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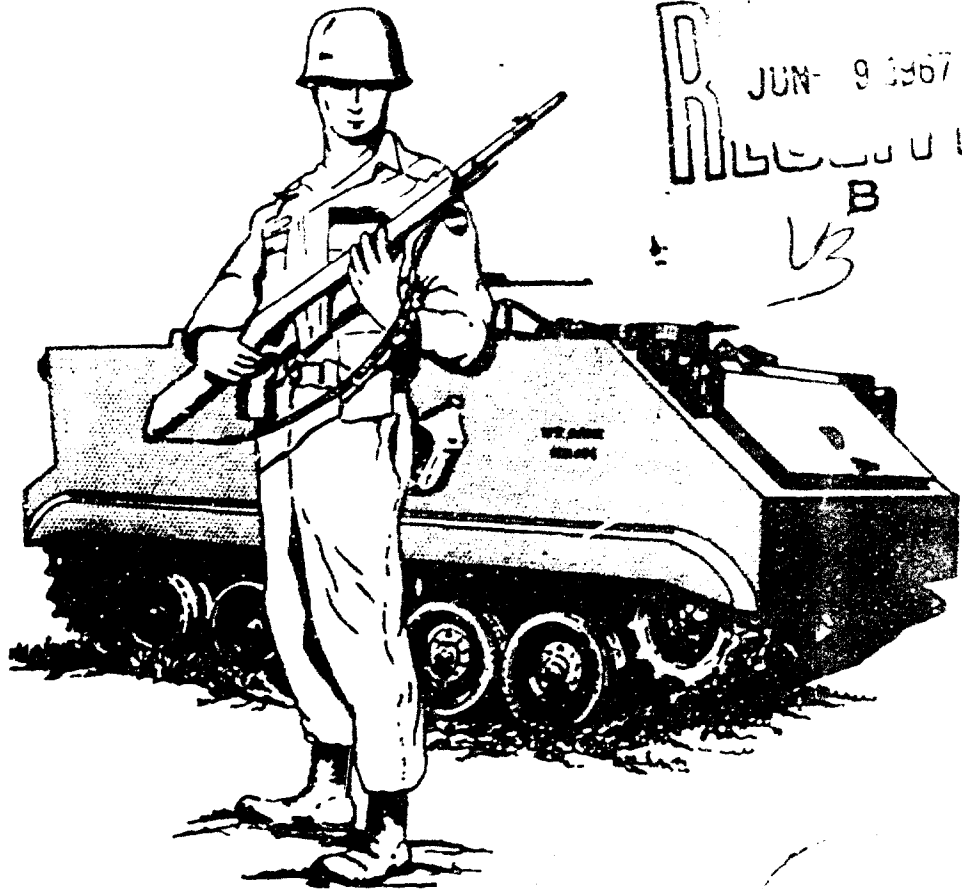
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EVALUATION OF BATTALION OPERATIONS

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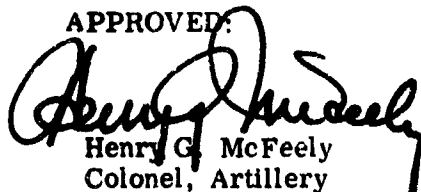
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US ARMY COMBAT DEVELOPMENT EXPERIMENTATION CENTER
Fort Ord, California

Evaluation of Battalion Operations Phase I

FIRST HALF FY 62

May 1962

APPROVED:


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ABSTRACT

The Evaluation of Battalion Operations, Phase I was conducted at Hunter Liggett Military Reservation from 23 October to 15 December 1961 as a field study of the performance of ROAD Infantry and Mechanized Infantry Battalions reinforced with Armor. Battalion command groups and selected component elements (full-strength reinforced rifle companies and the battalion mortar and DAVY CROCKETT platoons) provided representative player units. Analysis of performance disclosed problem areas in the effectiveness of control of battalion tactical operations and logistical support (Objective 1). Concurrent investigation of personnel and survey needs of the battalion mortar and DAVY CROCKETT platoon (Objective 2) and research of the battalions' wire requirements (Objective 3) were accomplished.

Twenty-two findings related to the objectives and limited answers to CONARC questions were developed. Specific improvements in exchange and presentation of information and instructions, and the responsiveness of battalion maneuver, firepower, and logistical elements are suggested. Other recommendations expand DAVY CROCKETT control means and modify team organization. Changes in battalion wire personnel and equipment are also suggested. Personnel and equipment shortages during experimentation precluded specific recommendations in several areas. Further field test or study of these subjects is required.

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PREFACE

Although infantry weapons, equipment, and tactical doctrine have changed, infantry combat missions and tasks have not.

In the future the enemy will be mechanized, with the combat strength to dominate portions of the battlefield and the airspace above. This Aggressor will be equipped with sophisticated materiel, including tactical nuclear and chemical weapons. ROAD infantry and mechanized infantry battalions have been organized and equipped to defeat such an enemy. Each battalion fights as an infantry TOE organization, though cross-reinforcement with tanks or armor battalions and support from its parent brigade and division are normal. New and improved equipment offers greater firepower and mobility, more successful target acquisition, and more adequate knowledge of the enemy and friendly elements.

The reinforced battalion's increased self-sufficiency and tactical unity permit rapid formation and dispersal of its forces; its tactical doctrine has been devised to exploit these advantages. It integrates conventional, nuclear, and chemical weapons, and their effects can be aggressively exploited. A wider exchange of precise information in greater quantity provides commanders and staff with a realistic basis for decision and shortens reaction time. Quick and frequent movement is possible not only by ground or air vehicles, but by dismounted maneuver elements in close proximity to the enemy. The adoption of fixed positions can be avoided, and surprise and deceptive measures are more readily applied. The initiative can be retained, the point of decision selected by the commander, and the greatly increased firepower used to exploit these tactical advantages. The full combat potential of ROAD battalions can best be achieved in a hard-hitting, rapid war of movement.

I

Introduction

1. The Evaluation of Battalion Operations, Phase I was conducted at Hunter Liggett Military Reservation from 23 October to 15 December 1961. Authority for the experiment is CONARC letter, 11 August 1961, subject: "Directive for USACDEC Experiment, Evaluation of Battalion Operations, Phase I, First Half FY 62."

2. The purpose of the experiment was to evaluate the field performance of ROAD infantry and mechanized infantry battalions reinforced with armor. (See Figures 1 and 2.) Effectiveness of control in the planning and direction of battalion maneuver elements and firepower resources was the primary subject of investigation. Concurrent evaluation of the mortar and DAVY CROCKETT platoon and battalion wire requirements was accomplished.

3. Battalions were represented in the field by battalion command groups consisting of the commander, his staff, and subordinate commanders down to platoon level, together with minimum enlisted communications, operations, and transport personnel. One rifle company and the battalion mortar/DAVY CROCKETT platoon participated at full TOE strength. The Aggressor was depicted as a mechanized force at least as large as the test battalion and employing modern equipment.

4. An unforeseen, temporary reduction in personnel and unavailability of equipment during the Fall 1961 period limited the desired field representation of ROAD and Aggressor units. The use of mock-ups, substitution, and simulation adversely affected the experiment.

5. The field program provided an environment for ROAD operations at battalion level. It highlighted a war of movement under both non-nuclear and nuclear conditions. The organic DAVY CROCKETT section provided the means to effect transition to nuclear warfare. Limited chemical warfare was included. The experimental units conformed to the most recent Department of the Army TOEs. ROAD field manuals and reference data, published by US Army Schools, guided the tactical employment and established equipment characteristics.

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6. Four battalion exercises (two infantry battalion, two mechanized infantry battalion) were conducted. Detailed description of the exercises is contained in Annex A. The full range of typical battalion combat was played: movement-to-contact, attack, defense, and retrograde operations. Attachment of tanks and support from brigade and division were effected in realistic quantity to fit each tactical situation. Field performance was analyzed to expose battalion capabilities and weaknesses, and their causes and consequences.

FIGURE 1 ROAD INFANTRY BATT

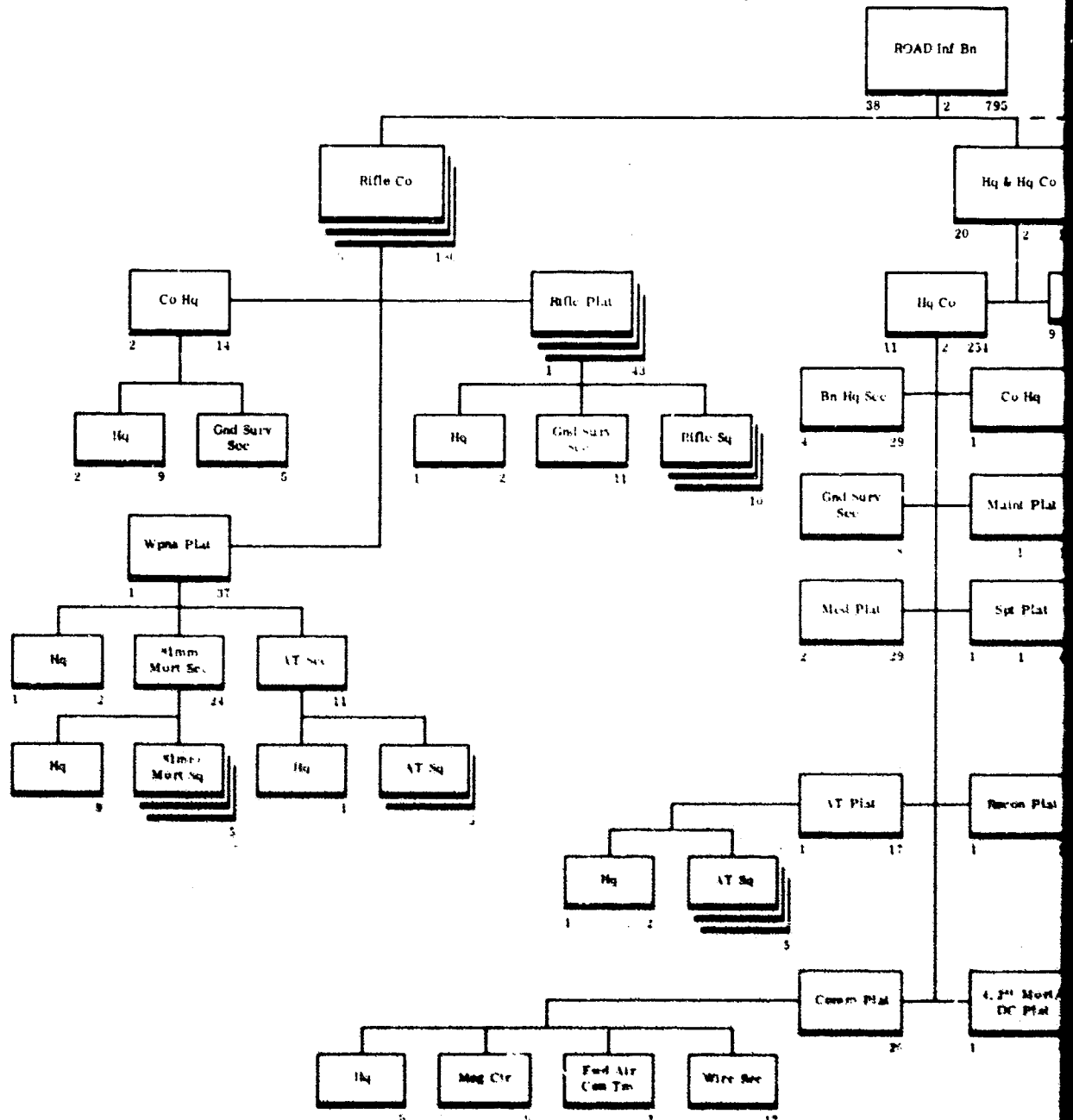


FIGURE 1 ROAD INFANTRY BATTALION

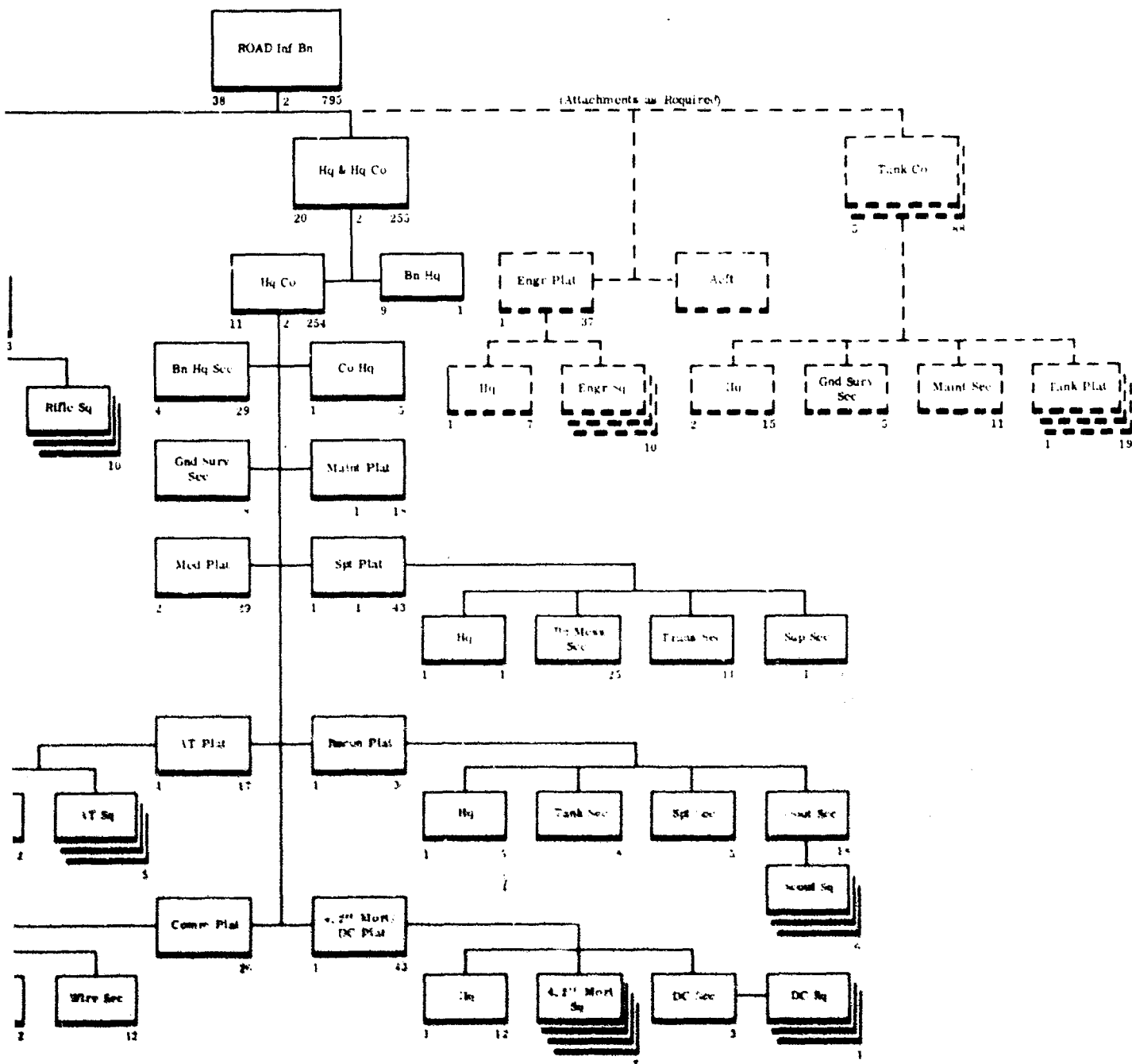
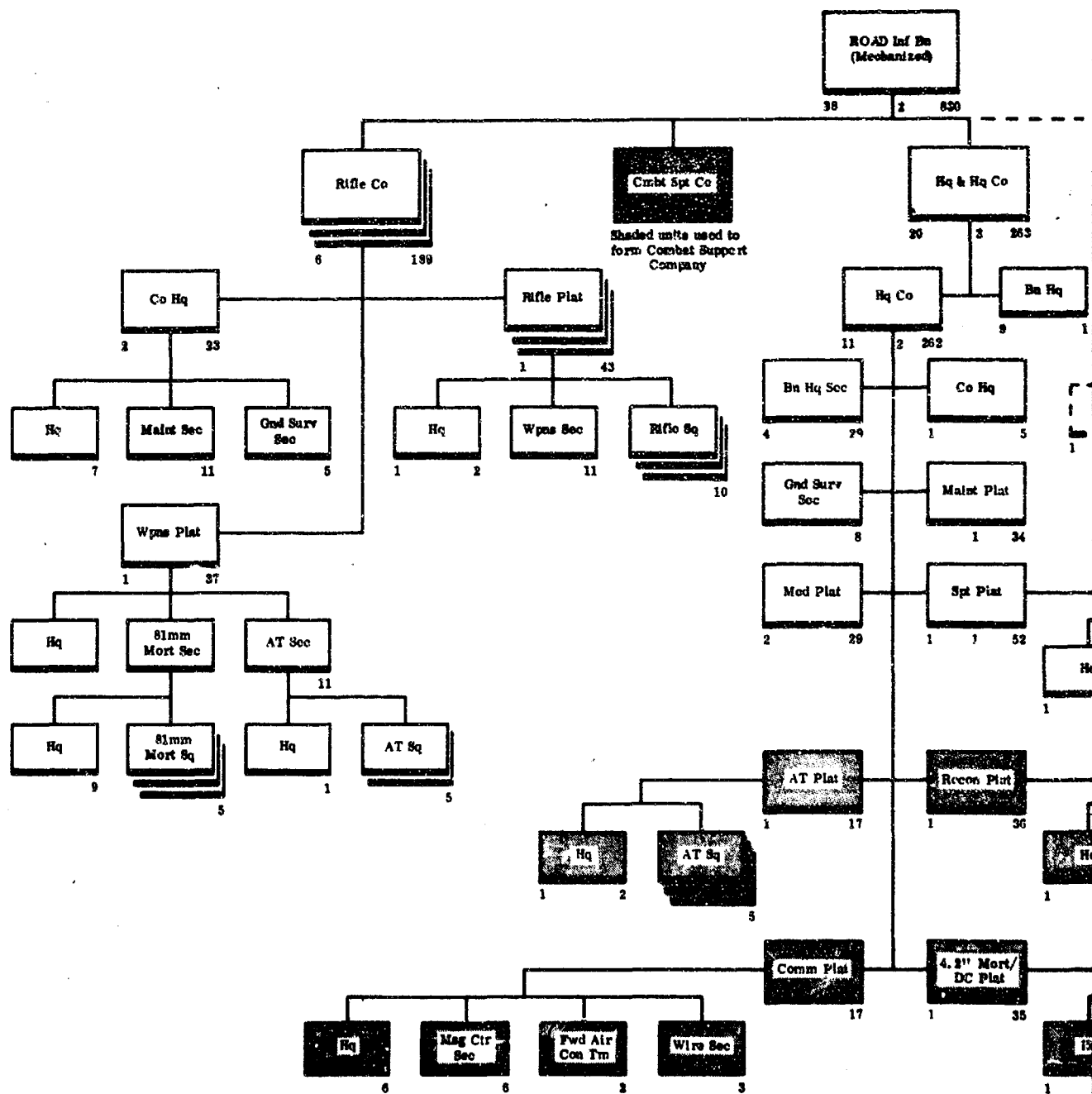
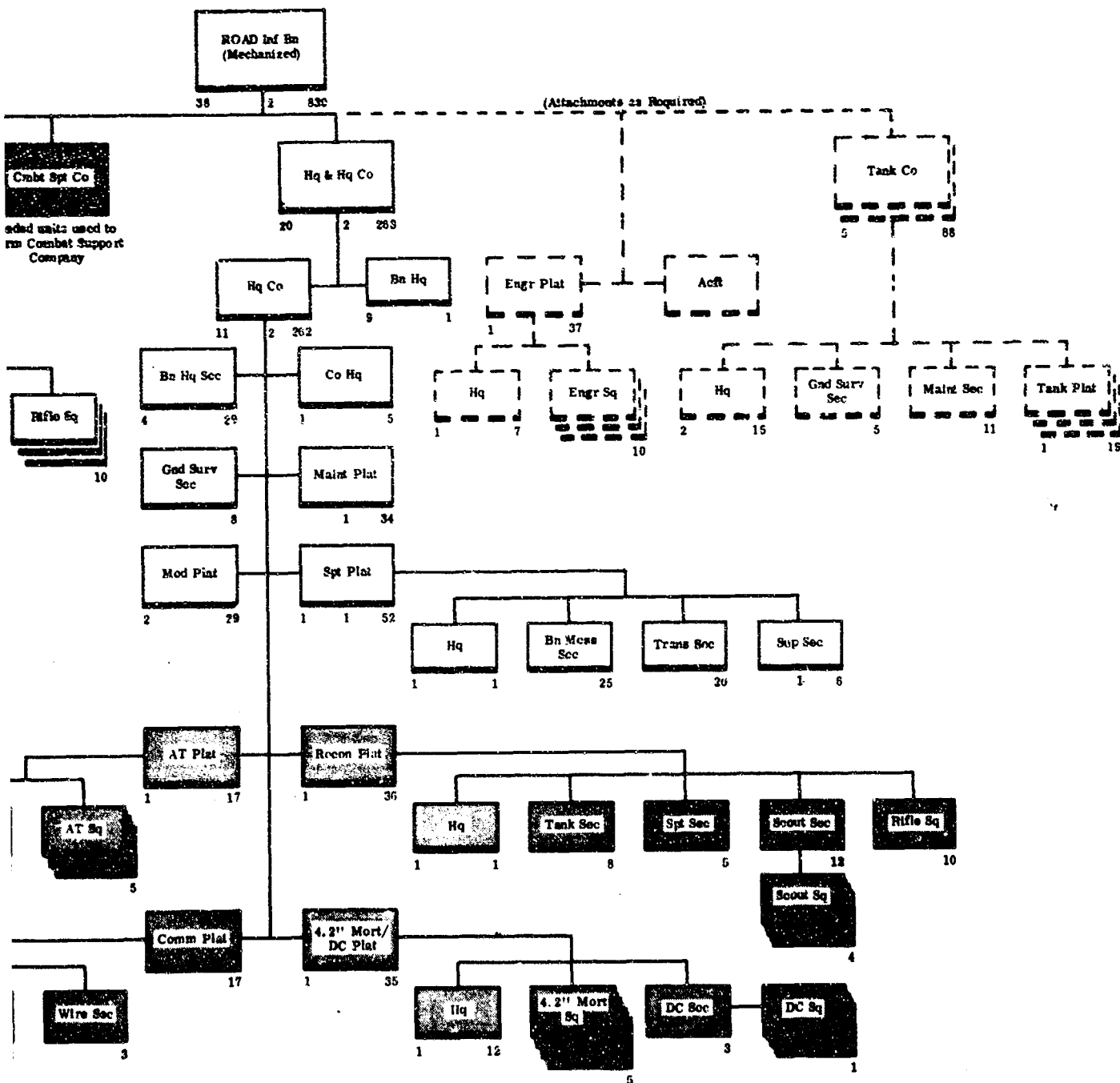


