42 | 25 |
| percent | 42 | 58 | |

| all assets used: | N | Y | Z |
|---|---|---|---|
| counts | 36 | 36 | 26 |
| percent | 50 | 50 | |

| recce plan: | N | Y | Z |
|---|---|---|---|
| counts | 11 | 62 | 25 |
| percent | 15 | 85 | |

| leader?: | N | Y | Z |
|---|---|---|---|
| counts | 3 | 66 | 29 |
| percent | 4 | 96 | |

| timely plan: | N | Y | Z |
|---|---|---|---|
| counts | 36 | 37 | 25 |
| percent | 49 | 51 | |

Preparation for reconnaissance

| assets ready: | N | Y | Z |
|---|---|---|---|
| counts | 38 | 35 | 25 |
| percent | 52 | 48 | |

| mission brief: | N | Y | Z |
|---|---|---|---|
| counts | 9 | 64 | 25 |
| percent | 12 | 88 | |

| rehearsal: | N | Y | Z |
|---|---|---|---|
| counts | 59 | 13 | 26 |
| percent | 82 | 18 | |

| commo net: | N | Y | Z |
|---|---|---|---|
| counts | 5 | 68 | 25 |
| percent | 7 | 93 | |

Execution of reconnaissance

| dismount: | N | Y | Z |
|---|---|---|---|
| counts | 30 | 41 | 27 |
| percent | 42 | 58 | |

| status report: | N | Y | Z |
|---|---|---|---|
| counts | 30 | 39 | 29 |
| percent | 43 | 57 | |

| coordinate: | I | N | Y | Z |
|---|---|---|---|---|
| counts | 1 | 51 | 16 | 30 |
| percent | | 76 | 24 | |

| asset matrix: | N | Y | Z |
|---|---|---|---|
| counts | 50 | 12 | 36 |
| percent | 81 | 19 | |

| avoid enemy: | N | Y | Z |
|---|---|---|---|
| counts | 50 | 17 | 31 |
| percent | 75 | 25 | |

We constructed two variables summarizing success at the specific tasks making up the reconnaissance mission. The first variable is called "recce.success"; it is computed for each mission by finding the fraction of the 20 reconnaissance tasks that were performed successfully (i.e., the tasks "penetrate the objective area" through "establish a screen beyond the objective" on the front of the second data card). When computing this fraction for a given mission, we eliminated those tasks that were not applicable to that mission (marked "I" in the data table) and those tasks that were not graded for that mission, i.e., not marked as a success or failure. Thus, for the first two missions (rows) for task force 3 in Table A.2, the values of recce.success would be 2/20 = 0.1 (because all 20 tasks were applicable and graded) and 4/14 = 0.29 (because six tasks were inapplicable), respectively.

The second constructed variable is called "recce.analysis"; it is computed for each mission by finding the fraction of the 14 features of the planning, preparation, and execution of the recon mission that were performed successfully (i.e., the tasks "use of template" through "avoid the enemy" on the back of the second data card). As above, when computing this fraction for a given mission, we eliminated those features that were not applicable to that mission and those features that were not graded for that mission. Thus, for the first and third missions for task force 3 in Table A.2, recce.analysis took the value 9/14 = 0.64 and 7/13 = 0.54, respectively.

These two constructed variables are tabulated below.

| recce.success: | 0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1 |
|---|---|---|---|---|
| counts | 31 | 25 | 12 | 5 |
| percent | 42 | 34 | 16 | 7 |

| recce.analysis: | 0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1 |
|---|---|---|---|---|
| counts | 1 | 10 | 32 | 30 |
| percent | 1 | 14 | 44 | 41 |

## Relating Constructed Variables to Other Success Measures

We hypothesized that recce.analysis--an aggregate measure of the success of the planning of, preparation for, and execution of the reconnaissance mission--would be strongly related to recce.success--an aggregate measure of success at the tasks making up the reconnaissance mission. With this in mind, we made a cross-tabulation of recce.analysis with recce.success. Further, we hypothesized that recce.analysis and recce.success would be related to our measures of the task force's success at its offensive mission (rating, terrain result, enemy result, and continue result), so we cross-tabulated recce.success and recce.analysis with each of those. These cross-tabulations appear below. Each cross-tabulation has to its right a table containing percentages, calculated within the rows of the cross-tabulation. For example, in the first table, the first row of percentages means that of those missions for which recce.analysis was between 0.2 and 0.4, 70 percent had a value of recce.success between 0.0 and 0.2, 20 percent had

a value of recce.success between 0.2 and 0.4, and the other 10 percent had a value of recce.success between 0.4 and 0.6. Missing values ("Z") were not counted in computing percentages.

| recce.success: | 0.0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1.0 | | | | |
|---|---|---|---|---|---|---|---|---|
| recce.analysis: | | | | | | | | |
| 0.0-0.2 | 1 | 0 | 0 | 0 | 100 | 0 | 0 | 0 |
| 0.2-0.4 | 7 | 2 | 1 | 0 | 70 | 20 | 10 | 0 |
| 0.4-0.6 | 15 | 10 | 7 | 0 | 47 | 31 | 22 | 0 |
| 0.6-1.0 | 8 | 13 | 4 | 5 | 27 | 43 | 13 | 17 |

This table shows some correlation between planning and preparation for reconnaissance and success in reconnaissance.

| rating: | 1 | 2 | 3 | 4 | Z | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| recce.success: | | | | | | | | | |
| 0.0-0.2 | 5 | 14 | 6 | 3 | 3 | 18 | 50 | 21 | 11 |
| 0.2-0.4 | 3 | 6 | 6 | 6 | 4 | 14 | 29 | 29 | 29 |
| 0.4-0.6 | 0 | 3 | 3 | 5 | 1 | 0 | 27 | 27 | 45 |
| 0.6-1.0 | 0 | 0 | 1 | 0 | 4 | 0 | 0 | 100 | 0 |

This table shows a substantial correlation between successful reconnaissance and offensive mission success.

| terrain result: | 1 | 2 | 3 | Z | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| recce.success: | | | | | | | |
| 0.0-0.2 | 12 | 8 | 5 | 6 | 48 | 32 | 20 |
| 0.2-0.4 | 7 | 2 | 8 | 8 | 41 | 12 | 47 |
| 0.4-0.6 | 3 | 2 | 6 | 1 | 27 | 18 | 55 |
| 0.6-1.0 | 1 | 0 | 0 | 4 | 100 | 0 | 0 |

| enemy result: | 1 | 2 | 3 | Z | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| recce.success: | | | | | | | |
| 0.0-0.2 | 5 | 14 | 10 | 2 | 17 | 48 | 34 |
| 0.2-0.4 | 3 | 6 | 13 | 3 | 14 | 27 | 59 |
| 0.4-0.6 | 0 | 2 | 9 | 1 | 0 | 18 | 82 |
| 0.6-1.0 | 1 | 0 | 0 | 4 | 100 | 0 | 0 |

| continue result: | 1 | 2 | 3 | Z | | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|
| recce.success: | | | | | | | | |
| 0.0-0.2 | 14 | 11 | 2 | 4 | | 52 | 41 | 7 |
| 0.2-0.4 | 9 | 9 | 4 | 3 | | 41 | 41 | 18 |
| 0.4-0.6 | 6 | 3 | 2 | 1 | | 55 | 27 | 18 |
| 0.6-1.0 | 0 | 0 | 1 | 4 | | 0 | 0 | 100 |

The first two tables above again show good correlation between success in reconnaissance and accomplishment of the offensive mission. The third table shows a weak correlation.

We also hypothesized that success at location tasks (locating positions and obstacles at the objective, locating the screen, and locating route obstacles) would be related to our measures of the task force's success at the offensive mission. We cross-tabulated the overall rating with the success or failure of each of the four tasks given above. Again, the tables to the right record the percentages within rows, with missing values ("Z") removed from the computation.

| rating: | 1 | 2 | 3 | 4 | Z | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| posns on obj: | | | | | | | | | | |
| I | 0 | 0 | 0 | 0 | 1 | | | | | |
| N | 4 | 14 | 4 | 3 | 4 | | 16 | 56 | 16 | 12 |
| Y | 4 | 9 | 12 | 11 | 7 | | 11 | 25 | 33 | 31 |
| Z | 0 | 0 | 0 | 0 | 25 | | | | | |

| rating: | 1 | 2 | 3 | 4 | Z | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| obj obstacles: | | | | | | | | | | |
| I | 0 | 2 | 1 | 0 | 1 | | | | | |
| N | 6 | 14 | 7 | 5 | 6 | | 19 | 44 | 22 | 16 |
| Y | 2 | 7 | 7 | 9 | 5 | | 8 | 28 | 28 | 36 |
| Z | 0 | 0 | 1 | 0 | 25 | | | | | |

| rating: | 1 | 2 | 3 | 4 | Z | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| screen: | | | | | | | | | | |
| I | 0 | 1 | 1 | 1 | 2 | | | | | |
| N | 8 | 11 | 11 | 6 | 4 | | 22 | 31 | 31 | 17 |
| Y | 0 | 11 | 4 | 7 | 6 | | 0 | 50 | 18 | 32 |
| Z | 0 | 0 | 0 | 0 | 25 | | | | | |

| rating: | 1 | 2 | 3 | 4 | Z | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| axis obstacles: | | | | | | | | | | |
| I | 2 | 3 | 2 | 1 | 4 | | | | | |
| N | 6 | 13 | 12 | 10 | 4 | | 15 | 32 | 29 | 24 |
| Y | 0 | 7 | 2 | 3 | 4 | | 0 | 58 | 17 | 25 |
| Z | 0 | 0 | 0 | 0 | 25 | | | | | |

These tables show some important (if not terribly strong) correlations, particularly for locating objective positions and obstacles.

## Relation of Planning/Preparation/Execution to Task Success

After finding the relationship (displayed above) between recce.analysis and recce.success, we examined the relationships between individual elements of planning, preparation, and execution, and success at the individual tasks. This section contains the resulting cross-tabulations.

**Use of Templates**. Several tasks should be facilitated by the use of a template. We cross-tabulated the use of a template (a feature of planning) with the measures of overall task force success, with the aggregate measure of the success of the reconnaissance mission (recce.success), and with the success or failure of several tasks. The tasks were locating positions and obstacles on the objective, locating the screen, and locating obstacles on the axis. As before, the table to the right contains percentages within the rows of the table on the left.

| rating: | 1 | 2 | 3 | 4 | Z | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| used template: | | | | | | | | | |
| N | 4 | 16 | 8 | 3 | 0 | 13 | 52 | 26 | 10 |
| Y | 4 | 7 | 8 | 11 | 12 | 13 | 23 | 27 | 37 |
| Z | 0 | 0 | 0 | 0 | 25 | | | | |

| terrain result: | 1 | 2 | 3 | Z | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| used template: | | | | | | | |
| N | 16 | 5 | 5 | 5 | 62 | 19 | 19 |
| Y | 7 | 7 | 14 | 14 | 25 | 25 | 50 |
| Z | 0 | 0 | 0 | 25 | | | |

| enemy result: | 1 | 2 | 3 | Z | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| used template: | | | | | | | |
| N | 6 | 14 | 11 | 0 | 19 | 45 | 35 |
| Y | 3 | 8 | 21 | 10 | 9 | 25 | 66 |
| Z | 0 | 0 | 0 | 25 | | | |

| continue result: | 1 | 2 | 3 | Z | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|
| used template: | | | | | | | |
| N | 15 | 10 | 4 | 2 | 52 | 34 | 14 |
| Y | 14 | 13 | 5 | 10 | 44 | 41 | 16 |
| Z | 0 | 0 | 0 | 25 | | | |

The second table--accomplishment of terrain-oriented objectives--shows a good correlation between use of the template and task force mission success. The other tables show weaker correlations.

| recce.success: | 0.0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1.0 | |
|---|---|---|---|---|---|
| used template: | | | | | |
| N | 17 | 7 | 6 | 1 | 55 23 19 3 |
| Y | 14 | 18 | 6 | 4 | 33 43 14 10 |
| Z | 0 | 0 | 0 | 0 | |

It is somewhat surprising that recce.success is not more strongly correlated with the use of templates.

| locate obj posns: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| used template: | | | | | | |
| N | 0 | 15 | 16 | 0 | 48 | 52 |
| Y | 1 | 14 | 27 | 0 | 34 | 66 |
| Z | 0 | 0 | 0 | 25 | | |

| locate obj obsts: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| used template: | | | | | | |
| N | 3 | 19 | 9 | 0 | 68 | 32 |
| Y | 1 | 19 | 21 | 1 | 48 | 52 |
| Z | 0 | 0 | 0 | 25 | | |

| locate screen: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| used template: | | | | | | |
| N | 2 | 17 | 12 | 0 | 59 | 41 |
| Y | 3 | 23 | 16 | 0 | 59 | 41 |
| Z | 0 | 0 | 0 | 25 | | |

| locate axis obsts: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| used template | | | | | | |
| N | 4 | 19 | 8 | 0 | 70 | 30 |
| Y | 8 | 26 | 8 | 0 | 76 | 24 |
| Z | 0 | 0 | 0 | 25 | | |

**Timeliness of Planning.** The tables below are cross-tabulations of timeliness of reconnaissance planning with recce.success and with the overall task force mission success measures.

| recce.success: | 0.0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1.0 | |
|---|---|---|---|---|---|
| timely plan: | | | | | |
| N | 19 | 11 | 5 | 1 | 53 31 14 3 |
| Y | 12 | 14 | 7 | 4 | 32 38 19 11 |
| Z | 0 | 0 | 0 | 0 | |

| rating: | 1 | 2 | 3 | 4 | Z | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| timely plan: | | | | | | | | | |
| N | 6 | 14 | 9 | 5 | 2 | 18 | 41 | 26 | 15 |
| Y | 2 | 9 | 7 | 9 | 10 | 7 | 33 | 26 | 33 |
| Z | 0 | 0 | 0 | 0 | 25 | | | | |

These results show that timely planning is only weakly correlated with recce.success and with accomplishment of the task force mission. This feature changes when scrutiny is limited to deliberate attacks. See Timeliness of Deliberate Attacks, below.