FIGURE 2 ROAD MECHANIZED INFANTRY BATT



ROAD MECHANIZED INFANTRY BATTALION



GENERAL CONCLUSIONS

II

General Conclusions

1. Detailed findings and recommendations for each experimentation objective are presented in Sections III through V; CONARC questions and data requirements in Section VI. Many of the findings and recommendations are interrelated and affect more than one objective. This section summarizes them, analyzing their effect on the battalion as a whole. Several basic conclusions concerning the overall effectiveness of the battalion are also included.

2. Command and control of the battalion and its elements depend on knowledge of the enemy and friendly forces and the ability to communicate instructions. Present means are inadequate to keep the commanders properly informed and support their personal direction of the battle. Information from the many sources is assembled and displayed with insufficient speed, accuracy and detail. If the battalion is to fight effectively in a war of movement, staff organization and functioning must be streamlined. Commanders must know the tactical and logistic situation regardless of their location on the battlefield. The present nuclear and chemical warning system is inadequate. An increased exchange of combat information among all leaders and staff is needed. Improved use of communications and display of information will overcome most deficiencies.

3. A battalion radio net is required to pass intelligence and warning alerts, friendly force information, and important administrative traffic to key battalion leaders and staff. This exchange cannot be superimposed on the command net. Message entry devices now under development are expected to transmit standard and routine reports (logistical status, intelligence, position location, etc.) simultaneously with voice transmissions. Redesign of the present battalion administrative net, with minor personnel and equipment augmentation, offers the most reasonable solution.

4. The decisive effect on the battalion effort expected of DAVY CROCKETT fires is not recognized in the present battalion organization. To degrade control and support from DAVY CROCKETT fires by inadequate manning and command is an unacceptable economy. Findings and recommendations concern the battalion platoon within the present concepts of augmentation, assembly of the weapon's team, and establishment of fire control. The most powerful weapon within the battalion is entrusted to a junior NCO, and officer supervision is provided by a platoon leader who also directs the mortar section. Section leaders are required

for both weapons elements. Survey is needed to support the DAVY CROCKETT section. The addition of a platoon radio command net and a small wire team is essential. There is no requirement for a light DAVY CROCKETT system.

5. The infantry battalion's rifle companies are unacceptably tied to an excessive vehicle tail. The company's cross-country mobility is questionable. The 1/4 and 3/4-ton trucks are inadequate weapons carriers. Vehicle additions to the battalion appear necessary to support wire teams and survey. A study of equipment requirements, basic loads, and personnel transport is required to develop a minimum motorization for the walking infantry. Movement ability is not provided through vehicle increase; it must be obtained in the improved ability of the foot soldier to move quickly over relatively short distances within a battalion operational area.

6. Some findings did not permit determination of specific recommendations because of personnel, equipment, time, and training limitations. Further field experimentation and study by agencies within the Combat Development System are required.

OBJECTIVE 1

III

Objective I

To examine the effectiveness of control as pertains to:

Employment of maneuver elements, including attached tank units, by the battalion command structure and staff.

The battalion's organization for combat to facilitate mission accomplishment.

Employment of indirect fire means including external fire support and the 4.2-inch mortar/DAVY CROCKETT platoon.

The battalion's acquisition and development of remunerative targets.

The capability of the battalion to support logistically the tactical operations.

The capability of the battalion to shift from non-nuclear to nuclear warfare.

A. Discussion of Objective

1. Control is the ability of the battalion commander, his staff, and subordinate commanders to plan and direct combat actions. Effectiveness of control, or the degree to which this ability is present, can be determined by evaluating:

- a. The commander's knowledge of the enemy, terrain, and friendly elements.
- b. The commander's capability to communicate timely decisions and to direct their execution.
- c. The capability of component elements to react to the decisions of the commander.

2. Evaluation and measurement of the six subordinate parts of the objective are interdependent and cannot be discussed individually. Therefore the findings and recommendations that follow answer the objective in its entirety.

B. Findings and Recommendations

1. Exchange of Intelligence Information and Dissemination of Collection Guidance (Appendix 1, Annex B, p 79). Existing battalion radio nets are inadequate to support the rapid, continuous exchange of intelligence information and the dissemination of collection instructions required during a battalion engagement. Traffic time and priority of command communications preclude the use of the battalion command net. Neither the command nor the logistical net link the desired subscribers. Improved communications discipline would not solve the problem.

Recommendations

a. That battalion radio (and wire, when installed) communications nets be redesigned to permit expanded, more rapid exchange of intelligence information and dissemination of collection instructions.

b. That consideration be given to:

(1) Redesign of the battalion logistical net as a more versatile "secondary battalion command net" to carry intelligence information as well as administrative and logistic traffic.

(2) The use of message entry devices (now under prototype study for transmission of artillery fire data) to expand the capability of present nets through non-voice transmission of intelligence data, administrative or logistic information, and position location reports. See para 16, p 16.

2. Processing of Intelligence Information and Direction of the Intelligence Effort (Appendix 2, Annex B, p 83). The battalion intelligence section (intelligence officer and intelligence sergeant) is unable to process intelligence effectively within the time available. Two men cannot monitor and assemble intelligence information, develop detailed assessments, and direct a closely-knit collection effort. Anticipatory planning is rarely possible. Positive supervision and coordination are often omitted. These deficiencies are unacceptable, particularly in acquisition and exploitation of nuclear and other mass fire targets. The section's coordination of fallout predictions is also impaired despite the assistance of the battalion chemical officer.

Recommendation

That an additional intelligence specialist (assistant intelligence NCO) be provided to improve the battalion capability to accomplish combat tasks. A modified battalion staff organization, integrating the S2 and S3 sections (para 5, p 12), and more expeditious transmission of intelligence information (para 1, p 10) will avoid further intelligence personnel augmentation.

3. Responsiveness of Intelligence Collection Agencies (Appendix 3, Annex B, p 85). The full potential of battalion collection agencies cannot be applied because of organizational relationships and allocation of radar and communication equipment. The rifle company commander's supervision of intelligence collection and dissemination is limited by the number and priority of his other jobs. Terrain and battlefield conditions limit the usefulness of present company radars. Their integration into the battalion surveillance plan is difficult.

Recommendations

a. That an intelligence NCO be authorized for each rifle company to assist the commander in planning and supervision of intelligence collection and in dissemination of intelligence.

b. That rifle company radar equipment and personnel be deleted and the battalion ground surveillance section include teams for attachment to battalion maneuver elements when appropriate. Suggested section organization is shown in Appendix 3, Annex B, p 85.

4. Exchange and Display of Friendly Force Information (Appendix 4, Annex B, p 87). The present battalion system of transmitting and displaying current information of friendly forces is inadequate. Periodic and emergency reporting does not offer the timeliness and detail needed for planning and supervision of combat action. Priority command traffic often precludes the exchange of information. Oral description is time-consuming despite brevity codes. Physical recording on unit or staff displays is also slow.

Recommendations

a. That communications nets and procedures be modified to allow prompt transmission and exchange of friendly force information. See para 1, p 10 .

b. That improved reproduction and display means be sought to furnish critical friendly forces information to the battalion commander regardless of his location. Recording and display by radio operators should be investigated.

5. Relationship of Intelligence and Operations Section (Appendix 5, Annex B, p 89). Battalion intelligence and operations sections normally function in the field as an integrated working unit. The TOE organization does not express this relationship. Intelligence serves the operational master; however, both intelligence and operations personnel must be intimately aware of each other's activities. Centralized direction by a single operations/intelligence chief through appropriate assistants would funnel the effort into the composite product needed by the commander.

Recommendation

That the personnel, equipment, and functions of the battalion intelligence and operations sections be integrated under the direction of an operations/intelligence officer.

6. Rear Area Security (Appendix 6, Annex B, p 91). Gaps between units and sensitive lightly-protected rear elements are exposed to guerrilla activity and ground or air infiltration of hostile elements. The present battalion organization does not provide adequate surveillance and security without dissipating combat elements. Under current doctrine priority use of battalion resources is applied to frontal and flank areas. No combat strength or command attention, other than contingency plans, is normally applied to rear area security tasks. Dependence is placed upon a skeletonized, improvised warning effort performed by supply, maintenance, headquarters, and communications personnel. The occasional assignment of this task to the reconnaissance platoon does not satisfy this requirement.

Recommendation

That a small security element be included in the headquarters company to provide rear area security and surveillance.

7. Coordination of Helicopter Movements and Helicopter-borne Fire Support (Appendix 7, Annex B, p 93). Battalions require a simple, uniform procedure in order to reduce coordination requirements and expedite response. Alert and organization of friendly forces for air movement must be accomplished in the minutes immediately preceding the aircraft's arrival in the battalion area. To exploit helicopter fire-support capability, positive control of fire support and maneuver must be maintained. The use of nuclear weapons increases the requirement for positive control of aircraft.

Recommendation

That simple, uniform procedures for the rapid integration of helicopter support be developed in order to reduce coordination time and exploit tactical advantages.

8. Warning of Employment of Nuclear/Chemical Weapons (Appendix 8, Annex B, p 95). Present warning procedures for nuclear/chemical fires, delivered on call or on targets of opportunity, do not permit timely engagement of targets or insure rapid alert of all men in the battalion area. Delays in notifying messengers, patrols, and communications and engineer personnel often restrict the use of the weapon. Warning requirements to higher headquarters, adjacent units, and nearby aircraft also retard firing.

Recommendations

- a. That a revised battalion radio net, as suggested in para 1, p 10, be established to provide warning of nuclear or chemical employment.
- b. That responsibility for nuclear/chemical warning coincide with area responsibility (i.e., rifle company commander for all elements within his area) rather than follow command channels (i.e., engineer commander for all his elements employed within the battalion area).
- c. That detailed warning techniques, as listed in Appendix 8, Annex B, p 96, be considered for notification of higher headquarters, adjacent headquarters, and men frequently separated from unit communications.

9. DAVY CROCKETT Planning and Employment (Appendix 9, Annex B, p 97). The differences in characteristics of the light and heavy DAVY CROCKETT weapons systems increase the problems of planning and employment. The two systems do not significantly improve the fire support capability, as the heavy weapon system can satisfy all fire requests. The longer range of the heavy weapon offers greater depth and choice of firing positions, and the requirement for off-vehicle movement to reach forward, defiladed firing locations is lessened. Reduced planning, training, and support requirements will result from the adoption of a single weapon system, and battalion control will be simplified. Based upon the CONARC-designated weapon allocation, nuclear fire support can be satisfied with only two launchers and related equipment. The number of launchers appears to have little direct relationship to the number of rifle companies they support. The weapons are normally employed, as are the battalion mortars, under battalion direction and control. Their range permits support of more than one company.

Recommendation

That the light DAVY CROCKETT weapon system be eliminated from the battalion mortar and DAVY CROCKETT platoon.

10. Command and Control Facilities (Appendix 10, Annex B, p 99).

Physical establishment and organization of an alternate command post after the destruction of existing battalion command and control facilities is not acceptable. Since enemy nuclear attacks on such facilities cannot be anticipated, prearranged division of the functions, personnel, and equipment of the battalion headquarters is required. The present fragmentation between a forward command group and the command post proper depicts the desired normal separation. Parallel communications and an increased exchange of information should permit permanent physical division. The placement of the forward command group in close proximity to one of the rifle companies would limit local security requirements and avoid concentration of personnel and vehicles at a single battalion headquarters.

Recommendation

That permanent division of battalion command post functions, personnel, and equipment be developed as normal doctrine.

11. ENTAC Authorization (Appendix 11, Annex B, p 101). The ENTAC's characteristics significantly limit its usefulness in close support of the rifle company. Its use is restricted by terrain conditions and combat situations, and commander's organization for combat and support of maneuver is complicated. There is greater opportunity for selective employment under battalion control. At this time, recoilless rifle-type weapons provide better support for the rifle company than is possible with the present ENTAC.

Recommendation

That ENTAC be replaced in the rifle company with the 106mm recoilless rifle until such time as a suitable replacement AT/assault weapon becomes available. (Latest TOE replaces ENTAC with 106mm recoilless rifle.)

12. Vehicle Requirements of the Infantry Battalion's Rifle Company (Appendix 12, Annex B, p 103). The many vehicles of the infantry battalion's rifle company (14 trucks and 9 trailers) add appreciably to the commander's problems of control, security, and support. Most of these vehicles provide logistical support or weapons, weapons crew, ammunition, and equipment transportation. Personnel, maintenance, and supply requirements, as well as problems of concealment and security, detract from their value. Effectiveness is materially depreciated in broken terrain when the vehicles must be separated from the riflemen. However, rifle company vehicular movement is habitually timed to the dismounted mobility of the rifle platoons. The preponderance of local, short moves lessens their importance.

Recommendation

That the number of rifle company vehicles be reduced by combining and reducing equipment and basic loads and dismounting weapons crew personnel.

13. Internal Battalion Mortar/DAVY CROCKETT Platoon Control (Appendix 13, Annex B, p 105). Command direction of the battalion mortar and DAVY CROCKETT platoon is unsatisfactory because of insufficient personnel, communications, and transport. Platoon coordination and supervision of the normally separated mortar elements and DAVY CROCKETT squads is limited by the single vehicle in platoon headquarters and the dependence upon the fire direction and DAVY CROCKETT radio nets for communications. The tasking of the senior mortar squad leader to control the four squads, particularly when the platoon occupies two firing positions or during displacement, does not solve the problem. Similarly in the DAVY CROCKETT section, the senior squad leader cannot effectively control his three squads. FDC communications and operations cannot be carried out with present communication, equipment, and personnel authorization, particularly when the FDC must be subdivided. The following recommendations will improve the platoon organization; however, the deficiencies listed above and in Sections IV and V question the worth of the concept of DAVY CROCKETT organization and employment.

Recommendations

- a. That an additional vehicle, driver, and communications be furnished the platoon sergeant so that he may properly assist the platoon leader.
- b. That mortar and DAVY CROCKETT section leaders be authorized for control and supervision of these elements. A vehicle, radio, and driver are also required for the DAVY CROCKETT section leader.
- c. That an additional fire direction computer be authorized for the FDC.
- d. That a platoon command net be established, and that the use of message entry devices between forward observers and the FDC be evaluated. See para 1, p 10.