**Readiness of Assets**. The tables below are cross-tabulations of asset readiness (a feature of preparation) with the overall task force mission success measures, and with reconnaissance task success.

| rating: | 1 | 2 | 3 | 4 | Z | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| assets ready: | | | | | | | | | |
| N | 7 | 13 | 10 | 4 | 4 | 21 | 38 | 29 | 12 |
| Y | 1 | 10 | 6 | 10 | 8 | 4 | 37 | 22 | 37 |
| Z | 0 | 0 | 0 | 0 | 25 | | | | |

| recce.success: | 0.0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1.0 | | | | |
|---|---|---|---|---|---|---|---|---|
| prep.assred: | | | | | | | | |
| N | 18 | 12 | 7 | 1 | 47 | 32 | 18 | 3 |
| Y | 13 | 13 | 5 | 4 | 37 | 37 | 14 | 11 |
| Z | 0 | 0 | 0 | 0 | | | | |

Here again, timeliness is not strongly correlated with success.

**Dismounting**. We hypothesized that many reconnaissance tasks would be more likely to be successful if the scouts dismounted (a feature of execution). The tables below are cross-tabulations of whether or not the scouts dismounted with measures of the success of the overall task force mission, and with measures of the scouts' success at several specific reconnaissance tasks.

| rating: | 1 | 2 | 3 | 4 | Z | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| dismount: | | | | | | | | | |
| N | 5 | 10 | 7 | 4 | 4 | 19 | 38 | 27 | 15 |
| Y | 3 | 13 | 9 | 10 | 6 | 9 | 37 | 26 | 29 |
| Z | 0 | 0 | 0 | 0 | 27 | | | | |

| recce.success: | 0.0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1.0 | |
|---|---|---|---|---|---|
| dismount: | | | | | |
| N | 18 | 6 | 6 | 0 | 60 20 20 0 |
| Y | 13 | 18 | 6 | 4 | 32 44 15 10 |
| Z | 0 | 1 | 0 | 1 | |

| penetrate obj: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 1 | 25 | 4 | 0 | 86 | 14 |
| Y | 1 | 23 | 17 | 0 | 58 | 42 |
| Z | 0 | 1 | 1 | 25 | | |

| locate obj posns: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 0 | 19 | 11 | 0 | 63 | 37 |
| Y | 1 | 10 | 30 | 0 | 25 | 75 |
| Z | 0 | 0 | 2 | 25 | | |

| describe obj pos: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 0 | 21 | 9 | 0 | 70 | 30 |
| Y | 1 | 16 | 24 | 0 | 40 | 60 |
| Z | 0 | 1 | 1 | 25 | | |

| locate obj obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 3 | 22 | 4 | 1 | 85 | 15 |
| Y | 1 | 16 | 24 | 0 | 40 | 60 |
| Z | 0 | 0 | 2 | 25 | | |

| breach obj obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 6 | 21 | 2 | 1 | 91 | 9 |
| Y | 3 | 28 | 10 | 0 | 74 | 26 |
| Z | 0 | 1 | 0 | 26 | | |

| withdraw/report | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 0 | 26 | 4 | 0 | 87 | 13 |
| Y | 1 | 23 | 17 | 0 | 58 | 42 |
| Z | 0 | 2 | 0 | 25 | | |

| OP on objective | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 0 | 24 | 6 | 0 | 80 | 20 |
| Y | 1 | 19 | 21 | 0 | 48 | 52 |
| Z | 0 | 1 | 1 | 25 | | |

| recce on axis: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| dismount: | | | | | | |
| N | 0 | 15 | 15 | 0 | 50 | 50 |
| Y | 2 | 22 | 17 | 0 | 56 | 44 |
| Z | 1 | 0 | 1 | 25 | | |

| locate screen: dismount: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| N | 2 | 14 | 14 | 0 | 50 | 50 |
| Y | 2 | 26 | 13 | 0 | 67 | 33 |
| Z | 1 | 0 | 1 | 25 | | |

| locate axis obst: dismount: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| N | 6 | 17 | 7 | 0 | 71 | 29 |
| Y | 4 | 28 | 9 | 0 | 76 | 24 |
| Z | 2 | 0 | 0 | 25 | | |

| OP on axis: dismount: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| N | 1 | 17 | 10 | 2 | 63 | 37 |
| Y | 1 | 21 | 18 | 1 | 54 | 46 |
| Z | 1 | 0 | 1 | 25 | | |

The data indicate that it is important to conduct dismounted reconnaissance near the objective, but not on the axis of advance.

**Avoidance of Enemy**. We hypothesized that avoidance of the enemy (a feature of execution) would make reconnaissance success more likely, because Blue scouts are often killed when they engage the OPFOR. The tables below contain the cross-tabulations of avoidance of enemy with the overall measures of the success of the task force mission, and with measures of success of several specific reconnaissance tasks.

| rating: avoid enemy: | 1 | 2 | 3 | 4 | Z | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| N | 6 | 19 | 13 | 8 | 4 | 13 | 41 | 28 | 17 |
| Y | 2 | 4 | 3 | 6 | 2 | 13 | 27 | 20 | 40 |
| Z | 0 | 0 | 0 | 0 | 31 | | | | |

| recce.success: avoid enemy: | 0-0.2 | 0.2-0.4 | 0.4-0.6 | 0.6-1 | | | | |
|---|---|---|---|---|---|---|---|---|
| N | 24 | 19 | 6 | 1 | 48 | 38 | 12 | 2 |
| Y | 6 | 4 | 5 | 2 | 35 | 24 | 29 | 12 |
| Z | 1 | 2 | 1 | 2 | | | | |

| penetrate obj: avoid enemy: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| N | 1 | 38 | 11 | 0 | 78 | 22 |
| Y | 1 | 7 | 9 | 0 | 44 | 56 |
| Z | 0 | 4 | 2 | 25 | | |

| locate obj pos: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 1 | 23 | 26 | 0 | 47 | 53 |
| Y | 0 | 4 | 13 | 0 | 24 | 76 |
| Z | 0 | 2 | 4 | 25 | | |

| describe obj pos: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 1 | 30 | 19 | 0 | 61 | 39 |
| Y | 0 | 5 | 12 | 0 | 29 | 71 |
| Z | 0 | 3 | 3 | 25 | | |

| locate obj obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 3 | 28 | 18 | 1 | 61 | 39 |
| Y | 1 | 7 | 9 | 0 | 44 | 56 |
| Z | 0 | 3 | 3 | 25 | | |

| breach obj obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 5 | 35 | 9 | 1 | 80 | 20 |
| Y | 2 | 12 | 3 | 0 | 80 | 20 |
| Z | 2 | 3 | 0 | 26 | | |

| withdraw/report: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 1 | 38 | 11 | 0 | 78 | 22 |
| Y | 0 | 8 | 9 | 0 | 47 | 53 |
| Z | 0 | 5 | 1 | 25 | | |

| OP on objective: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 1 | 34 | 15 | 0 | 69 | 31 |
| Y | 0 | 7 | 10 | 0 | 41 | 59 |
| Z | 0 | 3 | 3 | 25 | | |

| recce axis: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 1 | 27 | 22 | 0 | 55 | 45 |
| Y | 0 | 10 | 7 | 0 | 59 | 41 |
| Z | 2 | 0 | 4 | 25 | | |

| locate screen: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 1 | 29 | 20 | 0 | 59 | 41 |
| Y | 2 | 11 | 4 | 0 | 73 | 27 |
| Z | 2 | 0 | 4 | 25 | | |

| locate axis obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 7 | 31 | 12 | 0 | 72 | 28 |
| Y | 2 | 13 | 2 | 0 | 87 | 13 |
| Z | 3 | 1 | 2 | 25 | | |

| breach axis obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 8 | 36 | 6 | 0 | 86 | 14 |
| Y | 4 | 13 | 0 | 0 | 100 | 0 |
| Z | 4 | 2 | 0 | 25 | | |

| OP on axis: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| avoid enemy: | | | | | | |
| N | 1 | 30 | 18 | 1 | 63 | 37 |
| Y | 1 | 8 | 8 | 0 | 50 | 50 |
| Z | 1 | 0 | 3 | 27 | | |

Again, the results suggest that avoiding the enemy near the objective is important, but is less so for axis-oriented tasks.

## Asset Utilization

We expected that a task force's use of assets for reconnaissance should be predictive of the success of the reconnaissance mission and of the overall task force mission. To examine this matter, we used the data from the asset utilization matrix (third data card), the overall task force success measures, the measures of success at specific reconnaissance tasks, and the measure of the coordination of reconnaissance assets.

The asset utilization matrix tells which assets were used for which tasks in a given mission. For each of the 135 boxes in the asset utilization matrix (135 boxes = 15 tasks × 9 assets), we computed the fraction of missions for which that asset was used for that specific task. In a few missions, some tasks were not applicable; we did not count these tasks in computing the percentages. The resulting matrix of percentages appears below.

| | Asset | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | sct plt | GSR | vis aid | FO | Inf | Arm | Avn | Eng | Sig/ EW |
| **Objective** | | | | | | | | | |
| Locate enemy positions | 94 | 58 | 27 | 13 | 37 | 8 | 15 | 2 | 0 |
| Locate objective obst | 92 | 7 | 15 | 2 | 33 | 8 | 7 | 8 | 0 |
| Breach/mark obstacles | 43 | 0 | 0 | 0 | 23 | 2 | 0 | 61 | 0 |
| Establish obj OP | 75 | 16 | 11 | 2 | 15 | 0 | 2 | 0 | 0 |
| Direct fires | 35 | 0 | 0 | 21 | 16 | 10 | 8 | 0 | 0 |
| Assist C&C | 47 | 3 | 2 | 0 | 11 | 6 | 3 | 0 | 0 |
| **Route** | | | | | | | | | |
| Locate screen | 82 | 48 | 15 | 2 | 10 | 2 | 8 | 0 | 0 |
| Locate route obstacles | 79 | 0 | 2 | 0 | 11 | 3 | 5 | 5 | 0 |
| Breach/mark obstacles | 39 | 0 | 0 | 0 | 7 | 3 | 0 | 49 | 0 |
| Mark assault route | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration route | 21 | 3 | 2 | 0 | 3 | 3 | 0 | 0 | 0 |
| Establish route OP | 31 | 8 | 0 | 2 | 3 | 0 | 0 | 0 | 0 |
| Terrain recce | 19 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| Trafficability | 18 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Timely communication | 56 | 21 | 8 | 2 | 13 | 5 | 3 | 0 | 0 |

We noted some inconsistencies between the tasks that were marked "inapplicable" on the second data card (success at specific tasks) and the tasks that were marked "inapplicable" on the asset utilization matrix--there were hardly any of the latter, but a not insubstantial number of the former. We constructed an alternative set of asset utilization data, in which tasks were marked "inapplicable" in a fashion consistent with the second data card. This made almost no noticeable difference in any of our calculations, so we have not continued to use the alternative asset data set, and will not present any computations related to it.

After examining the matrix above, we wondered whether the various task forces had different patterns of utilization of assets other than the scouts. To consider this, we constructed another matrix, shown below, in the following way. For each combination of an asset and a task, we tabulated the fraction of task forces that used that asset for that task in at least half of their missions. Thus, an entry of 100 means that all 19 task forces used that asset for that task at least

half the time. Large percentages mean that most task forces use that asset for that task in most missions. Small percentages mean that some task force(s) have an uncommon preference for assigning that asset to that task.

| | Asset | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | sct plt | GSR | vis aid | FO | Inf | Arm | Avn | Eng | Sig/ EW |
| **Objective** | | | | | | | | | |
| Locate enemy positions | 100 | 64 | 36 | 14 | 43 | 21 | 0 | 0 | 0 |
| Locate objective obst | 100 | 7 | 14 | 0 | 36 | 21 | 0 | 0 | 0 |
| Breach/mark obstacles | 57 | 0 | 0 | 0 | 21 | 7 | 0 | 64 | 0 |
| Establish obj OP | 86 | 14 | 7 | 0 | 14 | 0 | 0 | 0 | 0 |
| Direct fires | 36 | 0 | 0 | 21 | 14 | 14 | 0 | 0 | 0 |
| Assist C&C | 50 | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 0 |
| **Route** | | | | | | | | | |
| Locate screen | 93 | 50 | 7 | 0 | 7 | 7 | 0 | 0 | 0 |
| Locate route obstacles | 93 | 0 | 0 | 0 | 7 | 7 | 0 | 7 | 0 |
| Breach/mark obstacles | 50 | 0 | 0 | 0 | 0 | 7 | 0 | 43 | 0 |
| Mark assault route | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration route | 29 | 0 | 0 | 0 | 7 | 7 | 0 | 0 | 0 |
| Establish route OP | 21 | 7 | 0 | 7 | 7 | 0 | 0 | 0 | 0 |
| Terrain recce | 29 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Trafficability | 21 | 7 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Timely communication | 64 | 21 | 7 | 0 | 14 | 7 | 0 | 0 | 0 |

**Use of Assets Other than Scouts.** We hypothesized that task forces that use more assets other than the scouts should do better than task forces that rely primarily on the scouts. As an aggregate measure of the use of assets other than scouts, we constructed a new variable, called "assets.notscouts." This constructed variable is a characteristic of a task force mission, and it is the percentage of relevant (i.e., not inapplicable) boxes in the mission's asset utilization matrix that were checked, for assets other than the scouts. Some assets would not be expected to be used for some tasks (e.g., using aviation to breach obstacles) but because those unlikely pairings of assets and tasks are the same for all missions, assets.notscouts provides a ranking of the missions, if not an absolute measure that is directly interpretable.