14. Direction and Coordination of Combat Trains Operations (Appendix 14, Annex B, p 109). The battalion S4 under the present concept is the direct supervisor of the combat trains area. These operational duties restrict him to the combat trains location. He is unable to effectively exercise centralized control and supervision of the battalion logistical effort.

Recommendations

- a. That a logistical control point be established in the combat trains area.
- b. That the battalion motor officer be designated as combat trains commander in addition to his primary duties.
- c. That one of the two battalion supply sergeants be positioned at the combat trains area with a primary duty of operating the logistical control point.
- d. That communications capability (in the battalion logistical net) be established at the logistical control point, utilizing either the S1/S4 communications vehicle or adding a vehicle, driver, and radio to the support platoon TOE.

15. Direction and Coordination of Medical Evacuation (Appendix 15, Annex B, p 111). The direction and coordination of the medical evacuation effort, so that aid evacuation teams can promptly adjust to unexpected casualty loads, are not effective. Present communications facilities among the battalion surgeon, medical section leader, aid evacuation teams, and supported companies are inadequate. Centralized control is required to employ the full evacuation potential.

Recommendation

That all medical evacuation vehicles be equipped with a communications capability to enter the battalion logistical net and monitor the supported company net.

16. Exchange of Information to Guide the Logistical Effort (Appendix 16, Annex B, p 113). Coordination and responsiveness of logistical elements are affected by a lack of knowledge of the tactical situation. Delays or hurried coordination often result when there is not sufficient information on friendly elements, enemy, and terrain. Demands from supported elements occur on a crash or periodic basis, causing peak communication traffic loads during or immediately following critical combat action and during the daily resupply period.

Recommendation

That logistical elements monitor a battalion information net to maintain knowledge of the tactical situation. Use of message entry devices should be considered. See para 1, p 10.

17. Responsiveness of Logistical Support (Appendix 17, Annex B, p 115). Battalion medical, supply, and transportation elements encounter distinct difficulties in responding to the needs of combat elements. Company casualty treatment and evacuation are restricted because of the coordination requirements imposed on one of the company aidmen. Speed in refueling of vehicles is handicapped by primary reliance on bulk transportation of gasoline. The computed weight and bulk of the estimated basic load of the infantry battalion appears to exceed the rated capacity of battalion transport. The safety and security requirements for the transport of the prescribed nuclear load of DAVY CROCKETT weapons of both the infantry and mechanized infantry battalions increases the vehicular need.

Recommendations

- a. That an additional company aidman be authorized.
- b. That battalions be provided with a partial capability for 5-gallon gasoline can transportation and distribution, and that multiple outlets be added to each 1200-gallon gasoline tanker.
- c. That the basic load and transport capacity of the infantry battalion be reviewed to insure their compatibility.

IV

Objective 2

In the 4.2-inch mortar/DAVY CROCKETT platoon, to determine:

Minimum required strength for the DAVY CROCKETT section

Survey requirements of the Platoon.

Problems, if any, encountered in transition from 4.2-inch mortar to DAVY CROCKETT as the primary weapon.

A. Discussion of Objective

1. DAVY CROCKETT fires supplement, rather than substitute for, non-nuclear fire support. In non-nuclear warfare the section must maintain the three launchers and their vehicles and equipment in a stand-by status. When the outbreak of nuclear warfare occurs, the section actively supports the battalion fire plan. The latter role imposes added tasks of reconnaissance; augmentation with additional personnel with specialized training; selection and occupation of positions, emplacement, firing, displacement; installation and maintenance of communications; and ammunition supply. Consideration of three manning levels is involved; the TOE 3-man section, a 9-man section including the 6-man DA augmentation, and a 15-man section including six additional battalion mortar men cross-trained to perform as DAVY CROCKETT crewmen.

2. The use of survey data should improve first round hit probability and reduce adjustment or registration as well as the resultant disclosure. However, the practicality of field survey operations must be measured in terms of the need for increased accuracy, speed of target engagement, and effectiveness of the platoon's fires. The movement of forces on the ROAD battlefield presents a continuing requirement for weapon position and target area data. Nuclear safety requirements demand accurate target location.

3. When nuclear warfare is anticipated, the DAVY CROCKETT

section, with its launchers and prescribed nuclear load, moves from the trains area to join the forward combat elements. The section is augmented with additional personnel. However, the mortars must continue to provide conventional fire support.

B. Findings and Recommendations

1. Minimum Required Strength for the DAVY CROCKETT Section (Appendix 18, Annex B, p 117). In a non-nuclear environment the DAVY CROCKETT section must preserve its operational readiness. This includes the maintenance of equipment authorized the three teams, the movement and security of vehicles and equipment, and the maintenance of communications. The supervision and direction of the teams' readiness measures and the coordination and augmentation of the section during the transition to a nuclear environment cannot be accomplished effectively by the senior team leader. A section leader and three team leaders are needed.

A nuclear environment demands mobility as well as speed in adjustment and delivery of fires. The tasks performed simultaneously within each team are beyond the capabilities of a three-man team. A five-man team is recommended. Additional personnel to provide this five-man team should be from sources external to the battalion. Individuals must be fully-qualified at time of assignment and remain with the DAVY CROCKETT section throughout the period of nuclear warfare.

Recommendations

a. That the DAVY CROCKETT section during non-nuclear warfare conditions consist of a section leader and three team leaders with appropriate transportation and communications.

b. That under nuclear warfare conditions twelve additional men be furnished the section from sources external to the battalion. Detailed organization is described in Appendix 18, Annex B, p 117.

2. Survey Requirements of the Platoon (Appendix 19, Annex B, p 123). The requirement to mass and deliver surprise fires effectively can be satisfied by the mortar elements of the platoon without survey if accurate maps are available. Improved accuracy can be obtained, however, through the use of survey data.

DAVY CROCKETT weapons must deliver the same types of fires effectively. Adjustment with spotting rounds provides accuracy within the limitations of the weapon; however, at times tactical considerations will restrict or prohibit adjustment. The need for increased accuracy of firing data without benefit of adjustment warrants the use of survey.

Recommendation

That survey data be provided for the employment of DAVY CROCKETT weapons. If made available to the DAVY CROCKETT section, it should also be used to improve the accuracy of mortar fires.

3. Problems Encountered in Transition from 4.2-inch Mortar to DAVY CROCKETT as the Primary Weapon (Appendix 20, Annex B, p 125). The platoon leader is unable to provide the necessary direction, coordination, and supervision for both mortar and DAVY CROCKETT elements if they are employed concurrently. Better command and control are possible if the platoon sergeant is furnished a separate means of transportation and a section leader for the four mortar squads is added. These transition problems, as discussed under effectiveness of control (para 13, p 15) and manpower requirements of the DAVY CROCKETT section (para 1, p 20) are eliminated if those recommendations are followed. When mortarmen are used to augment the DAVY CROCKETT section, the mortar fire capability is reduced in proportion to the number and skill of individuals taken from mortar crews and the time during which mortars are employed without full crews.

Recommendation

That changes recommended in para 13, p 15 and para 1, p 20 be adopted to lessen transition problems.

V

Objective 3

To determine requirements for wire communications in the infantry and mechanized infantry battalions.

A. Discussion of Objective

The inability of wire to provide timely communications during the rapid and frequent shifts of a war of movement has increased dependence on radio. The latter, however, has unavoidable limitations in line-of-sight transmission, possible compromise of security, and threat of hostile jamming. As time, tactical situation, and unit capabilities permit, wire nets are installed to assume radio traffic loads. Radio then becomes the emergency standby. Normally, priority wire installation by the battalion communications platoon links the companies to the battalion headquarters and establishes fire direction nets. Component elements initiate their own internal wire circuits, giving similar priority to command and fire support. The tactical posture and mission, changes in organization for combat, dispersion, etc. determine the extent of the wire requirements.

B. Finding and Recommendations

1. Need for Wire Communications (Appendix 21, Annex B, p 127). More opportunities exist for wire usage than are suggested in present doctrine. A limited wire system appears desirable and feasible for both infantry and mechanized infantry battalions during movement-to-contact operations, particularly during periods of imposed radio silence. Wire link between the main command post and command group, and to a dismounted lead company, assists in control and security. During the conduct of dismounted attacks, wire communication between the battalion and the attacking company command posts is equally necessary. The most extensive reliance on wire communication occurs, however, during defensive operations. The wire requirements for the mechanized infantry battalion in the defense and in dismounted operations are essentially the same as those of the infantry battalion.

Recommendation

That current doctrine be revised to specify additional and appropriate opportunities for the use of wire in movement-to-contact and attack operations and to express the wire needs of the mechanized infantry battalion in defense and dismounted operations.

2. Capability to Install, Operate, and Maintain Wire Communication (Appendix 22, Annex E, p 129). The infantry battalion's capability to establish an effective wire system within its headquarters and to its organic and attached elements is impaired by the lack of a wire chief for one of its three wire teams. Duties of the wire foreman at battalion headquarters make it undesirable to use him as a wire team chief. The mechanized infantry battalion with equipment and personnel for only one wire team is incapable of providing a defensive wire system. Further, its switchboard capability cannot provide minimum switching facilities for most tactical operations. Similar comparison of rifle company requirements in each battalion reveals the need for wiremen to install and maintain the mechanized company's system. In the battalion mortar and DAVY CROCKETT platoon, the wire allocation is insufficient. The allocation does not permit establishment of wire circuits from the forward observers or DAVY CROCKETT teams to the platoon headquarters or FDC without relay through company switchboards. While personnel of the platoon can establish the wire system they cannot maintain the wire lines.

Recommendations

- a. That an additional wire chief be authorized in the infantry battalion communication platoon.
- b. That an additional three-man wire team, with appropriate transportation, and additional wire and switchboard facilities be authorized for the mechanized infantry battalion communication platoon.
- c. That the mechanized infantry rifle company be authorized two wiremen.
- d. That the battalion mortar and DAVY CROCKETT platoon be authorized a two-man wire team and increased wire and associated equipment.

CONARC QUESTIONS

VI

USCONARC Questions and Data Requirements

Question 1

What is the maximum frontage and depth of the area of influence of the reinforced rifle company in the various compositions and situations considered?

The frontage of company attacks varied from 700 to 1900 meters, depending upon reinforcement, enemy, and terrain. In the defense, company frontage varied from 800 to 2100 meters; depth, from 1200 to 2500 meters. See description and figures in Appendix 2, Annex A, p 61. Company exercises could not verify the area of influence because of personnel and equipment shortages. However, the above frontages and depths are practical for reinforced company employment.

Question 2

What is the optimum flank-to-flank frontage of the area occupied by the reinforced rifle company in the offense and defense?

Valid measurement of company positions was not possible because of personnel and equipment shortages.

Question 3

What changes occur in the area occupied and the area influenced by a given unit in the transition from non-nuclear to nuclear conditions?

No identifiable change in the area occupied occurred in transition to nuclear conditions. The battalion's non-nuclear and nuclear disposition were essentially the same. There was no extension of the area influenced as DAVY CROCKETT did not extend the range of non-nuclear fire support. Changes in the conduct of combat within the area influenced did occur, particularly in the defense. Frequent movement and changes in disposition of units were necessary to avoid presenting a nuclear target to the enemy. Key terrain was often denied by concentrated fire support rather

than physical occupation. The employment of the battalion mortar and DAVY CROCKETT platoon was changed. See Appendixes 9, 18, and 20, Annex B, pp 97, 117, and 125.

Question 4

What combination of tank and mechanized units within the battalion appears most effective?

The battalion command structure can effectively manage up to five major maneuver elements. Any combination of tank, mechanized infantry, and infantry companies can be used. The use of less than three companies restricts the flexibility of the battalion and fails to exploit the command and control potential.

Question 5

What is the optimum number of platoon-size maneuver elements per reinforced company commensurate with operational requirements and controllability?

The number of maneuver elements was not developed because of personnel and equipment limitations. Control of three to five maneuver elements appears practical.

Question 6

What combat formations of the reinforced company (and platoon where appropriate) proved to be the most satisfactory in each of the situations considered?

Evaluation of company and platoon formations was not possible because of personnel and equipment limitations.

Question 7

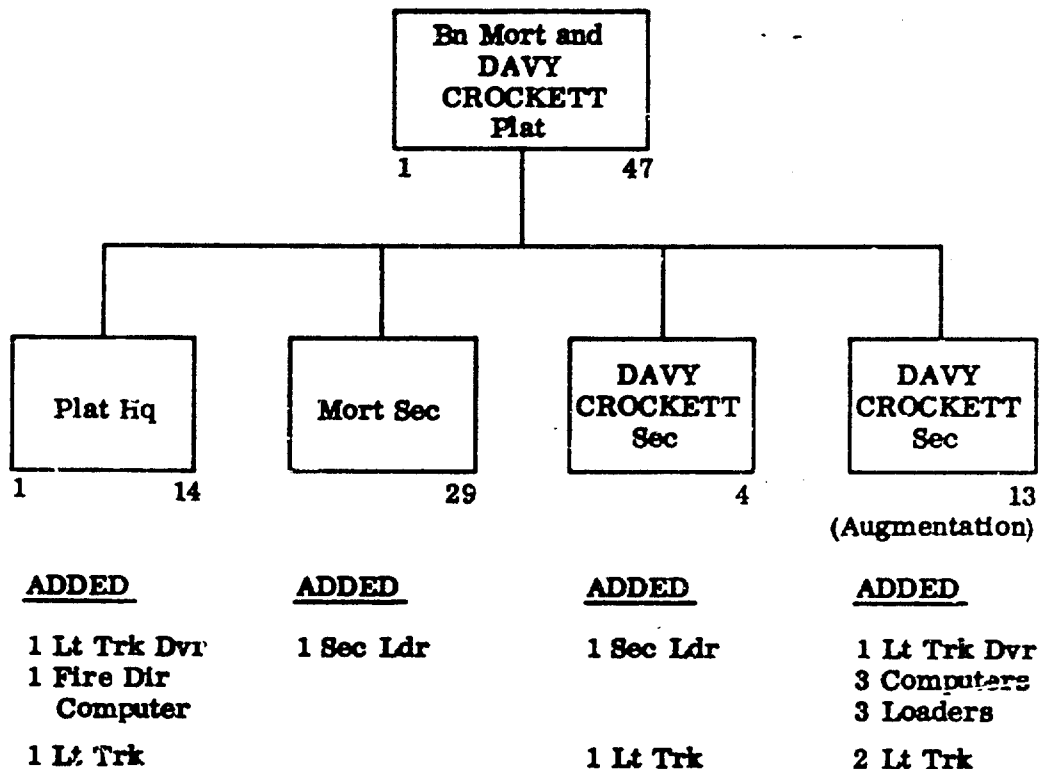
Are there sufficient 4.2-inch mortar fire control personnel?

A mortar section leader and an additional fire direction computer for the platoon FDC are required. See Appendix 13, Annex B, p 105.

Question 8

What is the optimum organization and equipment of the 4.2-inch Mortar/DAVY CROCKETT platoon?

Recommended organization and additional equipment are shown below. See Appendixes 13, 18, and 22, Annex B, pp 105, 117, and 129.



Question 9

What is the optimum organization for the DAVY CROCKETT section where:

- a. Only three TOE individuals are authorized, i.e., three squad leaders? three gunners? one each squad leader, gunner, assistant gunner?*

Draft DA TOEs, providing three team leaders, were applied during this experiment. An additional section leader is recommended. See Appendixes 13, and 18, Annex B, pp 105 and 117.

- b. Augmentation to organize two additional squads in an emergency is furnished by other members of the 4.2-inch mortar/DAVY CROCKETT platoon who have been cross trained?*

Mortar personnel augmentation is not considered practical. See Appendixes 18 and 20, Annex B, pp 117 and 125.

- c. Armament for three-man TOE squad includes three weapons systems (one heavy, two light, with transport)?*

DA TOE changed the armament to two heavy and one light system. The deletion of the light system is recommended. See Appendix 9, Annex B, p 97.

Question 10

Is any augmentation to 4.2-inch mortar/DAVY CROCKETT platoon fire control personnel necessary under the conditions enumerated in Question 9?

A DAVY CROCKETT section leader and an additional fire direction computer are needed for fire control, supervision, and coordination. See Appendixes 13 and 18, Annex B, pp 105 and 117.

Question 11

What diminishment of 4.2-inch mortar capability occurs when DAVY CROCKETT is augmented and employed?

Reduced capability is in proportion to the number, skill, and length of time individuals are taken from the mortar crews. See Appendix 20, Annex B, p 125.

Question 12

What are the survey requirements for the 4.2-inch mortar/DAVY CROCKETT platoon?

Survey is required for DAVY CROCKETT to obtain improved accuracy of fires and reduce disclosure of weapon position by preliminary spotting rounds. Extension of survey to mortar elements will increase accuracy of their fires. See Appendix 19, Annex B, p 123.

Question 13

Are the DAVY CROCKETT weapons more effective when attached to rifle companies or when employed under battalion control?

DAVY CROCKETT weapons are employed more effectively under battalion control. See Appendix 9, Annex B, p 97.

Question 14

What effect does habitual or extended usage of the DAVE CROCKETT have on the 4.2-inch mortar fire capability?

The platoon leader cannot provide the needed direction, coordination, and supervision for concurrent employment of mortar and DAVY CROCKETT elements. A separate means of transportation for the platoon sergeant and the addition of a mortar section leader permits acceptable delegation of some of his functions. When mortar elements augment the DAVY CROCKETT section, the mortar fire capability is reduced in proportion to the number, skill, and length of time individuals are taken from the mortars crews. See Appendixes 18 and 20, Annex B, pp 117 and 125.

Question 15

What is the optimum level of control of nuclear employment?

a. Control of DAVY CROCKETT systems is best retained at battalion level. The battalion can also acquire remunerative targets for attack by division nuclear weapons, furnishing the following information:

- 1) Location of desired ground zero (DGZ).
- 2) Location of friendly troop dispositions.
- 3) Configuration of friendly forward elements.
- 4) Condition of friendly forces: exposed or protected.
- 5) Desirable time of firing.
- 6) Special considerations (i. e., fallout, bonus damage, etc.).

b. Detailed target analysis and selection of appropriate delivery means, height of burst, and on occasion nuclear yield, are best accomplished at the division fire support coordination center (FSCC) for the following reasons:

- 1) Division FSCC maintains the current status of nuclear delivery means and allocated nuclear weapons.
- 2) Sufficient trained target analysis personnel are available.
- 3) FSCC has greater flexibility in selection of delivery means.
- 4) Friendly troop warning can be more rapidly disseminated with communication facilities available to the division.