Below are cross-tabulations of assets.notscouts with the success of the overall task force mission, with recce.success, and with the measures of the success of specific reconnaissance tasks. For these cross-tabulations, we reduced assets.notscouts to three categories: less than or equal to 3 percent, greater than 3 percent and less than or equal to 6 percent, and greater than 6 percent.

| rating: | 1 | 2 | 3 | 4 | Z | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| assets.notscouts: | | | | | | | | | |
| 0-3 | 4 | 7 | 9 | 4 | 1 | 17 | 29 | 38 | 17 |
| 3-6 | 1 | 6 | 1 | 5 | 0 | 8 | 46 | 8 | 38 |
| 6-100 | 2 | 10 | 6 | 5 | 1 | 9 | 43 | 26 | 22 |

| recce.success: | 0-.2 | .2-.4 | .4-.6 | .6-1.0 | | | | |
|---|---|---|---|---|---|---|---|---|
| assets.notscouts: | | | | | | | | |
| 0-3 | 15 | 7 | 2 | 1 | 60 | 28 | 8 | 4 |
| 3-6 | 7 | 3 | 3 | 0 | 54 | 23 | 23 | 0 |
| 6-100 | 6 | 12 | 6 | 0 | 25 | 50 | 25 | 0 |

Neither of these correlations suggests a strong relationship, although there is some relationship between recce.success and assets.notscouts. These weak correlations appear a bit stronger when considering only deliberate attacks. See Asset Utilization in Deliberate Attacks, below.

| locate obj pos: | N | Y | N | Y |
|---|---|---|---|---|
| assets.notscouts: | | | | |
| 0-3 | 9 | 16 | 36 | 64 |
| 3-6 | 6 | 7 | 46 | 54 |
| 6-100 | 10 | 14 | 42 | 58 |

| describe obj pos: | N | Y | N | Y |
|---|---|---|---|---|
| assets.notscouts: | | | | |
| 0-3 | 13 | 12 | 52 | 48 |
| 3-6 | 7 | 6 | 54 | 46 |
| 6-100 | 13 | 11 | 54 | 46 |

| locate obj obst: I | N | Y | Z | N | Y |
|---|---|---|---|---|---|
| assets.notscouts: | | | | | |
| 0-3 | 0 | 14 | 11 | 0 | 56 | 44 |
| 3-6 | 0 | 8 | 5 | 0 | 62 | 38 |
| 6-100 | 3 | 11 | 9 | 1 | 55 | 45 |

| breach obj obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| assets.notscouts: | | | | | | |
| 0-3 | 1 | 18 | 6 | 0 | 75 | 25 |
| 3-6 | 0 | 11 | 2 | 0 | 85 | 15 |
| 6-100 | 6 | 14 | 3 | 1 | 82 | 18 |

| OP on objective: | N | Y | N | Y |
|---|---|---|---|---|
| assets.notscouts: | | | | |
| 0-3 | 19 | 6 | 76 | 24 |
| 3-6 | 7 | 6 | 54 | 46 |
| 6-100 | 13 | 11 | 54 | 46 |

| recon axis: | I | N | Y | N | Y |
|---|---|---|---|---|---|
| assets.notscouts: | | | | | |
| 0-3 | 1 | 12 | 12 | 50 | 50 |
| 3-6 | 0 | 8 | 5 | 62 | 38 |
| 6-100 | 0 | 12 | 12 | 50 | 50 |

| locate screen: | I | N | Y | N | Y |
|---|---|---|---|---|---|
| assets.notscouts: | | | | | |
| 0-3 | 1 | 16 | 8 | 67 | 33 |
| 3-6 | 1 | 8 | 4 | 67 | 33 |
| 6-100 | 1 | 11 | 12 | 48 | 52 |

| locate axis obs: | I | N | Y | N | Y |
|---|---|---|---|---|---|
| assets.notscouts: | | | | | |
| 0-3 | 2 | 19 | 4 | 83 | 17 |
| 3-6 | 1 | 9 | 3 | 75 | 25 |
| 6-100 | 5 | 14 | 5 | 74 | 26 |

| OP on axis: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| assets.notscouts: | | | | | | |
| 0-3 | 0 | 19 | 6 | 0 | 76 | 24 |
| 3-6 | 0 | 7 | 5 | 1 | 58 | 42 |
| 6-100 | 2 | 9 | 13 | 0 | 41 | 59 |

Additional assets apparently provide a detectable advantage only for setting up observation posts.

**Specific Assets and Specific Tasks.** Because we found little relation between the aggregate measure of asset utilization (assets.notscouts) and the measures of task force mission or reconnaissance mission success, we thought that the aggregation of assets.notscouts might be masking effects that specific assets had on specific tasks. To check this, we cross-tabulated the use of several specific assets with the success or failure at the execution of specific tasks. These tables appear below.

It seems plausible that obstacle breaching might work better if engineers were assigned to the task. The first table is for obstacles on the objective, the second for obstacles on the axis.

| breach obj obst: engineers | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| I | 1 | 0 | 0 | 0 | | |
| N | 4 | 17 | 2 | 1 | 89 | 11 |
| Y | 2 | 26 | 9 | 0 | 74 | 26 |
| Z | 2 | 7 | 1 | 26 | | |

| breach axis obst: engineers | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| I | 1 | 0 | 0 | 0 | | |
| N | 6 | 22 | 3 | 0 | 88 | 12 |
| Y | 3 | 24 | 3 | 0 | 89 | 11 |
| Z | 6 | 5 | 0 | 25 | | |

The results show that breaching obstacles is seldom accomplished during reconnaissance, even with the use of engineer assets.

We thought that use of the GSRs should make it easier for the scouts to locate enemy positions on the objective and to locate the screen. The first table below cross-tabulates successful location of enemy positions on the objective with use of GSRs, and the second table cross-tabulates successful location of the screen with use of GSRs.

| locate obj pos: used GSRs | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| N | 0 | 10 | 16 | 0 | 38 | 62 |
| Y | 0 | 15 | 21 | 0 | 42 | 58 |
| Z | 1 | 4 | 6 | 25 | | |

| locate screen: used GSRs | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| I | 1 | 0 | 0 | 0 | | |
| N | 2 | 19 | 11 | 0 | 63 | 37 |
| Y | 0 | 16 | 13 | 0 | 55 | 45 |
| Z | 2 | 5 | 4 | 25 | | |

There is essentially no correlation.

It also seemed plausible that the use of infantry could make it easier to locate enemy positions on the objective and to locate the screen. The first table below cross-tabulates successful location of enemy positions on the objective with use of infantry, and the second table cross-tabulates successful location of the screen with the use of infantry.

| locate obj pos: used infty | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| N | 0 | 16 | 23 | 0 | 41 | 59 |
| Y | 0 | 9 | 14 | 0 | 39 | 61 |
| Z | 1 | 4 | 6 | 25 | | |

| locate screen: used infty | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| I | 1 | 0 | 0 | 0 | | |
| N | 2 | 32 | 21 | 0 | 60 | 40 |
| Y | 0 | 3 | 3 | 0 | 50 | 50 |
| Z | 2 | 5 | 4 | 25 | | |

**Coordination of Reconnaissance Assets.** Because these cross-tabulations showed little apparent effect of asset use on specific tasks, we wondered whether assets had an effect when they were coordinated, but not otherwise.

Although we could find no strong relationship between assets.notscouts and recce.success--that is, between our aggregate measure of the use of assets other than scouts and our aggregate measure of success at reconnaissance tasks--we hypothesized that these two variables should be related when assets were coordinated, even if they were not related when the use of assets was not coordinated. To examine this, we plotted recce.success vs. assets.notscouts for the 16 missions for which the assets were coordinated and again for the remaining 51 missions for which the assets were not coordinated. We found no pattern of relationship in either plot, contrary to our hypothesis.

## Battle Type

This subsection contains tables and derived values that differentiate between types of battles, with special emphasis on deliberate attacks.

**Success Measures for Deliberate Attacks, and Hasty Attacks/Movements to Contact.** Task force success measures and recce success measures are tabulated for deliberate attacks (DA) and separately for hasty attacks and movements to contact (HAMTC). These separate tabulations are presented as two-way tables for ease of comparison.

*Task force success measures*

| rating: | 1 | 2 | 3 | 4 | Z | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| btype: | | | | | | | | | | |
| DA | 5 | 15 | 9 | 11 | 8 | | 13 | 38 | 23 | 28 |
| HAMTC | 3 | 7 | 7 | 3 | 4 | | 15 | 35 | 35 | 15 |

| terrain result: | 1 | 2 | 3 | Z | | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|
| btype: | | | | | | | | |
| DA | 15 | 7 | 14 | 12 | | 42 | 19 | 39 |
| HAMTC | 7 | 5 | 5 | 7 | | 41 | 29 | 29 |

| enemy result: | 1 | 2 | 3 | Z | | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|
| btype: | | | | | | | | |
| DA | 5 | 12 | 23 | 8 | | 13 | 30 | 58 |
| HAMTC | 4 | 9 | 9 | 2 | | 18 | 41 | 41 |

| continue result: | 1 | 2 | 3 | Z | | 1 | 2 | 3 |
|---|---|---|---|---|---|---|---|---|
| btype: | | | | | | | | |
| DA | 21 | 14 | 5 | 8 | | 53 | 35 | 13 |
| HAMTC | 7 | 9 | 4 | 4 | | 35 | 45 | 20 |

For deliberate attacks only, the relationship between recce.success and task force success is shown in the table below. The correlation is slightly stronger than the correlation for all missions.

| rating: | 1 | 2 | 3 | 4 | Z | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| recce.success: | | | | | | | | | | |
| 0-0.2 | 4 | 11 | 2 | 1 | 2 | | 22 | 61 | 11 | 6 |
| 0.2-0.4 | 1 | 2 | 5 | 5 | 2 | | 8 | 15 | 38 | 38 |
| 0.4-0.6 | 0 | 2 | 2 | 5 | 1 | | 0 | 22 | 22 | 56 |
| 0.6-0.8 | 0 | 0 | 0 | 0 | 2 | | | | | |
| 0.8-1.0 | 0 | 0 | 0 | 0 | 1 | | | | | |

**Reconnaissance success**

| recce.success: | 0-.2 | .2-.4 | .4-.6 | .6-1.0 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| btype: | | | | | | | | | |
| DA | 20 | 15 | 10 | 3 | | 42 | 31 | 21 | 6 |
| HAMTC | 11 | 10 | 1 | 2 | | 46 | 42 | 4 | 8 |

| recce.analysis: | 0-.2 | .2-.4 | .4-.6 | .6-1.0 | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| btype: | | | | | | | | | |
| DA | 1 | 9 | 18 | 20 | | 2 | 19 | 38 | 42 |
| HAMTC | 0 | 1 | 13 | 10 | | 0 | 4 | 54 | 42 |

| penetrate obj: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 0 | 30 | 18 | | 63 | 37 |
| HAMTC | 2 | 18 | 4 | | 82 | 18 |

| find obj pos: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 0 | 18 | 30 | | 37 | 63 |
| HAMTC | 1 | 11 | 12 | | 48 | 52 |

| descr obj pos: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 0 | 23 | 25 | | 48 | 52 |
| HAMTC | 1 | 14 | 9 | | 61 | 39 |

| loc obj obst: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 0 | 23 | 24 | 1 | 49 | 51 |
| HAMTC | 3 | 15 | 6 | 0 | 71 | 29 |

| wthdrw/rprt: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 0 | 33 | 15 | | 69 | 31 |
| HAMTC | 1 | 17 | 6 | | 74 | 26 |

| OP on obj: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 0 | 27 | 21 | | 56 | 44 |
| HAMTC | 1 | 16 | 7 | | 70 | 30 |

| recce axis: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 3 | 26 | 19 | | 58 | 42 |
| HAMTC | 0 | 10 | 14 | | 42 | 58 |

| locate screen: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 3 | 27 | 18 | | 60 | 40 |
| HAMTC | 1 | 13 | 10 | | 57 | 43 |

| loc axis obs: | I | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 5 | 30 | 13 | | 70 | 30 |
| HAMTC | 6 | 15 | 3 | | 83 | 17 |

| OP on axis: | I | N | Y | Z | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | 1 | 27 | 17 | 3 | 61 | 39 |
| HAMTC | 2 | 11 | 11 | 0 | 50 | 50 |

| used template: | | N | Y | | N | Y |
|---|---|---|---|---|---|---|
| btype: | | | | | | |
| DA | | 17 | 31 | | 35 | 65 |
| HAMTC | | 13 | 11 | | 54 | 46 |

| recce plan: | N | Y | | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 8 | 40 | | 17 | 83 |
| HAMTC | 3 | 21 | | 13 | 87 |

| timely plan: | N | Y | | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 28 | 20 | | 58 | 42 |
| HAMTC | 8 | 16 | | 33 | 67 |

| used all assets? | N | Y | Z | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 24 | 23 | 1 | 51 | 49 |
| HAMTC | 11 | 13 | 0 | 46 | 54 |

| leader? | N | Y | Z | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 2 | 43 | 3 | 4 | 96 |
| HAMTC | 1 | 22 | 1 | 4 | 96 |

| assets ready: | N | Y | | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 27 | 21 | | 56 | 44 |
| HAMTC | 10 | 14 | | 42 | 58 |

| mission brief: | N | Y | | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 6 | 42 | | 13 | 87 |
| HAMTC | 3 | 21 | | 13 | 87 |

| rehearsal: | N | Y | Z | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 39 | 9 | 0 | 81 | 19 |
| HAMTC | 19 | 4 | 1 | 83 | 17 |

| commo net: | N | Y | | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 1 | 47 | | 2 | 98 |
| HAMTC | 4 | 20 | | 17 | 83 |

| dismount: | N | Y | Z | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 16 | 31 | 1 | 34 | 66 |
| HAMTC | 13 | 10 | 1 | 57 | 43 |

| status reports: | N | Y | Z | N | Y |
|---|---|---|---|---|---|
| btype: | | | | | |
| DA | 22 | 24 | 2 | 48 | 52 |
| HAMTC | 7 | 15 | 2 | 32 | 68 |

| coord assets: | I | N | Y | Z | | N | Y |
|---|---|---|---|---|---|---|---|
| btype: | | | | | | | |
| DA | 0 | 35 | 10 | 3 | | 78 | 22 |
| HAMTC | 1 | 15 | 6 | 2 | | 71 | 29 |

| asset matrix: | | N | Y | Z | | N | Y |
|---|---|---|---|---|---|---|---|
| btype: | | | | | | | |
| DA | | 29 | 11 | 8 | | 73 | 27 |
| HAMTC | | 20 | 1 | 3 | | 95 | 5 |

| avoid enemy: | | N | Y | Z | | N | Y |
|---|---|---|---|---|---|---|---|
| btype: | | | | | | | |
| DA | | 34 | 10 | 4 | | 77 | 23 |
| HAMTC | | 16 | 6 | 2 | | 73 | 27 |

**Timeliness in Deliberate Attacks.** The two tables below relate timeliness of planning with task force mission success and with recce mission success, for deliberate attacks only.