Question 16

What are the battalion's requirements for engineer support?

Battalion requirements include recommendations and advice on engineer employment, clearing and laying minefields, barrier development, and preparation of obstacles, positions, hasty fortifications, and field works. These needs can be satisfied normally by the engineer company

supporting the brigade.

Question 17

To what extent is wire communication required or desired in the mechanized and infantry battalions?

More opportunities exist for wire usage than are suggested in present doctrine. A limited wire system appears desirable and feasible for both infantry and mechanized infantry battalions during movement to contact operations, particularly when radio silence is imposed. Control and security are aided if wire links are established between the main command post and command group, and to dismounted companies until initial contact is made with the enemy. During the conduct of dismounted attacks wire communication between the battalion and company command posts is also necessary. During defensive operations the entire battalion places primary reliance on wire. The wire requirements of the mechanized infantry battalion in the defense and in dismounted operations are essentially the same as those of the infantry battalion. See Appendixes 21 and 22, Annex B, pp 127 and 129.

Question 18

As components of the overall reaction time (time from appearance of a target to the actual engagement of the target), what is the relative importance of the following factors:

- a. Human judgement -- decisions, assignment of priorities, and evaluation of information?*
- b. Communication -- waiting for circuits, failure of equipment, and actual transmission time?*
- c. Data processing -- storage, retrieval and display of information, fire direction computations, and inventory control?*

a. Human judgement applied in evaluating information, rendering decisions, and assigning priorities is of greatest importance in executing nuclear fire missions. See Appendix 5, Annex B, p 89. Communication closely follows human judgement as there is greater need for communication in warning friendly troops, notification of higher headquarters, and

coordination and exchange of information. Both are more important than data processing.

b. In the execution of non-nuclear fires, communication is most important. The need for accuracy and quick response in data processing is more important than human judgement, as the latter is primarily accomplished by compliance with standing operating procedures.

Question 19

Are reaction times sufficiently long to have an adverse tactical effect (e.g., because of disappearance of the target)?

Frequently reaction times are too long to exploit tactical advantage. Improvement appears feasible if:

a. Non-fire mission traffic is removed from the fire direction net of the battalion mortar and DAVY CROCKETT platoon. See Appendix 13, Annex B, p 105.

b. Simplified automatic data processing is used. See answer to Question 20, below.

c. Improved and faster target analysis for nuclear fires is provided. See Appendixes 7 and 10, Annex B, pp 93 and 99.

d. Faster and more positive warning to friendly forces is possible. See Appendix 8, Annex B, p 95.

e. Inaccuracies in target location are reduced. See Appendix 19, Annex B, p 123.

Question 20

To what extent and how could improved communication systems and ADPS have reduced the reaction times observed? If possible, be specific as to tasks which might have been performed by ADPS.

See response to Question 19, above. Reaction time will be reduced by developing a battalion radio net which provides continuing knowledge of enemy and friendly forces to principal tactical and support personnel. See Appendix 1, Annex B, p 79. If the net can accommodate a simplified battlefield ADPS, the following actions will be performed more effectively:

a. Exchange of tactical knowledge among battalion operations/intelligence section, reconnaissance and surveillance elements, and forward observers.

b. Retransmission of target intelligence to organic, higher, and adjacent units.

c. Storage, display, and comparison of target information. See Appendixes 1 and 2, Annex B, pp 79 and 83.

d. Target analysis. See Appendix 13, Annex B, p 105.

e. Exchange of logistical information and requirements. See Appendixes 4 and 16, Annex B, pp 87 and 113.

Question 21

What is the comparative rate of combat attrition, US and Aggressor forces, in the experimental situations?

Data were not developed because of personnel and equipment shortages.

Question 22

Is the battalion administrative support capability adequate in the situations considered? What augmentation, if any, is suggested?

Coordination and direction of logistic support elements require the establishment of a control point in the combat trains area. Change in location and function of logistics personnel and communications is necessary. Added radios for medical evacuation vehicles, an additional company aid man, a modified gasoline distribution means, and a balanced basic load and transport capacity are needed. See Appendixes 14, 15, 16, and 17, Annex B, pp 109, 111, 113, and 115.

Question 23

What administrative (logistical) problems are generated by cross-reinforcement? How are they solved?

The typical requirements of refueling, resupply, maintenance, and evacuation were encountered. They were adequately solved using present methods and procedures.

Question 24

Is a trains organization recommended for control of administrative support elements of the battalion? If so, what should be the command organization?

A logistical control point within the combat trains area, under the direction of the battalion S4, is needed. Change in location and functions of personnel and communications will provide the organization. See Appendix 14, Annex B, p 109.

Question 25

Does the concept of fragmenting the battalion mess team to companies provide satisfactory service? How frequently is this procedure used? How is the team employed when it is impractical to attach segments to companies?

Fragmenting provided satisfactory service. Most frequently the consolidated mess cooked the evening meal in the field trains, transported the prepared food to companies in insulated containers, and prepared and served breakfast in the company areas. The noon meal was normally combat rations.

Question 26

Does the mobility of administrative support elements of the battalion compare favorably with supported tactical units?

Field test of logistic mobility was incomplete because of personnel and equipment shortages. The weight of the estimated basic load exceeds the rated capacity of the organic transport. See Appendix 17, Annex B, p 115.

Question 27

Can the battalion headquarters company commander adequately control and administer the battalion headquarters and headquarters company?

Operational control of most elements of the headquarters company is decentralized to the battalion staff. Direct administrative support is provided to the individual platoons from the battalion trains under the commander's monitorship. No inadequacies were noted.

Question 28

Would the separation of battalion combat support functions into a new separate company facilitate tactical operations? Is this benefit marginal or of sufficient importance to warrant a change in the organization?

The formation of a combat support company headquarters offers a facility for an alternate battalion command post, but does not otherwise materially facilitate tactical operations. Its coordination of tactical plans and employment between battalion headquarters and the mortar, DAVY CROCKETT, antitank, reconnaissance, communications and ground surveillance elements was unsatisfactory. See Appendix 5, Annex B, p 89.

Question 29

Are the battalion administrative support functions adequately organized to facilitate and support combat operations?

No deficiencies were noted except for the requirement for a logistical control point (see Question 24, p 34 and Appendix 14, Annex B, p 109) and detailed changes of company aid men, fuel distribution and basic load transport capacity (see Question 26, p 34 and Appendix 17, Annex B, p 115.

Question 30

Is the number of intelligence personnel assigned to the battalion headquarters section adequate? What changes, if any, are recommended?

An additional intelligence NCO is needed. See Appendix 2, Annex B, p 83.

Question 31

Is the organization of the battalion reconnaissance platoon adequate? What changes, if any, are recommended?

The armored cavalry platoon organization of the mechanized infantry battalion is adequate; the reconnaissance platoon of the infantry battalion is deficient in firepower and mobility. The 106mm recoilless rifles mounted on 1/4-ton trucks lack sufficient cross-country mobility. The 1/4-ton trucks are overloaded when carrying a 106mm recoilless rifle, four personnel, one VRC-10 radio, one PRC-10 radio, one reel CE-11 with wire, and other equipment and ammunition. The reconnaissance platoon should be redesigned in accord with the mechanized infantry armored cavalry platoon organization and equipment authorization.

Question 32

In the battalion and company ground surveillance sections:

- a. *Are there sufficient personnel to perform assigned missions effectively?*

There are sufficient personnel under normal combat conditions. When required to displace on foot for extended distances, augmentation is required. Deletion of company ground surveillance sections is recommended. See Appendix 3, Annex B, p 85.

- b. *Are the vehicles and communications equipment adequate to provide the required mobility and timely reporting of information?*

No deficiencies were noted. See Appendix 3, Annex B, p 85.

- c. *Does the use of authorized radars reduce the number of personnel for security operations to a point that augmentation is necessary to perform this function?*

Radar teams usually depend upon other elements for security. No augmentation appears necessary.

d. Are the radars effective in detecting enemy movement at night before the movement is reported by other means?

Equipment and personnel shortages did not permit measurement.

Data Requirements

Personnel and equipment shortages and the experimental design required to investigate the CONARC objectives did not permit the collection of valid, detailed data to answer the requirements.

Annex A

Description of Experiment

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Rifle Company

<u>Non-Available Equipment</u>	<u>Substitute</u>
Launcher and guidance set, truck mounted, antitank assault missile.	Wooden ENTAC mock-up mounted on 1/4-ton truck (Figure A-1)
Radar Set, AN/PPS-4	Simulated with wooden mock-up (Figure A-2)

Battalion Mortar/DAVY CROCKETT Platoon

<u>Non-Available Equipment</u>	<u>Substitute</u>
Gun, recoilless, 120mm, XM63, w/mount tripod, XM120, w/equip/DAVY CROCKETT	81mm mortar (Figure A-3)
Gun, recoilless, 155mm, XM64, w/mount tripod, XM121, w/equip/DAVY CROCKETT	106mm recoilless rifle (Figure A-4)
Mortar, self-propelled, full tracked, 4.2-inch	4.2-inch mortar with ground mount and 3/4-ton truck

The M-1 rifle, carbine, M1919A1 machine gun and other current weapons were substituted for the M-14 rifle, the XM79 or other individual weapons without degrading the evaluation. To the extent feasible complete TOE and basic loads were carried.

(6) Hunter Liggett Military Reservation (HLMR), the site of the experiment, is hilly and steeply ridged. Ranges run generally north-south with peaks to 3,000 feet. The flat open terrain of the San Antonio River Valley and the rolling terrain in the Stony Valley - Nacimiento Valley area (Figure 5) offer easy movement. Surface soils are generally silty and when dry become dusty under traffic. Trafficability is generally good except on steep grades during and after rainfall. The annual rainfall does not usually exceed 12 to 13 inches; streams are normally dry from June through early December. There is little growth or underbrush to block ground observation or movement. Temperatures during the experiment were generally mild, ranging from 25° F in early morning to 80° F at midday.



FIGURE A-1
ENTAC SIMULATION



FIGURE A-2
AN/PPS-4 RADAR SIMULATION

ANNEX A

FOR OFFICIAL USE ONLY



FIGURE A-3
LIGHT DAVY CROCKETT SIMULATION



FIGURE A-4
HEAVY DAVY CROCKETT SIMULATION



FIGURE A-5 ROLLING TERRAIN OF STONY VALLEY - NACIMIENTO VALLEY AREA

b. Methodology

(1) Experimental methodology was initially developed using the 1:1000 terrain board representation of HLMR. This aid also served to develop the concept for the field test, verify the scenarios, and orient the participants. The terrain board study confirmed that many specifics of combat would have little impact upon an evaluation of battalion operations. It mattered little, for instance, that Tank #1 of the 1st Platoon of Company A was knocked out of action; the important information at battalion level was that the tank company had lost a tank. Detailed casualty effects of artillery concentrations or tactical air attack were not necessary; the impact on battalion control was sufficiently precise and valid when net battlefield losses were periodically applied. It was also possible to accept representation of other tactical forces. Aggressor ground and air elements were assumed to dominate selected areas of the battlefield for given periods of time. The relative strength of forces was prescribed in the USCONARC directive.

(2) Exercise situations placed stresses upon the battalion which would reveal deficiencies in organization, equipment, and tactics. Reinforcing units were limited to two tank companies, one engineer platoon, logistical and maintenance teams, and a reasonable proportion of division artillery and army aircraft support. Attachments and detachments were made at critical times to expose problems of control and organization for combat. To stress control, brigade orders often required battalion movement along more than one axis, a change in direction, or a diversion of major portions of the battalion. Allocations of artillery support and nuclear weapons were changed at critical times. Frontages and areas of responsibility were varied within ROAD doctrine and environment.

c. Concept and Organization of the Test Program

(1) The experimental program provided for an equal division of field test time between infantry and mechanized infantry battalions. Field actions consisted of combat events involving movement to contact, attack, defense, and retrograde operations.

(2) The field phase consisted of four 72-hour tactical battalion exercises, each played over a 10- to 12-day period. (See Appendix 1, p 59, Chronology of Experiment). Two tactical exercises employed infantry battalions; two, mechanized infantry battalions. Each exercise consisted of a command group phase and a company/battalion mortar and DAVY CROCKETT platoon phase. Each battalion command group phase lasted from six to nine days. The mechanized infantry battalion command group exercises included a combat support company organization within the command group.

(3) Each exercise was initiated by a brigade order. The initial situation presented the background and set the stage in a manner similar to Army Service School instruction. Field play was conducted during daylight hours although darkness or periods of limited visibility were frequently simulated. The command group studied the mission and terrain, developed plans and orders, moved skeletonized elements in accordance with plans, and last and most important, underwent an exacting and imaginative interrogation and review of their tactical solutions. The battalion commander was given maximum freedom to develop his own solution, limited only by ROAD doctrine and the prescribed experimental situation. Seldom was solution time restricted as the aim was a considered, deliberate battalion's answer to the requirement.

(4) The battalion command group solution normally sponsored the next requirement. However, when the command group solution conflicted with the preplanned scenario, a revised tactical situation was introduced. Intended stresses and the development of the study areas were achieved with minor reorientation.

(5) Following the battalion command group phase of each exercise, a full-strength reinforced infantry or mechanized infantry rifle company, together with the battalion mortar and DAVY CROCKETT platoon, executed selected combat tasks as planned in the battalion command group tactical solutions. These "live" illustrations by fully-manned and equipped units gave an added field appraisal of the soundness and feasibility of the battalion command group actions and orders, as well as further evidence to assist in evaluation of the experimental objectives. A small Aggressor force provided realism during the company/battalion mortar/DAVY CROCKETT platoon phase. The Aggressor was equipped with necessary vehicles to permit rapid movement and representation of larger forces. Blank adapters and other sound and flash devices simulated battlefield noise.

(6) Exercise direction emanated from a field control headquarters representing the ROAD brigade and Aggressor command. Controller guidance permitted maximum freedom of choice to test elements and sought only to force the occurrence of events that would provide evidence and preserve the continuity of exercise play. Controller umpiring and casualty assessment were based on comparative field judgments of opposing combat strength. Realistic firepower, logistic resources, and time and space considerations were applied. Play during limited visibility was conducted consistent with troop safety and evaluation capability. Prompt and reasonable reinsertion of personnel and equipment casualties as replacements avoided unacceptable reduction of the test unit.

(7) Each exercise followed the procedures outlined below:

- (a) The battalion commander and selected staff officers were briefed on the tactical situation at the Experimental Control Center (ECC) (Figure A-6) by the senior controller, who then presented the first requirement, normally the preparation of a complete written battalion operations order. Acting as the brigade or adjacent commander, the controller responded to questions from player personnel.
- (b) The battalion commander, staff, controllers and evaluators moved to the field locations. There the battalion commander directed the reconnaissance, selected a course of action, and issued implementing orders. Staff officers and subordinate commanders developed their plans to accomplish assigned tasks. Reconnaissance was permitted as appropriate to the tactical situation.
- (c) Personnel returned to the ECC where the battalion commander, staff, and subordinate commanders presented their solutions to the assembled evaluators, analysts and controllers.
- (d) Following their presentations, the battalion command group was divided into four subgroups for detailed discussion and interrogation by evaluators and analysts. These seminar groups consisted of:

Group 1 - Battalion Commander, S3, S2, Communications Officer, Reconnaissance Platoon Leader, and Antitank Platoon Leader (Figure A-7)

Group 2 - Rifle and Tank Company Commanders and Platoon Leaders

Group 3 - Fire Support Coordinator, Mortar and DAVY CROCKETT Platoon Leader, S3 Air, and Chemical Officer

Group 4 - Battalion Executive Officer, S4, S1, Support Platoon Leader, Medical Platoon Leader, and Motor Officer

Evaluator questionnaires guided these discussions.

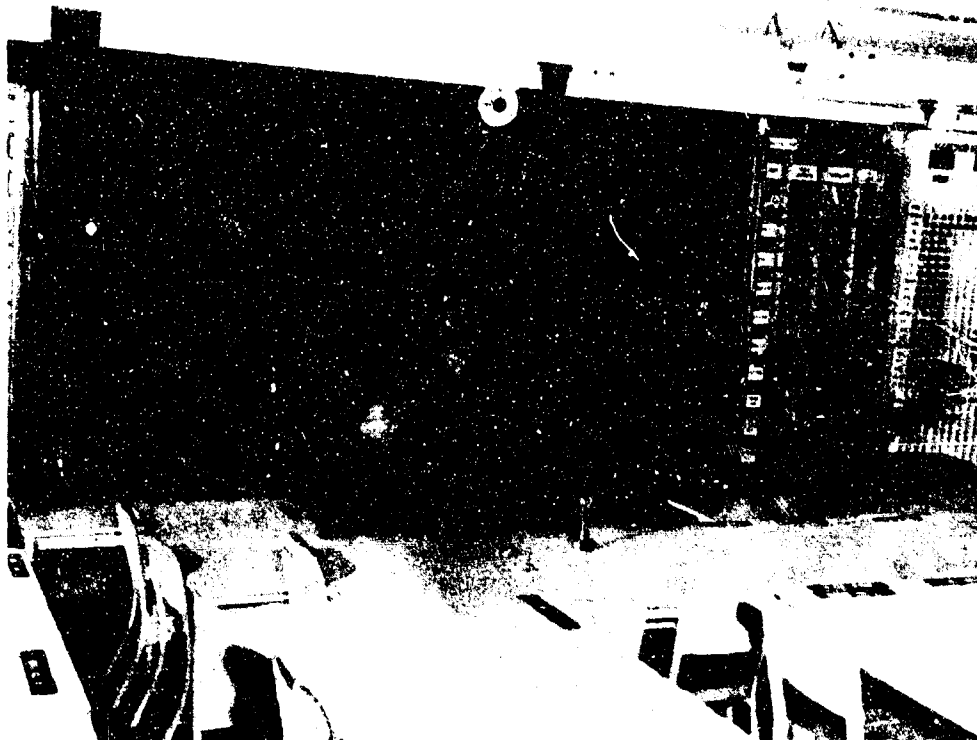


FIGURE A-6
PREPARATION OF THE ECC FOR CONTROLLER BRIEFING

Players submitted detailed logs of their actions in the field.

- (e) The battalion command group returned to the field, occupying locations specified in their solution. The next situation was then presented in one of two methods. If the subsequent action was to be triggered by information acquired by subordinate units, it was inserted by controllers at the desired level and passed through tactical channels by the players to the appropriate command level where the commander and staff took necessary action. If requirements were presented by orders or information from higher or adjacent headquarters, the senior controller furnished the information to the battalion commander or the staff officer concerned. Requests for additional information and support were answered by the senior controller,

based on the planned continuity and stresses expressed in the scenario. After solving the requirement in the manner described earlier, the group returned to the ECC where the solution was presented and discussed. Subsequent situations and requirements were presented in a like manner.



FIGURE A-7
DISCUSSION GROUP REVIEWING THE TACTICAL PLAY

- (f) Upon completion of the battalion command group phase the company/battalion mortar and DAVY CROCKETT platoon units executed selected orders and instructions developed during the previous phase. Available for these phases were one rifle company, one tank platoon and one engineer squad, plus the battalion reconnaissance and mortar and DAVY CROCKETT platoons. All units were composed of personnel who had not participated in the earlier battalion command group phase.
- (g) The company/battalion mortar and DAVY CROCKETT platoon phase started with the units deployed in positions designated in the battalion command

group solution. The company commander was briefed by the controller on the general and special situation and then given his mission. Sufficient time to perform necessary troop leading procedures, make his decision, and issue his instructions to subordinate leaders was provided. The battalion mortar and DAVY CROCKETT platoon leader was briefed in a like manner. The units then responded as directed by their commanders.

2. ORGANIZATION FOR EXPERIMENTATION

a. Experimentation and Aggressor units were organized as follows:

(1) The infantry battalion command group (Figure A-8) included commanders down to platoon level as well as unit and selected special staff officers. The mechanized infantry battalion command group is shown in Figure A-9. Minimum enlisted drivers, radio operators and operations personnel were provided to facilitate experimental play.

(2) The infantry and mechanized infantry rifle companies were organized in accordance with DA draft TOE 7-18 and 7-47E. Limited modifications were necessary because of the lack of equipment.

(3) The battalion mortar and DAVY CROCKETT platoon was organized in accordance with DA draft TOE 7-16E. Though only battalion mortarmen augmented the DAVY CROCKETT section during actual field test, the additional DA augmentation was applied in the seminars, discussions, and post play.

(4) The Aggressor force was simulated in exercise play, except for a small detachment which provided enemy representation during the company/battalion mortar and DAVY CROCKETT platoon phase. The Aggressor "paper" force that opposed the battalion command groups was based on an Aggressor reinforced mechanized rifle battalion (Figure A-10). This battalion was supported by a proportionate share of supporting arms from its parent regiment and division. Aggressor doctrine provided for attacks on a two kilometer front and for defense of a 3-1/2-kilometer-wide sector. Portions of additional battalions were played to extend the Aggressor front to match the zones of the ROAD battalions.

b. The project team (Figure A-11) was organized to design, control, and evaluate the exercise and prepare the final report.

(1) Exercise controllers developed the scenarios and conducted the field portion of the experiment. They represented higher and adjacent commanders and staff and inserted sufficient battlefield intelligence to

**FIGURE A-8
BATTALION COMMAND GROUP**

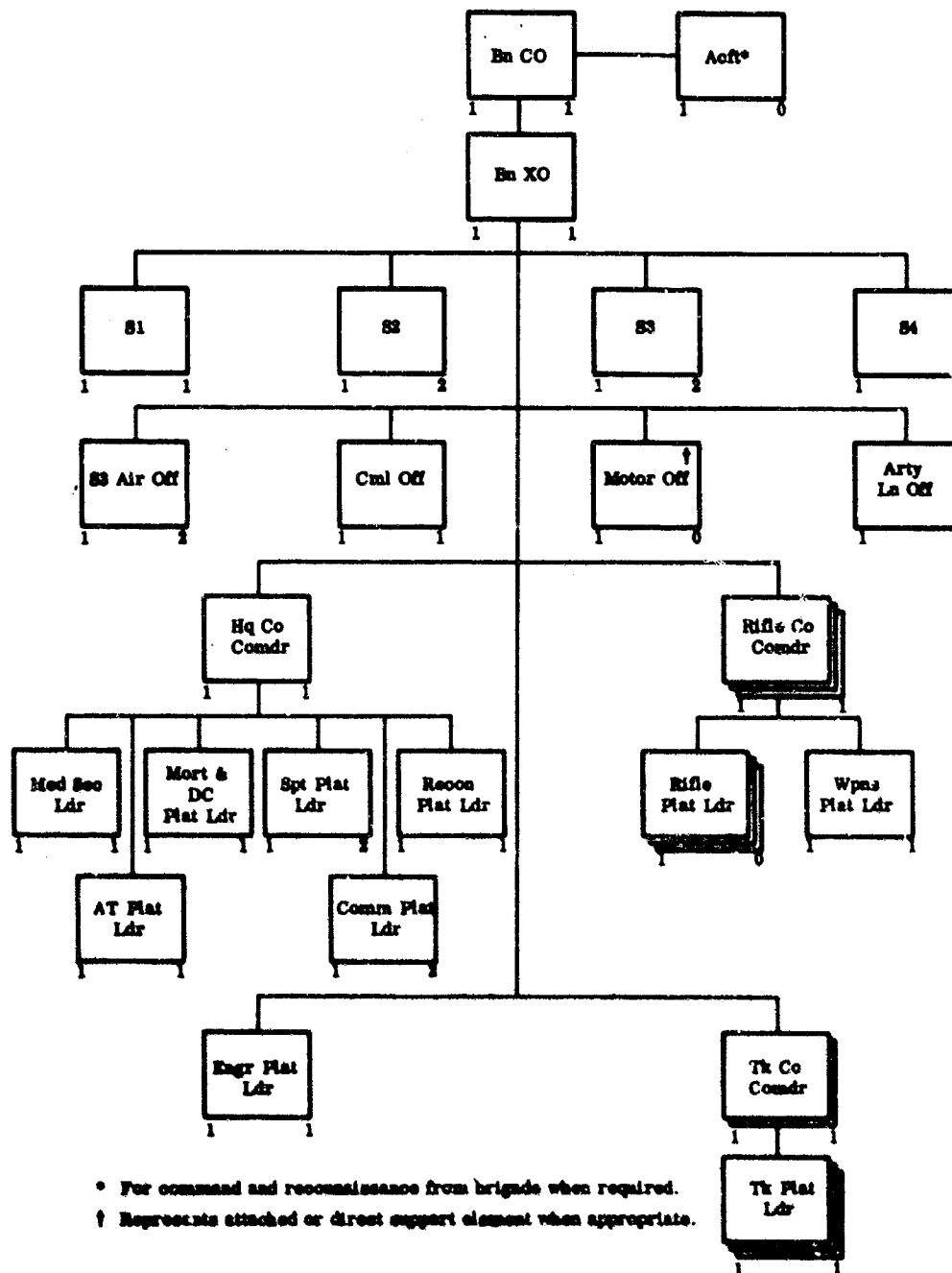
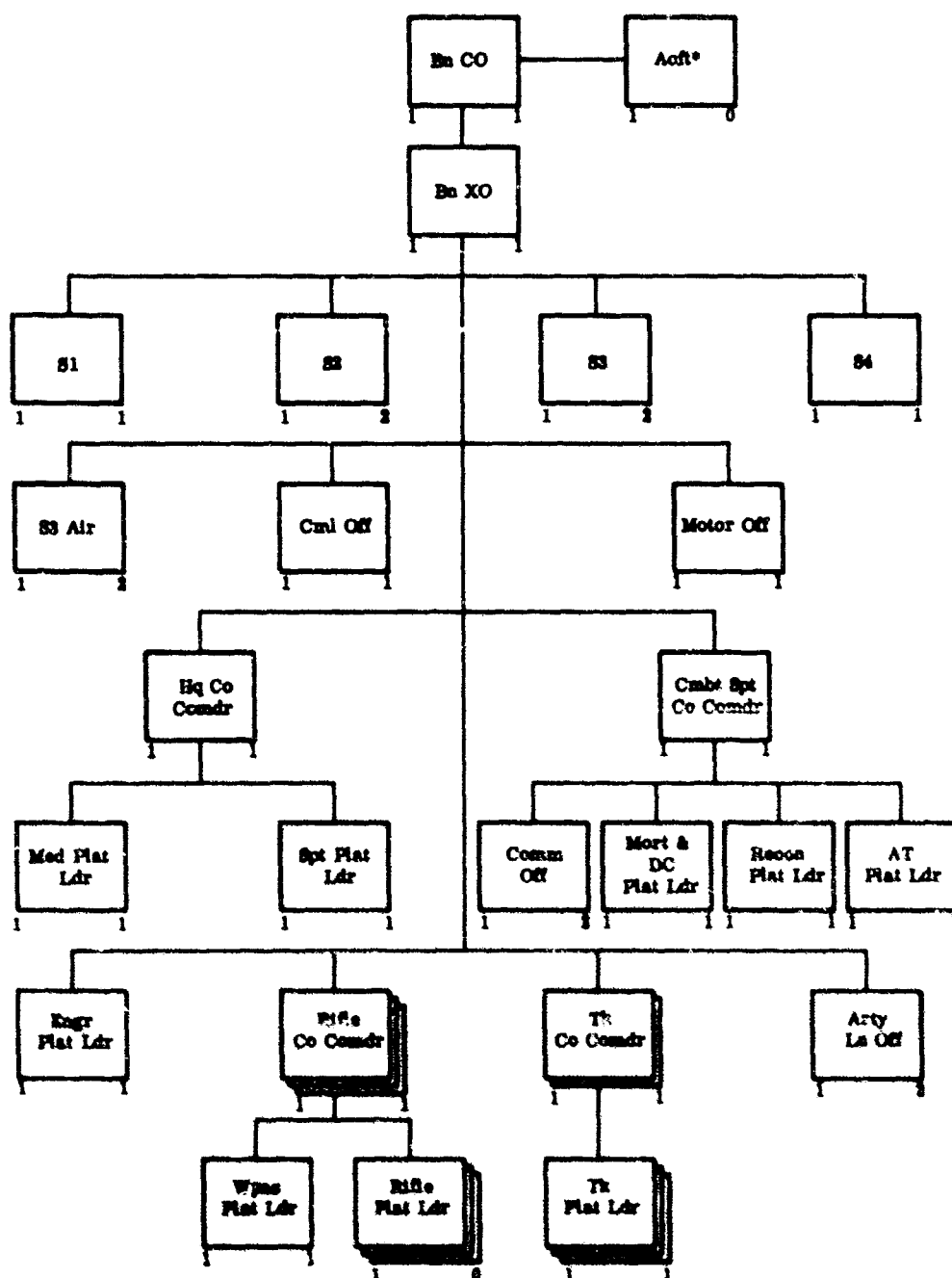
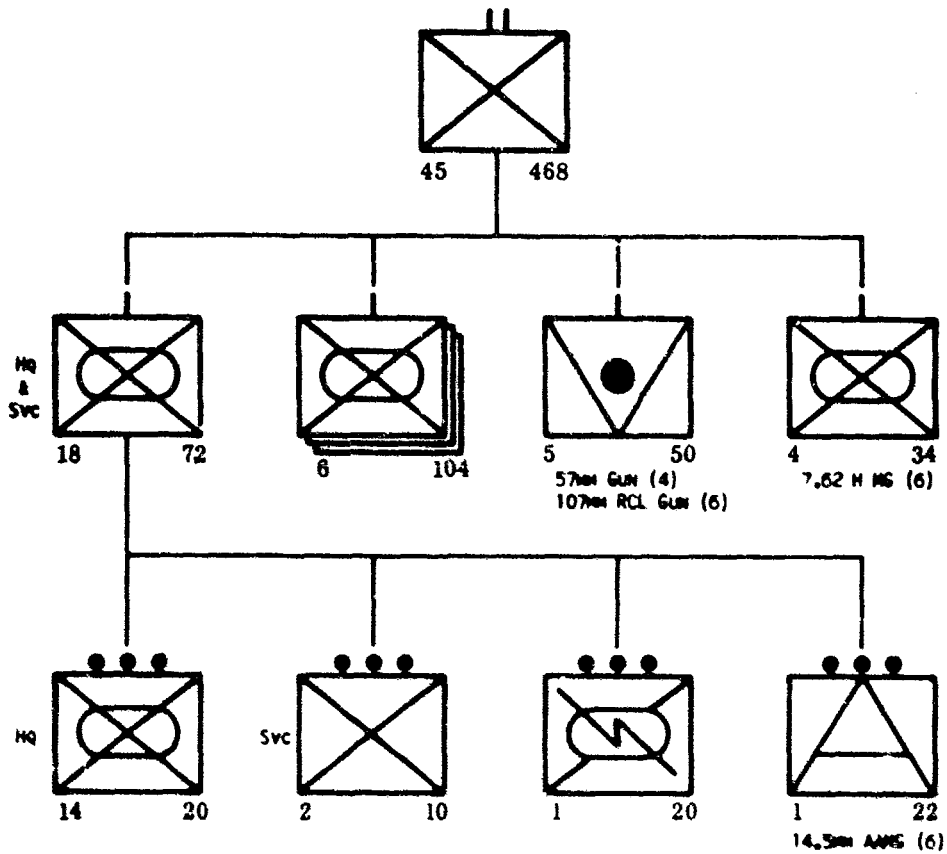


**FIGURE A-9 COMMAND GROUP, MECH INF BN
(WITH COMBAT SUPPORT COMPANY)**

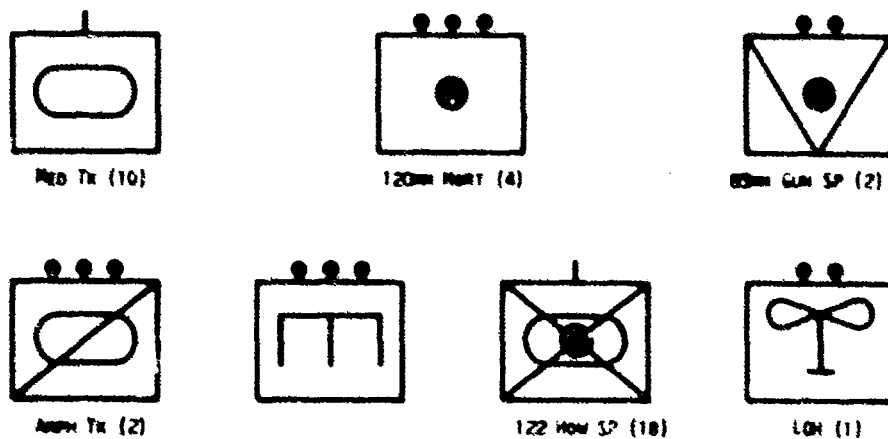


* For command and reconnaissance from brigade when required.

FIGURE A-10
AGGRESSOR MECHANIZED RIFLE BATTALION *

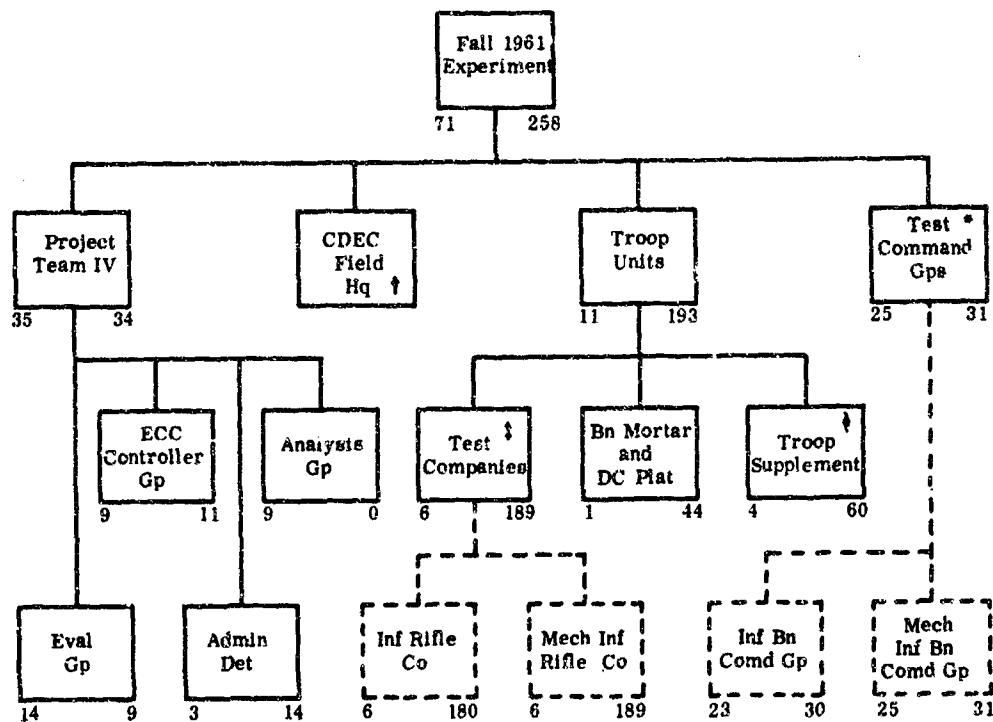


NORMAL REINFORCEMENTS (ATTACHED or DIRECT SUPPORT)



*Assigned and attached elements are 100% mobile.

FIGURE A-11
EXPERIMENTAL FORCE ORGANIZATION
(Fall 1961 Experiment)



- * Includes unit staff, company cmdrs, and selected plat ldrs.
- † Admin and log spt; personnel requirements not included in experimental force tot.
- ‡ Includes aid men, arty and 4.2" mort FO's. Companies not employed simultaneously.
- § Provides as required up to two tank plats, elements of recon plat, AT plat, bn admin and log spt, and Aggressor representation.
- Experimentation used only one company or command group at a time.

support the exercise. A small detachment established a central communications center and maintained current status boards at the ECC to provide background for the discussion periods and orientation of visiting personnel.

(2) Evaluators developed the objective analyses, prepared questionnaires to be answered during the experiment, observed field play within their area of interest, participated in player interrogations, and wrote the results of their observations and findings for the final report.

(3) The analysts were senior, combat-experienced officers with varied combat arms and technical service background. This group observed the field problems, participated in the battalion command group discussions, provided balance to the specialization of the evaluators, and aided the exercise controllers in the direction of the field exercises.

(4) The administrative detachment provided vehicle drivers, and clerical and administrative support.

c. The project team was independent of the test elements for transportation, communications, maintenance and supply. Their separate microwave radio-relay communications system precluded interference with the tactical TOE radio nets of the test elements. During the company/battalion mortar and DAVY CROCKETT platoon phase project team personnel assumed the tactical posture of player troops. They observed all rules of camouflage, vehicle, and individual discipline, in order to assist in realistic player performance. Individual exercises are summarized in Appendix 2, Summary of Field Exercises.