| rating: | 1 | 2 | 3 | 4 | Z | | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| plan.timely: | | | | | | | | | | |
| N | 5 | 13 | 6 | 3 | 1 | | 19 | 48 | 22 | 11 |
| Y | 0 | 2 | 3 | 8 | 7 | | 0 | 15 | 23 | 62 |

| recce.success: | 0-.2 | .2-.4 | .4-.6 | .6-1.0 | | | | |
|---|---|---|---|---|---|---|---|---|
| plan.timely: | | | | | | | | |
| N | 15 | 8 | 4 | 1 | | 54 | 29 | 14 | 4 |
| Y | 5 | 7 | 6 | 2 | | 25 | 35 | 30 | 10 |

**Asset Utilization in Deliberate Attacks.** Each entry in the matrix below contains the percentage of deliberate attacks for which the given asset (column) was used for the given task (row).

| | Asset | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | sct plt | GSR | vis aid | FO | Inf | Arm | Avn | Eng | Sig/ EW |
| **Objective** | | | | | | | | | |
| Locate enemy positions | 95 | 56 | 31 | 13 | 44 | 3 | 10 | 3 | 0 |
| Locate objective obst | 95 | 3 | 21 | 3 | 36 | 3 | 3 | 10 | 0 |
| Breach/mark obstacles | 54 | 0 | 0 | 0 | 31 | 0 | 0 | 64 | 0 |
| Establish obj OP | 79 | 13 | 15 | 0 | 21 | 0 | 0 | 0 | 0 |
| Direct fires | 36 | 0 | 0 | 15 | 15 | 5 | 5 | 0 | 0 |
| Assist C&C | 44 | 0 | 0 | 0 | 10 | 3 | 0 | 0 | 0 |
| **Route** | | | | | | | | | |
| Locate screen | 79 | 46 | 15 | 0 | 10 | 0 | 0 | 0 | 0 |
| Locate route obstacles | 79 | 0 | 3 | 0 | 10 | 0 | 0 | 8 | 0 |
| Breach/mark obstacles | 49 | 0 | 0 | 0 | 8 | 0 | 0 | 49 | 0 |
| Mark assault route | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Infiltration route | 18 | 5 | 0 | 0 | 3 | 3 | 0 | 0 | 0 |
| Establish route OP | 26 | 3 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Terrain recce | 13 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |
| Trafficability | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Timely communication | 51 | 23 | 10 | 0 | 13 | 3 | 0 | 0 | 0 |

This matrix differs little from the overall matrix under Asset Utilization.

The tables below contain cross-tabulations of assets.notscouts with recce.success and rating, for deliberate attacks only.

| rating: | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|
| assets.notscouts: | | | | | | | | |
| 0-3 | 3 | 5 | 5 | 2 | 20 | 33 | 33 | 13 |
| 3-6 | 0 | 6 | 1 | 4 | 0 | 55 | 9 | 36 |
| 6-100 | 1 | 4 | 3 | 5 | 8 | 31 | 23 | 38 |

| recce.success: | 0-.2 | .2-.4 | .4-.6 | .6-.8 | .8-1.0 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| assets.notscouts: | | | | | | | | | | |
| 0-3 | 8 | 5 | 2 | 0 | 0 | 53 | 33 | 13 | 0 | 0 |
| 3-6 | 5 | 3 | 3 | 0 | 0 | 45 | 27 | 27 | 0 | 0 |
| 6-100 | 4 | 5 | 4 | 0 | 0 | 31 | 38 | 31 | 0 | 0 |

These tables show weak correlation between the use of assets and success at the overall mission and in reconnaissance.

## Scout Vehicle Cards

This section contains summaries of the vehicle cards.

**Numbers of Vehicles Available.** The first table contains the numbers of missions for which the scout platoon had one vehicle, two vehicles, and so on up to six vehicles available at the beginning of the mission. The second and third tables repeat the first, except that the second table is for non-modernized units only and the third is for modernized units.

*All units*

| #of veh's avail: | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| counts | 3 | 2 | 7 | 11 | 18 | 22 |
| percent | 5 | 3 | 11 | 17 | 29 | 35 |

*Non-modernized units*

| #of veh's avail: | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| counts | 2 | 0 | 3 | 5 | 12 | 18 |
| percent | 5 | 0 | 8 | 13 | 30 | 45 |

*Modernized units*

| #of veh's avail: | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| counts | 1 | 2 | 4 | 6 | 6 | 4 |
| percent | 4 | 9 | 17 | 26 | 26 | 17 |

The average number of vehicles available at the beginning of the mission was (followed by the percentage of the full complement that the average represents):

M-113: 2.7 (90%) ITV: 2.3 (77%) M3: 4.1 (68%)

**Rounds Fired.** Forty of the missions were run by non-modernized units. The next table classifies the 40 missions by the number of Cal.50 rounds fired.

| Cal.50 rounds fired: | 0 | 1-100 | >100 |
|---|---|---|---|
| counts | 29 | 6 | 5 |
| percent | 73 | 15 | 13 |

This gives an average of 48 rounds per mission, and rounds were actually fired in 11 of the 40 missions.

The other 23 missions were run by modernized units; the next table classifies these missions by the number of 25-mm rounds fired.

| 25-mm rounds fired: | 0 | 1-1000 | >1000 |
|---|---|---|---|
| counts | 6 | 15 | 2 |
| percent | 26 | 65 | 9 |

This gives an average of 536 rounds per mission for these modernized units, and rounds were actually fired in 17 of the 23 missions.

The next table classifies all 63 missions according to the number of TOW rounds fired.

| TOW rounds fired: | 0 | 1 | 2 | 4 | 6 | 7 | 8 | 11 |
|---|---|---|---|---|---|---|---|---|
| counts | 46 | 3 | 5 | 5 | 1 | 1 | 1 | 1 |
| percent | 73 | 5 | 8 | 8 | 2 | 2 | 2 | 2 |

This gives an average of just over 1 (1.03) round per mission, and rounds were actually fired in 17 of the 63 missions.

**Vehicle Kills.** In nine of the battles, the number of scout vehicles killed was ambiguous, so those nine battles were not used in the calculations that follow. The ambiguity arose as follows: a data collector included in the counts of vehicles killed the GSRs that were with the scout platoon. These could be removed from the counts of vehicles available, so that those data are unambiguous; but they could not be removed from the counts of vehicles killed, so those counts remain ambiguous.

The first table classifies the 54 usable battles by the fraction of their initial complement of vehicles killed during the mission (either by the enemy or by friendlies).

| fraction of vehicles killed: | 0-.2 | .2-.4 | .4-.6 | .6-.8 | .8-1.0 |
|---|---|---|---|---|---|
| counts | 12 | 7 | 12 | 8 | 15 |
| percent | 22 | 13 | 22 | 15 | 28 |

Next, we added across battles to get the total number of scout vehicles that fought in the 54 missions and the total numbers of them killed by the different possible killers. The next table contains the fraction of Blue scout vehicles killed by each of the killing systems.

| killing system: | OPFOR | | | | | |
|---|---|---|---|---|---|---|
| | arty | T-72 | BMP | RPG | other | fratricide |
| percent Blue vehicles killed by system | 6 | 13 | 19 | 7 | 3 | 8 |

The average number of scout tracks killed by each system per battle is:

| killing system: | OPFOR | | | | | |
|---|---|---|---|---|---|---|
| | arty | T-72 | BMP | RPG | other | fratricide |
| Blue vehicles killed by system | .28 | .61 | .91 | .31 | .15 | .37 |

Overall, 248 vehicles started (in these 54 battles), 122 were killed by OPFOR, 20 by Blue forces. Of the 20 fratricides, 12 were by tanks, 4 by artillery, 1 by FASCAM, 1 by close air support, and 2 were not specified.