3. TRAINING

a. General

Preparatory training emphasis provided knowledge of the new ROAD infantry and mechanized infantry battalion organization, equipment, and tactics. Visits to USACGSC and specialized resident instruction at USAIS for project team personnel supported the training effort. A like requirement for an understanding of Aggressor, based upon the project team's Aggressor training text, was also satisfied.

b. Battalion Command Group Training

The battalion command group was formed around the existing command structure of USACDEC's 3d Armored Rifle Battalion, 41st Infantry. Partial substitution of branch, grade, and MOS was required because of personnel shortages. Even though training time was limited, the high experience level of senior participants quickly developed acceptable performance. Preparation included study courses on ROAD organization and tactics, orientation on the ROAD environment and concepts by

project team personnel, terrain board pre-play of typical ROAD combat while at Fort Ord, and several practice exercises on the ground at HLMR. Battalion standing operating procedures were prepared.

c. Training of the Reinforced Rifle Company and the Battalion Mortar and DAVY CROCKETT Platoon

This training requirement was complicated because USACDEC's personnel losses during July through September left few trained individuals. Substitution by branch, grade and MOS had to be accepted, relying on on-the-job training to obtain acceptable performance. The company and its reinforcing elements concentrated on small unit tactics and control, weapons crew drill and movement, communication procedures and command techniques. Particular attention was given to ENTAC and ground surveillance radar. Selected individuals were trained at Fort Huachuca in operation and maintenance of the radar sets. The mortar and DAVY CROCKETT platoon emphasized mortar and DAVY CROCKETT crew drill, displacement, security measures and communications. Special texts and resident instructions for senior platoon personnel were provided by USAIS.

d. Project Team Training

A 20-hour review course on ROAD environment, organization, equipment, tactics and procedures was conducted for all project team personnel during the pre-test period at Hunter Liggett Military Reservation.

(1) Detailed controller participation was based upon a project team-developed manual. Procedural training in umpiring and directing the exercise play, including communications, for both ECC personnel and field controllers was accomplished. Familiarity with the exercise situations and terrain was provided by terrain board illustration while at Fort Ord and subsequent terrain walks and practical exercises at Hunter Liggett Military Reservation.

(2) Specialized evaluator training consisted of the individual evaluator's detailed study and analysis of assigned objectives. Terrain board exercises provided familiarity and test of the evidence and developed procedures. Checklists and questionnaires were used to acquire these data. On-the-ground review and study of exercise situations completed preparation for evaluator participation.

e. Training Material and Texts

Tables of organization and equipment and training texts for the battalions and their supporting elements, as developed by US Army Service Schools early in the summer, were applied in the initial design of the

experiment. Continuing adjustment was made in the test element organizations, as well as their unit loading plans and their training, as revisions were received. At time of field test, elements were organized and equipped in conformance with DA draft TOEs published in September/October 1961. Actual test conditions and evaluation conformed to doctrine described in the Final Manuscript of FM 7-20, Infantry, Airborne Infantry, and Mechanized Infantry Battalions, September 1961. Controller and Aggressor texts, and ROAD brigade and battalion standing operating procedures guided the specialized training and exercise conduct. Appendix 3, p 75, References, lists the materials and texts used.

4. EVALUATION

a. Evaluation of the experimental evidence, post-play analysis, and ROAD tactical doctrine and equipment capabilities established the relationship between the observed performance of the experimental unit and its potential capability. Evaluation recognized the previously-discussed experimental limitations. Study identified the cause and effect of performance and related it to the estimated capability and the test unit's organization, equipment, tactics, and procedures. To a major extent the field phase of the experimental program was designed to test the validity of these apparent and suspected relationships. The results of the field activity were evaluated and extrapolated, leading to recommendations for amendment of the proposed ROAD TOEs and a more accurate expression of ROAD operations. Several findings and recommendations offer specific areas for future, detailed field experimentation.

b. Military evaluators recorded complete descriptions of observed and potential performance of actions associated with the experimental objectives. Details included key personnel and unit actions and responses to missions; position location, situation, and status of units; tactical and administrative support tasks; and personnel and equipment evacuation and replacement. Numerical data consisted only of times of occurrence and frequency counts. Player logs, which recorded the action and reasons for action of each player, and completed player questionnaires were obtained from key participants. Evaluators recorded deficiencies or problem areas, and their causes or consequences, in terms of organization, equipment, and doctrine as observed or developed in discussions with the player personnel.

c. At the end of each phase, summaries of problem areas were prepared to focus attention on the critical aspects of the combat actions. These summaries also served as a basis for examination and analysis during post-play.

d. Upon completion of the field experiment a post analysis considered all evidence within each objective area. Findings and corrective recommendations were developed. The relationship of one set of findings, conclusions, and recommendations on those of other subject areas were studied and reconciled. Post analysis explored the relationships of findings to applicable training literature and TOEs, and organized and expressed the findings for publication and ready reference.

APPENDIX 1 to ANNEX A
CHRONOLOGY OF EXPERIMENT

16 May	Received Tentative Directive by Ltr from USCONARC, ATSWD-R322 (CDEC), Subject: Directive for CDEC Program of Experimentation, Fall 1961, dated 16 May 1961.
17 May - 29 June	Developed analysis of experimental objectives; prepared comments to CONARC on Tentative Directive; initiated design and evaluation planning; prepared ROAD environment description.
30 June	Submitted Bill of Material.
1 July - 14 July	Prepared Outline Plan and initiated development of scenarios, Aggressor text and controller manual.
15 July	Submitted personnel requirements.
16 July - 10 Aug	Continued planning activities.
11 Aug	Received approved Directive by Ltr from USCONARC, ATSWD-R322 (CDEC), Subject: Directive for USA Combat Development Experimentation Center Experiment, Evaluation of Battalion Operations, Phase I, First Half FY 62.
12 Aug - 27 Aug	Prepared revised Outline Plan based on approved directive; initiated terrain board preplay; revised experiment; oriented troop participants and project team elements using terrain board model; prepared mock-ups and simulated material.
28 Aug	Received approval of Outline Plan by Ltr from USCONARC, ATSWD-R461 (CDEC), dated 28 Aug 1961, Subject: Outline Plan of Experiment, "Evaluation of Battalion Operations, Phase I - Approval of CDEC Outline Plan of Experiment", 17 July 61.
29 Aug - 13 Sep	Trained experimental troops; finalized evaluation plan and scenarios; initiated field reconnaissance at HLMR.

14 Sep	Received telephonic notification from CONARC that CDEC would be levied 1800 personnel during experimental period.
15 Sep - 28 Sep	Revised scope of experiment; modified planning and preparations in consonance with reduced personnel available.
29 Sep	Forwarded summary of revised experimentation scope to CONARC by DF dated 29 Sep 61.
2 Oct - 3 Oct	Moved to HLMR.
4 Oct - 22 Oct	Conducted training; continued field reconnaissance; completed final preparation for experimentation.
23 Oct - 31 Oct	Battalion Command Group Phase of First Exercise (Infantry Battalion).
1 Nov - 3 Nov	Rifle Company/Battalion Mortar and DAVY CROCKETT Platoon Phase of First Exercise (Infantry Battalion).
6 Nov - 15 Nov	Battalion Command Group Phase of Second Exercise (Infantry Battalion).
16 Nov - 21 Nov	Rifle Company/Battalion Mortar and DAVY CROCKETT Platoon Phase of Second Exercise (Infantry Battalion).
22 Nov - 26 Nov	Reorganized and trained for Mechanized Infantry Exercises.
27 Nov - 3 Dec	Battalion Command Group Phase of Third Exercise (Mechanized Infantry Battalion).
4 Dec - 6 Dec	Rifle Company/Battalion Mortar and DAVY CROCKETT Platoon Phase of Third Exercise (Mechanized Infantry Battalion).
7 Dec - 15 Dec	Battalion Command Group Phase of Fourth Exercise (Mechanized Infantry Battalion).
15 Dec - 20 Dec	Returned to Fort Ord.
21 Dec - 6 Jan	Evaluated and collected data; outlined final report.
7 Jan - 9 Mar	Prepared draft of final report.
10 Mar - 15 May	Staffed, edited, revised, and re-staffed draft report through CDEC and SRI Research Office.
16 May - 30 May	Prepared report for publication.

APPENDIX 2 to ANNEX A
SUMMARY OF FIELD EXERCISES

1. EXERCISE NUMBER 1, REINFORCED INFANTRY BATTALION

a. This exercise was held from 23 October to 3 November 1961. The weather was clear and dry with temperatures in the middle fifties. For the movement-to-contact phase (Situations 1 thru 7, Figure A-12) the exercise followed a wooded valley from 200 to 1100 meters wide between parallel ridges rising about 600 meters above the valley floor. The attack and defense phases of the exercise were played in rolling country with little or no vegetation.

b. The battalion, reinforced with a company of tanks and a platoon of engineers, served as the advance guard of a brigade against scattered resistance in a non-nuclear environment. After planning and initiating the advance (Situation 1), the battalion encountered a roadblock that was reduced by fire and maneuver of the lead company (Situation 2). A short time later, brigade ordered the establishment of a company-sized blocking force beyond the battalion left flank. The battalion airlifted the second company in column to the blocking position (Situation 3). Continuing the advance, the battalion reached two roadblocks at almost the same time. Aggressor withdrew from the left block and detonated a chemical mine-field, effectively closing that axis. The other block was forced by the lead rifle company, supported by a platoon of tanks plus mortar and artillery fire (Situations 4 and 5). About two miles farther down the valley, a reinforced Aggressor platoon, occupying the high ground to the right front, placed surprise fire on the battalion column. One infantry company attacked the Aggressor unit, supported by both smoke and high explosive artillery fires (Situation 6). At the close of the movement-to-contact, the battalion had driven in the security force of the main Aggressor defensive position (Situation 7). While preparing to continue the attack, the battalion received orders to organize a hasty defense, withholding further attack until the next morning. During the night the separated company on the blocking force mission rejoined the battalion.

c. The battalion attacked during Situations 8 and 9. On the left the attack failed to drive Aggressor from strong positions on high ground; on the right, steady progress was made. When the battalion committed its tank company reserve to extend the envelopment of the right flank, the Aggressor defense collapsed and the attack continued to Objective 1.

d. During the attack the left flank company suffered almost 50 percent casualties. The brigade reinforced the battalion with a second tank company and detached the ineffective rifle company. During Situations 10

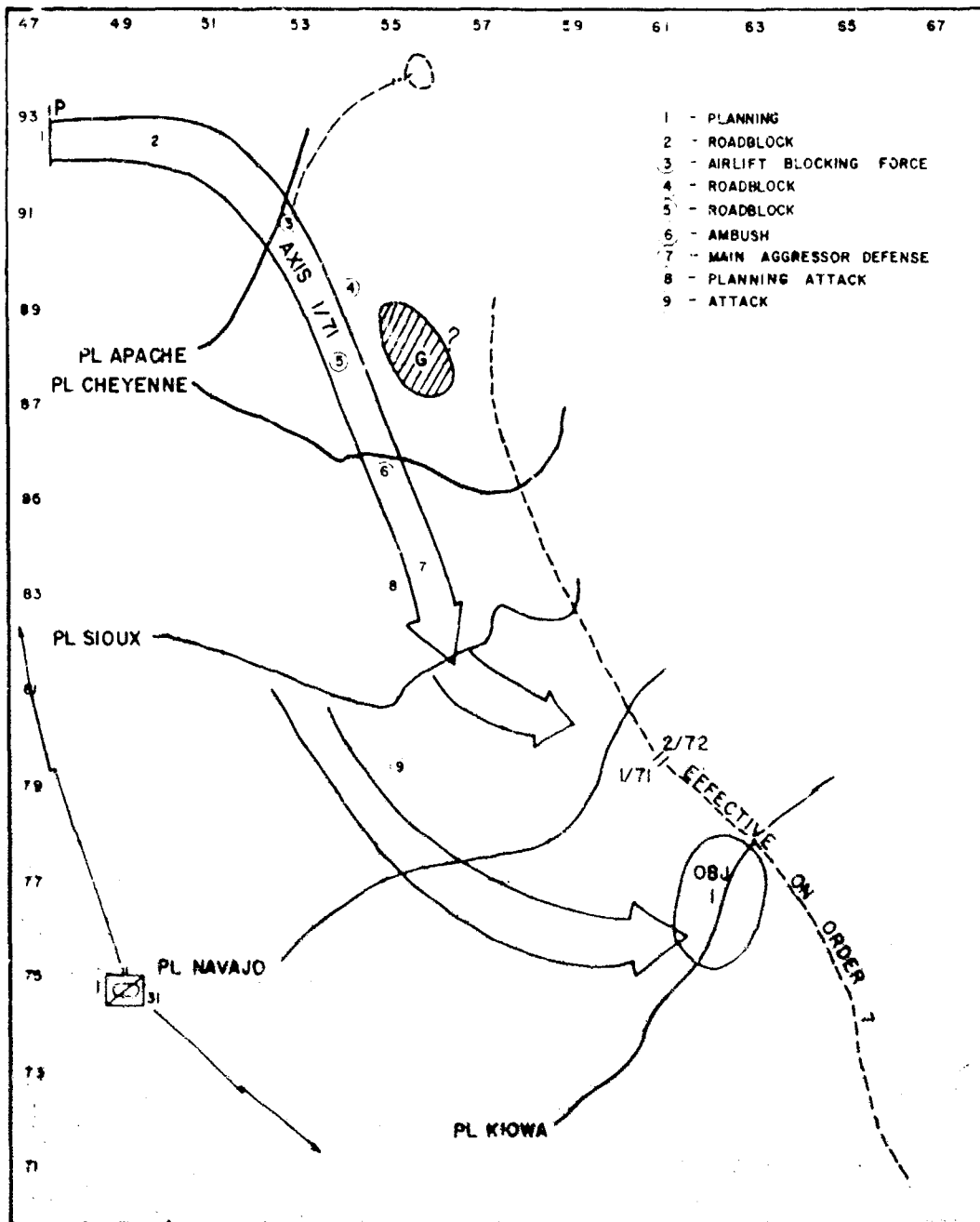


FIGURE A-12
EXERCISE 1, SITUATIONS 1 - 9

thru 12 (Figure A-13) the battalion defended the right sector of the brigade area. The environment changed to that of active nuclear warfare during the second defensive requirement. In the last situation, Aggressor attacked with nuclear weapons and non-persistent chemical artillery fires. The battalion blocked the penetration and counterattacked with one tank company.

e. Upon completion of the battalion command group phase, the full TOE rifle company and the mortar and DAVY CROCKETT platoon executed selected segments of battalion solutions to four movement-to-contact situations, two attack situations, and two defensive situations. (See circled situation numbers on Figures A-12 and A-13.)

2. EXERCISE NUMBER 2, REINFORCED INFANTRY BATTALION

a. This exercise was held from 6 - 21 November 1961. The weather was clear and dry with temperatures in the low fifties. The terrain consisted of low, wooded hills and small, open areas with many dry watercourses. Vegetation was mainly live oak and manzanita.

b. The battalion, reinforced with two tank companies and a platoon of engineers, was the main effort of a brigade attack against an organized defense in non-nuclear environment. Situations 1 to 6 (Figure A-14) examined the attack operations. After planning a five-phase attack, the battalion executed a passage of lines and attacked with three rifle companies abreast followed by two tank companies. Successive situations required the battalion to breach minefields, adjust their organization for combat, maneuver attacking elements, and use indirect fire support. Shortly after the battalion seized Objective 2, they repulsed a counterattack.

c. A brigade order then detached one tank company and ordered a night withdrawal to new defensive positions. Situations 7 thru 11 (Figure A-15) covered defensive operations with a shift to active nuclear warfare during the Aggressor attack. DAVY CROCKETT nuclear fires slowed the enemy and the tank company counterattack restored the defensive positions.

d. A new brigade order directed the battalion to plan and execute a daylight withdrawal while serving as the brigade covering force. Withdrawal operations were required in Situations 12 to 15 (Figure A-16). Aggressor nuclear strikes forced changes in the withdrawal plans and stressed the control of dispersed elements. With DAVY CROCKETT nuclear fire support and coordinated movement of withdrawing units to avoid contaminated areas, the alternate battalion command post successfully directed the battalion withdrawal.

e. Upon completion of the battalion command group phase the full TOE rifle company and mortar and DAVY CROCKETT platoon executed selected segments of the battalion solutions to four attack situations, three defensive situations, and three retrograde situations. (See circled situation numbers on Figures A-14, A-15, and A-16).

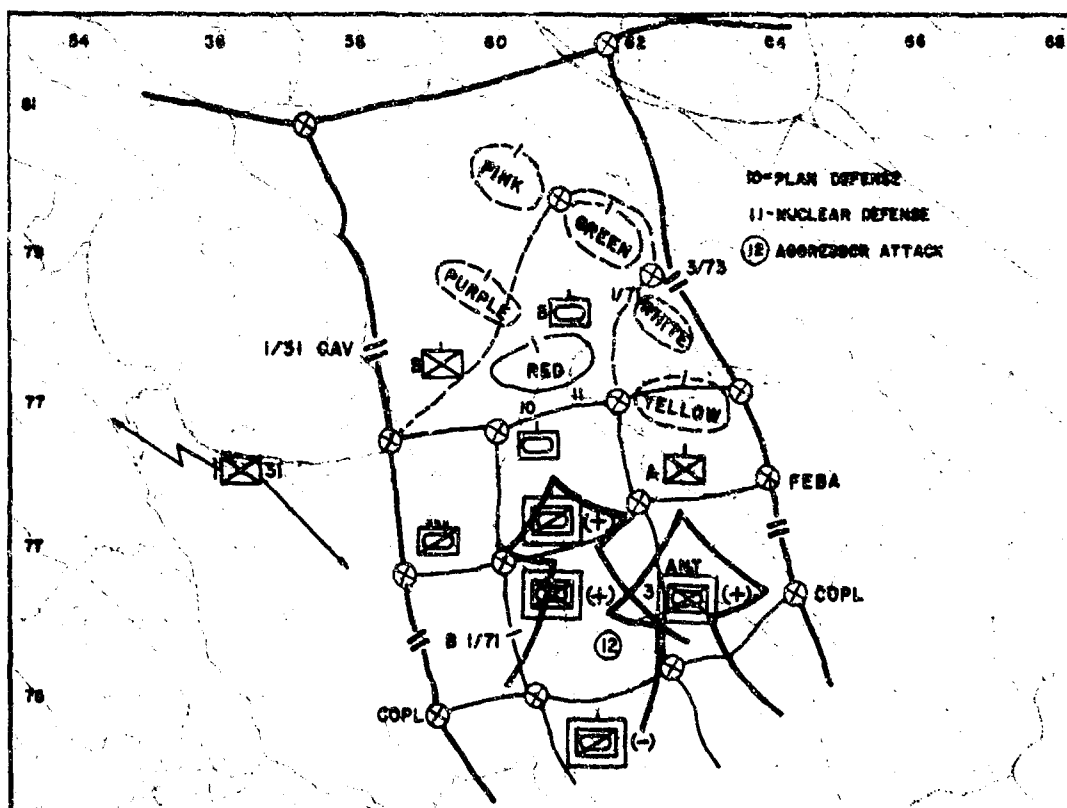


FIGURE A- 13
EXERCISE 1, SITUATIONS 10 - 12

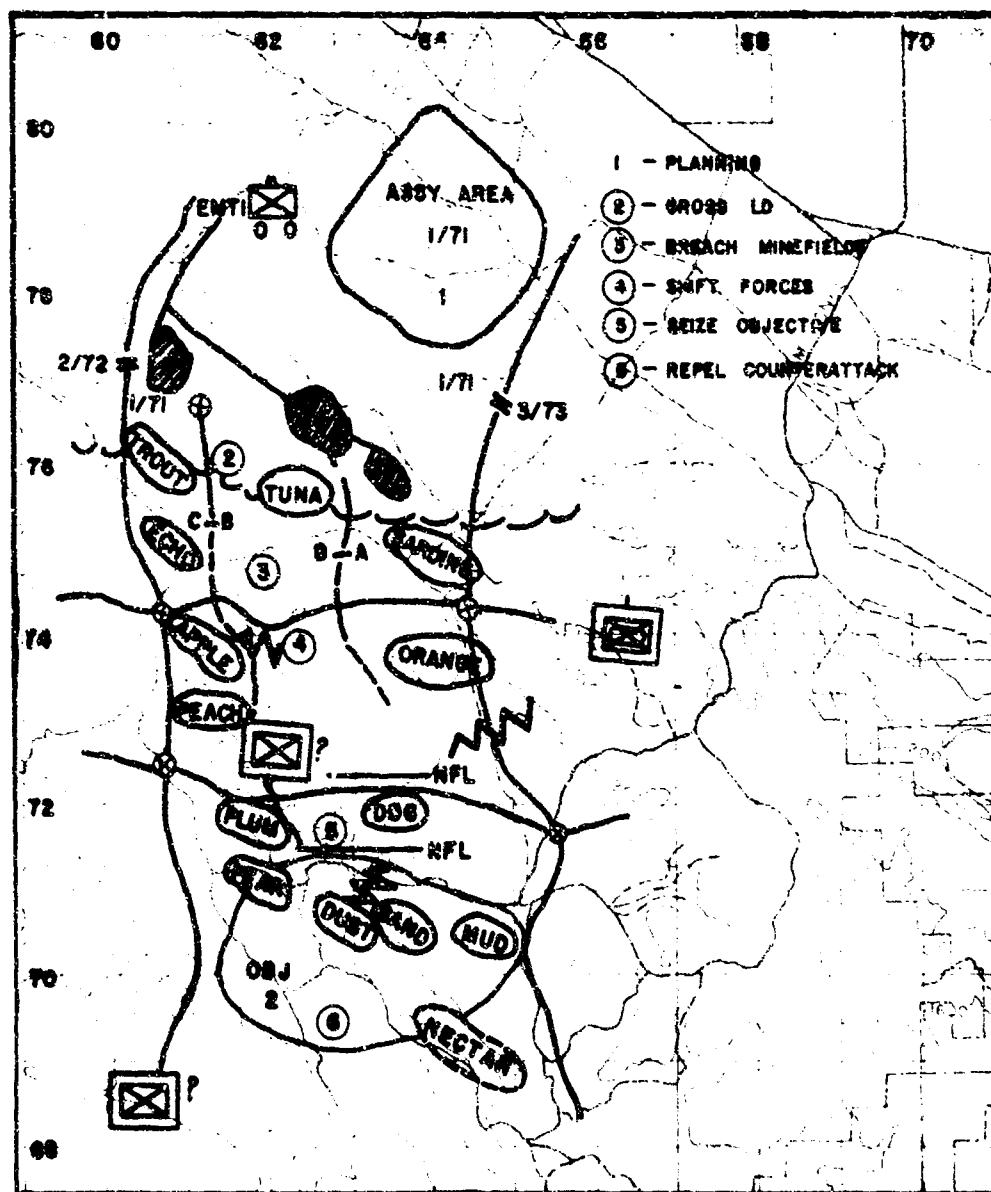


FIGURE A-14
EXERCISE 2, SITUATIONS 1 - 6

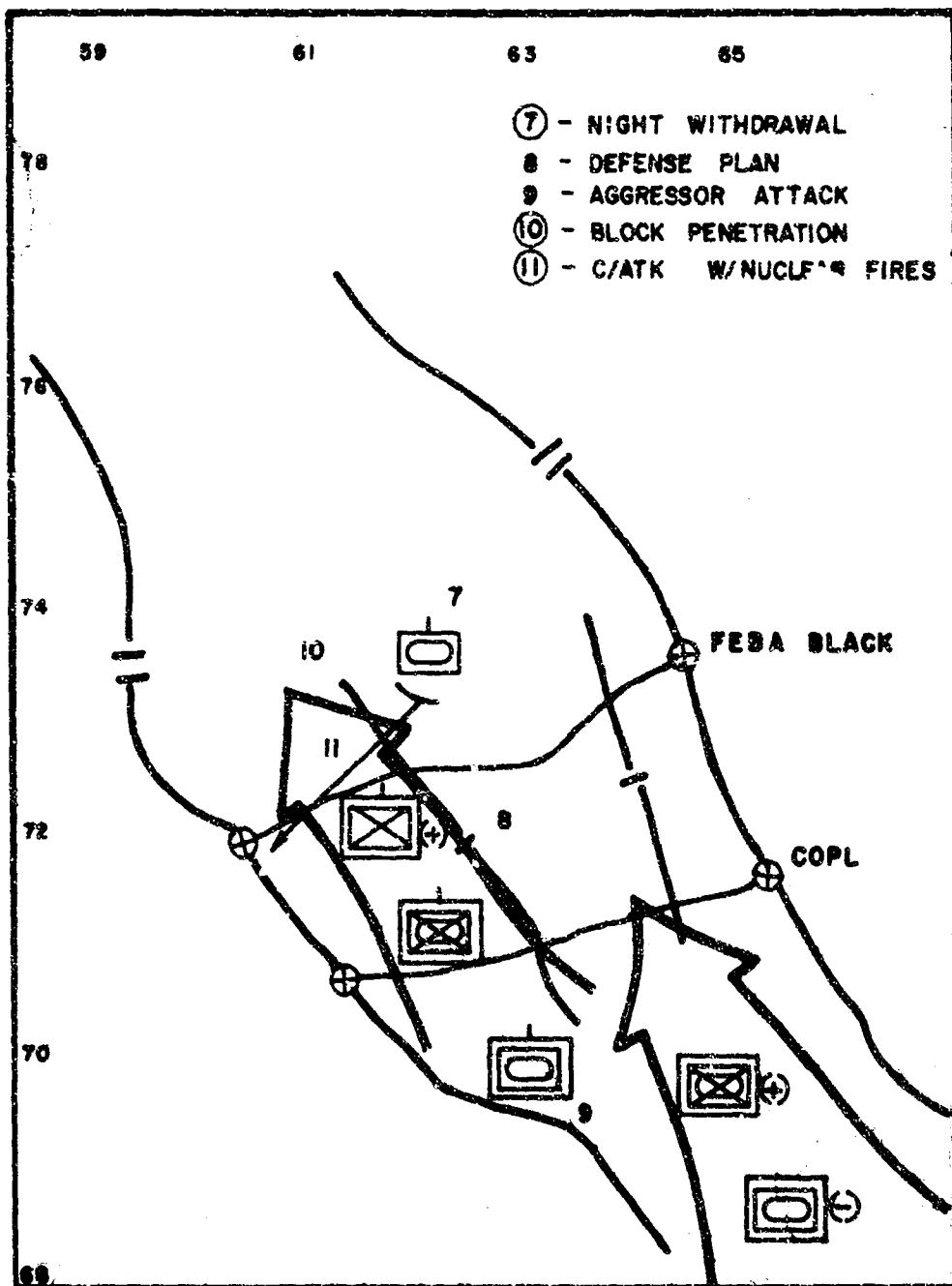
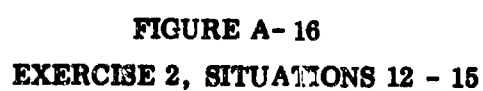


FIGURE A-16
EXERCISE 2, SITUATIONS 7 - 11



3. EXERCISE NUMBER 3, REINFORCED MECHANIZED INFANTRY BATTALION

a. This exercise was conducted from 27 November to 6 December 1961. The weather was generally clear and dry except for three days of intermittent rain. The mean temperatures were in the low fifties. For the ten retrograde and defensive situations (Situations 1 thru 10, Figure A-17), the exercise was played in rolling country with light or no vegetation and cut by several small dry watercourses. For the five attack situations (Situations 11 thru 15, Figure A-18), the exercise started in rolling country, moved through wooded hills, and ended in a narrow wooded valley.

b. The battalion, minus one rifle company and plus one tank company, served as part of a brigade delaying force in a non-nuclear environment. The battalion planned to delay on successive positions: the first position manned by two rifle companies, each reinforced with a platoon of tanks; the second or intermediate delay position by a tank company minus two platoons. Situations 1 thru 5 emphasized control and employment of maneuver elements as well as acquisition of targets and employment of indirect fire means. In Situation 6, the environment changed to that of active nuclear warfare when DAVY CROCKETT nuclear fires were used to assist the battalion's withdrawal from the last delaying position.

c. The brigade order for defense returned the third rifle company. The battalion planned a defense that placed the tank company minus two platoons on the COPL, two rifle companies each reinforced with a platoon of tanks on the FEBA, and the third rifle company in reserve (Situation 8). Plans were made also for employment of a second tank company, as a counterattacking force, when that unit joined the battalion. After the Aggressor had penetrated the left flank, two DAVY CROCKETT nuclear rounds slowed the attack (Situation 9). The reserve rifle company blocked the penetration and the second tank company successfully counterattacked. At the close of Situation 10 the battalion received an attack order with no changes in attachments.

d. The battalion planned the attack in two phases and on two axes, supported by preplanned nuclear fires (Situations 11 thru 15, Figure 18). Both attacks were led by a tank company with an infantry platoon attached, and with a rifle company minus one platoon following and supporting the tank attack. The third rifle company was in reserve and followed the main effort on the right axis. The first phase of the attack ended with the seizure of Objective 1. The second phase continued with the same formation. The withdrawing Aggressor exploded an ADM that blocked the right axis of advance, causing the battalion to shift its total effort to the left. The battalion, employing a DAVY CROCKETT nuclear round to eliminate the strongly defended Aggressor block, continued the attack to the final objective.

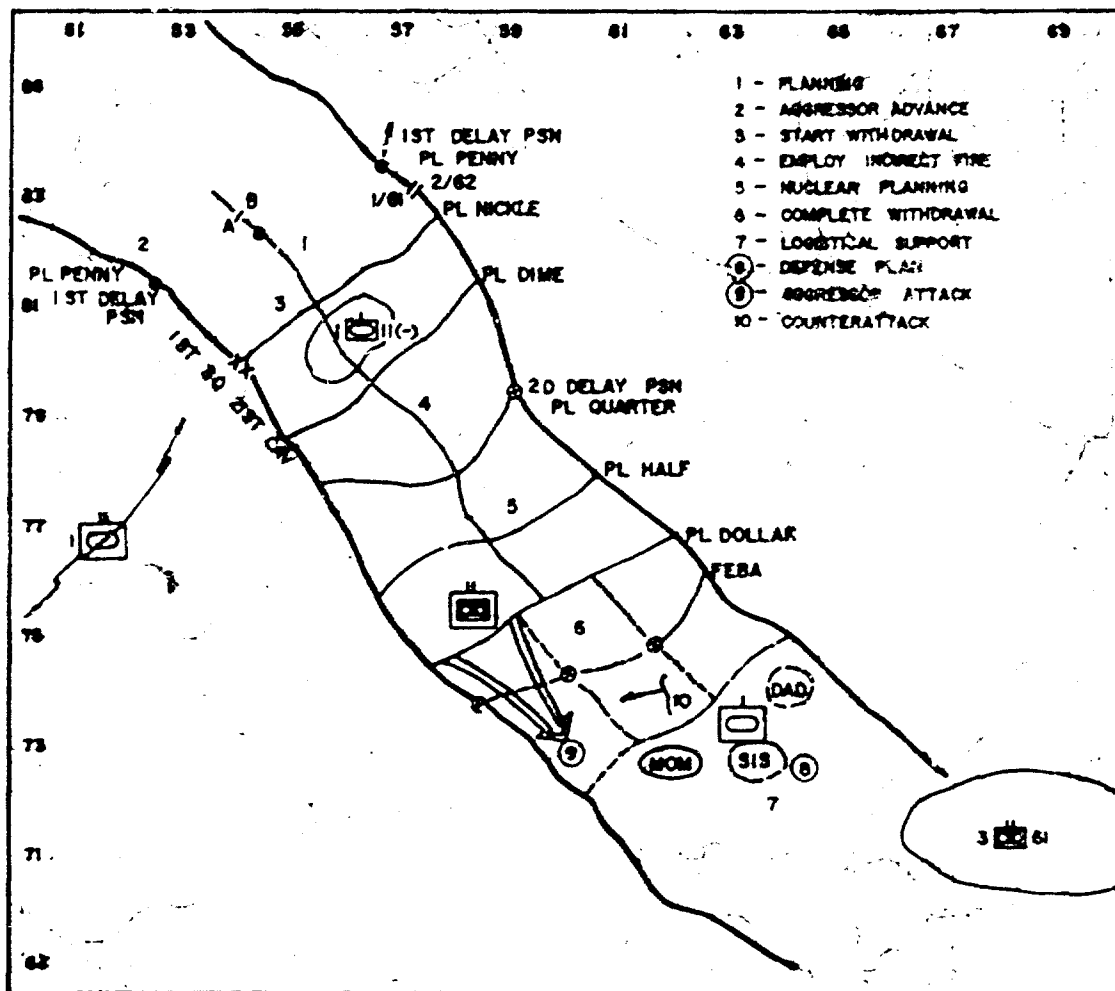


FIGURE A-17
EXERCISE 3, SITUATIONS 1 - 10

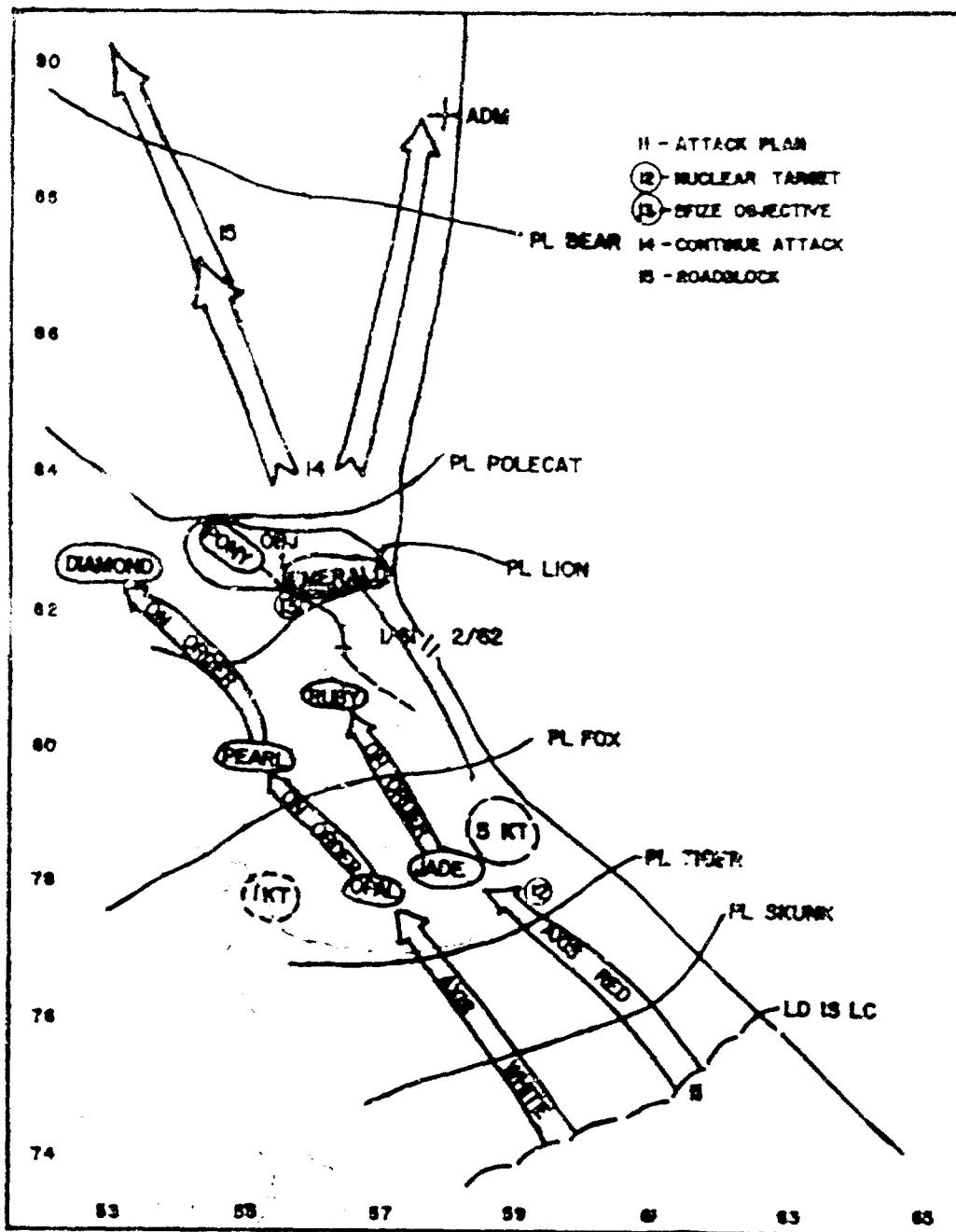


FIGURE A-18
EXERCISE 3, SITUATIONS 11 - 15

e. Upon completion of the battalion command group phase, the full TOE rifle company and battalion mortar and DAVY CROCKETT platoon executed selected segments of the battalion solutions to two defense situations and two attack situations. (See circled situation numbers on Figures A-17 and A-18.)