**Soft-skinned Vehicles.** The last table classifies the 63 missions by the number of extra scout vehicles that would have been killed had they been soft-skinned ("Z" means that the question was not answered or was answered ambiguously, as described above).

| number of extra killed: | 0 | 1 | 2 | Z |
|---|---|---|---|---|
| counts | 44 | 3 | 3 | 13 |

The average number (per battle) of extra kills would be 0.12, i.e., about one track every eight battles.

## Appendix B

## SPECULATIONS ON DOCTRINE, TACTICS, AND RECONNAISSANCE

During the conduct of this work, we have been struck by a number of points whose interrelationships were not immediately obvious. They relate to the tactical doctrine of the U.S. Army, the doctrine of the Soviet Army (as enunciated in U.S. Army publications), and the factor of battlefield intelligence. Let us enumerate some of these points (the order is unimportant).

1. U.S. tactical offensive doctrine, as spelled out in manuals such as FM 7-7 or FM 71-2, does not clearly differentiate between the situations in which the commander has, or does not have, good knowledge of the enemy situation. Although the value of intelligence and reconnaissance is recognized, the manual does not suggest that basic modes of operation should be altered according to the level of intelligence we possess. In a sense, the difference is that between hasty attack and deliberate attack, but the intelligence connection is not made clear.
2. Our doctrine invokes the theme of advancing by bounds in the assault, with units providing overwatch for each other.
3. Soviet doctrine for the attack, as laid out in FM 100-2-1, does not embody the principle of overwatch. We see at the NTC that the OPFOR advances at a steady and usually rapid pace. On the other hand, the manual speaks of Soviet reconnaissance moving by bounds, and notes the priority that the Soviets place on reconnaissance.
4. The data from Sec. II are striking in that there is a very sharp correlation between OPFOR success and failure according to the success of their reconnaissance. It would seem that OPFOR tactics for the attack must rely on good intelligence for success. The data for the training task forces also show a strong correlation between offensive success and good battlefield information, but there appear to be several cases where the attack is successful even when intelligence is lacking. lacking.

The above observations, seen in juxtaposition, suggest that U.S. tactical doctrine for the offense should be modified to explicitly recognize the intelligence situation during METT-T (Mission, Enemy, Terrain, Troops-Time) analysis. The suggestion is that when the attack must proceed, even lacking adequate intelligence information, the present methods of advance employing overwatch are employed. However, when the enemy situation is better understood, the advance may be made in a more continuous fashion, with more (or all) maneuver forces concentrated. This represents something of a combination of U.S. and Soviet doctrine. Additionally, with good information about the defender's disposition, artillery can be better employed to help conduct what was the "overwatch" role. A point of genuine concern is whether our battalion task forces are supported by sufficient artillery to provide the necessary level of responsive support in that role.

## Appendix C

## DIFFERENTIATING CAVALRY FROM TASK FORCE RECONNAISSANCE

It appears that the battalion task force scout platoon is often identified with the cavalry scout platoon. This is seen in the organization itself, as the two platoons are identically equipped, whether as M113 units or M3 units. The personnel complement is likewise the same, with an outstanding exception: In all scout platoons the enlisted personnel are in Military Occupational Specialty (MOS) 19D. The platoon leader in a cavalry scout platoon is always an armor officer of the cavalry persuasion. In a tank battalion scout platoon, the position is filled by an armor officer (not necessarily with cavalry background), but in a mechanized infantry battalion, the leader is often an infantry officer. Thus, officers with essentially identical jobs have quite different training.

FM 71-2J, *The Tank and Mechanized Infantry Task Force*, in its section on the role of the scout platoon, refers to FM 17-98 as the complete manual for scout platoon operations. But as we have pointed out, the scout platoon manual, FM 17-98 (*Test*), in its present version does not differentiate between cavalry and task force scout platoons. The judgment of experienced officers is that this publication has been oriented toward the cavalry function, yet was used for task force scout platoon training because there was no alternative. Thus, as far as equipment, personnel, and training are concerned, one might conclude that the U.S. Army did not differentiate between scout platoons according to their parent unit (cavalry troop or maneuver battalion). This statement is in fact explicitly made in FM 17-95 (*Cavalry Operations*). We believe that this is an error. We would argue that the missions of the two are quite different and that the differences should be recognized in terms of equipment and training. The task force scout platoon must not be regarded as the local mini-cavalry. FM 17-98 is being rewritten to overcome this misperception.

The present situation is, however, less clear-cut than these remarks would suggest. Although the scout platoon manual does include the full gamut of offensive and defensive operations, in addition to the reconnaissance function, the Army Training and Evaluation Program

(ARTEP) for the mechanized infantry/tank task force includes a separate section on scout platoon operations. Only the reconnaissance and screening functions are included. If emphasis is judged by the number and complexity of tasks, the weight is equally on reconnaissance and fighting. And, as noted, the existing version of the scout platoon field manual is being rewritten to give specific emphasis to the task force scout platoon mission. This appendix encourages initiatives already under way.

To put the problem in perspective, there are about 54 scout platoons associated with Armored Cavalry Regiments, 60 more are assigned to divisional cavalry, and roughly 100 are organic to the maneuver battalions of the heavy divisions. This is only to indicate that each of the several classes of scout platoon assignment is of major size. Thus, if it is found that their tasks differ in nature, they are clearly worthy of individual treatment. Are their tasks different?

We would argue that they are, and FM 17-95, *Cavalry Operations*, partially makes the point. In discussion of organization for combat of the regimental armored cavalry troop, combat missions are emphasized; in the discussion of the divisional ground cavalry troop, reconnaissance is emphasized. But the role of the battalion task force scout platoon is not mentioned. However, in FM 71-2J, Appendix L (Scout Platoon), the reconnaissance function is emphasized. However, nowhere is there a differentiation made in the probable targets of the reconnaissance effort of the various units, and herein may lie an essential element in understanding the problem.

We believe that an Armored Cavalry Regiment, in its reconnaissance mission, is charged with developing what can be termed coarse-grained intelligence concerning the enemy. The issues are what units are present, in what strength. Where are they located, and what seems to be their intention? This is the intelligence information which might lead to a mission order to be issued to a battalion task force. The task force, on the other hand, has the job of coping with the enemy force in detail. The combat information required by the task force commander is fine-grained, down to the location and orientation of individual vehicle positions.

The emphasis for scout platoons at task force level is on reconnaissance, not fighting, and on the details of the enemy situation. Cavalry has the job of longer range reconnaissance (which may necessitate fighting for information) in a broader context, in addition to its fighting functions. Surely the training for the two jobs should not be identical. Fortunately this differentiation is becoming more clearly recognized.

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