4. EXERCISE NUMBER 4, REINFORCED MECHANIZED INFANTRY BATTALION

a. This exercise was held during the period 7 - 14 December 1961. The weather was rainy with mean temperatures in the upper forties. The four movement-to-contact and defense situations (Situations 1 to 4, Figure A-19) were played in rolling country with little or no vegetation. The four attack and exploitation situations (Situations 5 to 8, Figure A-20) crossed a low range of mountains, entered the flat open area of the San Antonio River Valley, and ended on low wooded hills.

b. The battalion, reinforced with a tank company and a platoon of engineers, served as part of the brigade conducting a reconnaissance in force against increasing resistance. A non-nuclear environment was present. The battalion planned to advance on two axes, with the main effort on the right conducted by a tank company reinforced with a rifle platoon. On the left axis a rifle company was scheduled to move to PL MAMIE to protect the battalion flank. A minefield near PL MAMIE blocked the right column and the main effort shifted to the left axis, leaving a rifle platoon to block on the right flank. By the end of Situation 3 the advance had continued to PL JOYCE against stiffening resistance.

c. At this point the brigade ordered the battalion into a hasty defense for the night (Situation 4). An attack was ordered to seize Objective 5 (Figure A-20). A second tank company was to join the battalion upon seizure of that objective. The battalion attacked with three rifle companies abreast with the tank company following the center rifle company. The center company was forced to pass to the right of a chemically contaminated area in its zone. Upon the battalion's seizure of Objective 5, the Aggressor force broke and started withdrawing in disorder. The battalion then ordered the attack continued to Objective 1 on two axes (Situation 7). A tank company with one attached rifle platoon led each attack. A rifle company minus one platoon followed and supported. The battalion detached the right flank rifle company for a brigade mission.

d. The attack turned into a pursuit and exploitation in the face of disorganized resistance. The attack halted at Objective 1 and brigade ordered a defense as a strong counterattack was anticipated. The battalion planned the defense with two rifle companies forward and two tank companies in reserve. The reconnaissance platoon moved forward to contact the advancing Aggressor force.

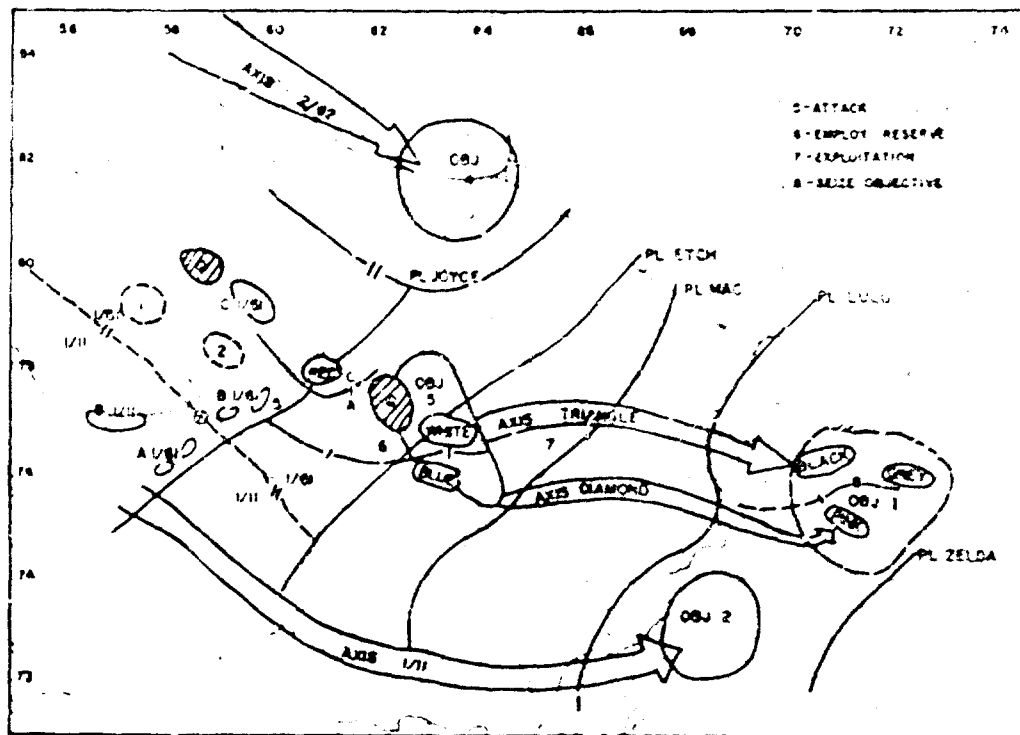


FIGURE A-19
EXERCISE 4, SITUATIONS 1 - 4

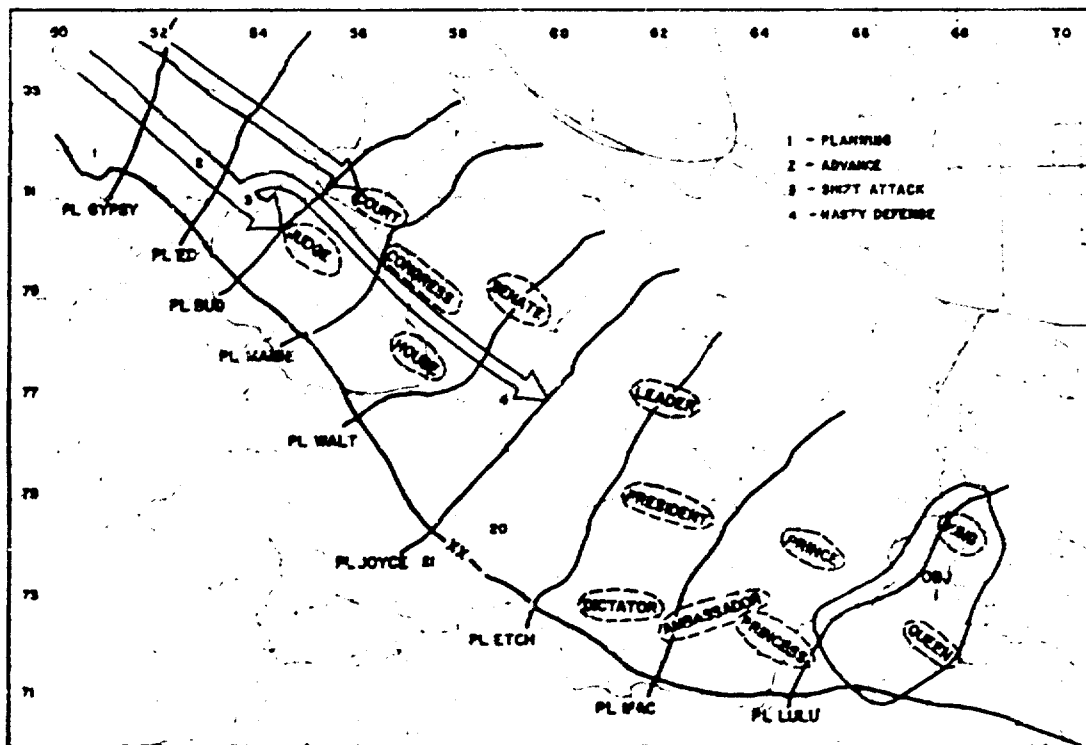


FIGURE A-20
EXERCISE 4, SITUATIONS 5 - 8

APPENDIX 3 to ANNEX A
REFERENCES

The following TOEs, manuals, and training literature were used as reference material for the experiment:

Tables of Organization and Equipment

1. TOE 7-15E (DRAFT) Infantry Battalion; Headquarters, Department of the Army, undated.
2. TOE 7-16E (DRAFT) Headquarters and Headquarters Company, Infantry Battalion; Headquarters, Department of the Army, undated.
3. TOE 7-18E (DRAFT) Rifle Company, Infantry Battalion, Headquarters, Department of the Army, undated.
4. TOE 7-45E (DRAFT) Armored or Mechanized Division, Mechanized Infantry Battalion; Headquarters, Department of the Army, undated.
5. TOE 7-46E (DRAFT) Headquarters and Headquarters Company, Armored or Mechanized Division, Mechanized Infantry Battalion; Headquarters, Department of the Army, undated.
6. TOE 7-47E (DRAFT) Rifle Company, Armored or Mechanized Division, Mechanized Infantry Battalion; Headquarters, Department of the Army, undated.

Field Manuals

1. FM 6-20, Field Artillery Tactics and Techniques, Department of the Army, December 1958.
2. FM 7-11, Rifle Company, Infantry, Airborne and Mechanized Infantry, Department of the Army, January 1962.
3. FM 7-15, Infantry, Airborne Infantry, Mechanized, Rifle Platoon and Squads. Headquarters, Department of the Army, undated.
4. FM 7-20, Infantry, Airborne Infantry, and Mechanized Infantry Battalions, Department of the Army, January 1962.
5. FM 7-21, Headquarters and Headquarters Company, Infantry Division Battle Group, Department of the Army, August 1957.

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6. FM 7-20, Infantry and Airborne Infantry Battle Group, Department of the Army, August 1959.
7. Annotated changes to FM 17-1 and FM 17-33, Tank Units Platoon, Company and Battalion, United States Army Armor School, June 1961.
8. FM 17-21, Armored Infantry Units, Platoon, Company and Battalion, Department of the Army, August 1957.
9. FM 17-50, (with Change 1), Armored Logistics, Department of the Army, 16 May 1958.
10. FM 23-20, DAVY CROCKETT Weapons System in Infantry and Armor Units, Department of the Army, December 1961.
11. FM 57-35, Airmobile Operations, Department of the Army, 2 November 1960.
12. FM 101-5, Staff Officers Field Manual, Staff Organization and Procedures, Department of the Army, July 1960.
13. FM 101-10, Staff Officers Field Manual, Organization, Technical and Logistical Data, Part 1, Unclassified Data, Department of the Army, February 1959.
14. FM 101-10, Staff Officers Field Manual, Organizational, Technical and Logistical Data, Part II, Extracts of Tables of Organization and Equipment, Department of the Army, November 1960.
15. Change 1, FM 101-31 (DRAFT), Nuclear Weapons Employment, United States Army Command and General Staff College.

Training Literature

1. Infantry Reference Data, United States Army Infantry School, August 1961.
2. Interim Reference Data, United States Army Infantry School, January 1962.
3. Communications Data, United States Army Infantry School, July 1961.
4. Reference Data for Armor Units, United States Army Armor School, September 1960.
5. USCONARC Directive Number 525-3, Combat Operations, ROAD Training Literature, Offensive Defense, 26 May 1961.
6. USCONARC Directive Number 525-7, Combat Operations, ROAD Training Literature, Meeting Engagements, 16 October 1961.
7. USCONARC Directive Number 525-8, Combat Operations, ROAD Training Literature, Barriers, Obstacles, Mines, Shelters, 18 October 1961.

Annex B

Discussion of Findings

The summary statement of each finding and recommendation of Sections III, IV and V is expanded through detailed discussion in separate appendixes of this Annex. Page reference beneath each appendix title indicates the page of the related summary statement in the basic report.

APPENDIX 1 to ANNEX B
EXCHANGE OF INTELLIGENCE INFORMATION AND DISSEMINATION
OF COLLECTION GUIDANCE
(Page 10)

Discussion

1. Accurate knowledge of the enemy and terrain is required by the battalion commander to make realistic decisions concerning organization for combat and employment of maneuver and indirect fire elements. The accuracy and value of this information depend on its currency, which, in turn depends upon the speed with which it is obtained and disseminated. Modern, improved radar and infrared devices are typical of the various types of equipment authorized battalion collection agencies to produce early knowledge. The battalion S2 section collects, collates, evaluates, and disseminates intelligence from many collection agencies. It follows then that responsive communications must link the S2 section, the collection agencies, and the battalion elements requiring the intelligence product.

2. Loss of currency often results from delayed transmission of intelligence, precluding the rapid response time essential to ROAD combat. Command and logistical traffic frequently retards the flow of intelligence traffic and is itself often delayed because of overloading of the communications facilities. Battalion and company ground surveillance coverage, chemical and radiological monitoring and survey operations, air defense warnings, provision of shell reports, and reporting on enemy contacts, buildup, and local tactical maneuver are the types of activities that compete for communications time.

3. Intelligence is of greater significance on the ROAD battlefield because of dispersion. Separation places greater dependence on surveillance and reconnaissance, early target acquisition, and prompt implementation of anti-infiltration and anti-airborne measures.

4. Restricted communication also precludes the intelligence officer's questioning of collection agencies concerning the source or substance of information he receives from commanders or other staff officers who do not participate in the collection effort. The detailed investigation that takes place in such cases adds to the previously stated problem of excessive traffic on the command net. The S2's interests concern the following battalion elements.

a. Reconnaissance platoon of the infantry battalions or armored cavalry platoon of the mechanized infantry battalion.

- b. Battalion ground surveillance section.
- c. Battalion mortar and DAVY CROCKETT platoon (platoon leader and forward observers).
- d. Supporting artillery detachments (liaison officer and forward observers).
- e. Rifle and tank companies (for all their collection means).
- f. Other battalion staff members, observation posts, and supporting aircraft.

5. The battalion logistical net contains few stations which can assist in transmitting intelligence information, though they have a valid need to receive the intelligence product. The net is fully committed to logistic traffic between 1600 and 2400 daily. In its present configuration its usefulness for intelligence traffic is limited.

6. A partial solution is to provide responsive communications between the battalion S2 and the collection agencies by establishing a separate radio (and wire) net. This, however, will not provide for dissemination of enemy and terrain information and intelligence to all battalion personnel requiring this product. To satisfy both requirements without excessive addition of equipment or repetitive transmission, a redesign of the logistical net and use of a modified automatic data processing system to expand the present traffic capability may be the most acceptable solution. The suggested net would include elements listed in para 4a thru f as well as stations on the present logistical net. Reporting and exchange of information using a "message entry device" (MED) could reduce all types of voice traffic and increase the capability of the two battalion nets. Through simplified coding to identify user interest within the MED reports, the messages of specialized interest to intelligence elements could be ignored by disinterested elements. Automatic readout of all traffic may be desirable at the battalion command post.

7. The battalion S2 monitors the battalion ground surveillance section radio net. However, he has no direct contact with company surveillance radar teams nor the forward observers of the battalion mortar and DAVY CROCKETT platoon. Over the battalion command net he can contact the battalion reconnaissance or armored cavalry platoon, the battalion mortar and DAVY CROCKETT platoon headquarters, supporting aerial reconnaissance elements, the artillery liaison officer, and rifle and tank company commanders.

8. The suggested redesign of the logistic net to carry a variety of traffic (intelligence, logistical information, etc.) offers each command

post the necessary information for immediate response and planning for future operations. Battalion and company commanders continue to transmit orders over the "primary" command net, supported by continuing flow of information on the "secondary" net. Monitoring anticipatory planning and action of the battalion mortar and DAVY CROCKETT platoon illustrates the value of this arrangement.

Recommendation

1. That battalion radio (and wire, when installed) communications nets be redesigned to permit an expanded, more rapid exchange of intelligence information and dissemination of collection instructions.
2. That consideration be given to:
 - a. Redesign of the battalion logistical net as a more versatile "secondary battalion command net" to carry intelligence information as well as administrative and logistic traffic.
 - b. The use of message entry devices (now under prototype study for transmission of artillery fire data) to expand the capacity of present nets through non-voice transmission of intelligence data or logistic information, and position location reports. See Appendix 16, Annex B, p 113.

APPENDIX 2 to ANNEX B
PROCESSING OF INTELLIGENCE
INFORMATION AND DIRECTION OF THE INTELLIGENCE EFFORT
(Page 10)

Discussion

1. A ROAD battalion headquarters is authorized two qualified intelligence personnel: the battalion S2 and an intelligence sergeant. Battalion S3 and chemical personnel are available at times for additional intelligence support. However, because of the austere manning of the intelligence section, the performance of intelligence function during sustained combat action is seriously hampered. Clerical and administrative tasks consume an excessive proportion of the time available. Valid requirements exist for additional battalion intelligence personnel.

2. Appendix 1 points out the inadequacy of present communications to furnish the intelligence officer and his commander with timely and accurate intelligence information. Conclusions indicate the need for full-time S2 section communications with and between the battalion collection agencies. The S2's individual activities require frequent absences from the headquarters. The preparation of plans, overlays, and orders, and the maintenance of journals and situation maps, are necessary to provide an accurate intelligence picture. An inconsistent performance of intelligence operations at the battalion intelligence center will downgrade tactical plans and direction.

3. The S2 has staff responsibility for informing the commander and staff on matters pertaining to combat intelligence and counter-intelligence. He ensures that information and intelligence are disseminated to higher, subordinate, and adjacent units, and exercises staff supervision of battalion agencies concerned with the intelligence effort. In fulfilling these duties, the battalion S2:

- a. Prepare the daily battalion patrol plan (coordinating with the S3).
- b. Plans and supervises briefing of reconnaissance patrols; furnishes information on the weather, terrain, and enemy for all patrols; ensures that combat and reconnaissance patrols are debriefed and patrol reports are prepared and disseminated (coordinating with the S3).
- c. Supervises battalion surveillance activities and prepares the ground surveillance plan (coordinating with the FSC and S3).
- d. Plans and supervises the operations of the battalion ground surveillance (radar) section (coordinating with the S3).
- e. Plans and supervises the activities of the reconnaissance or armored cavalry platoon in execution of intelligence missions (coordinating with the S3).
- f. Supervises the activities of attached intelligence specialist teams.

APPENDIX 2 to ANNEX B
PROCESSING OF INTELLIGENCE
INFORMATION AND DIRECTION OF THE INTELLIGENCE EFFORT
(Page 10)

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3. The S2 has staff responsibility for informing the commander and staff on matters pertaining to combat intelligence and counter-intelligence. He ensures that information and intelligence are disseminated to higher, subordinate, and adjacent units, and exercises staff supervision of battalion agencies concerned with the intelligence effort. In fulfilling these duties, the battalion S2:

- a. Prepare the daily battalion patrol plan (coordinating with the S3).
- b. Plans and supervises briefing of reconnaissance patrols; furnishes information on the weather, terrain, and enemy for all patrols; ensures that combat and reconnaissance patrols are debriefed and patrol reports are prepared and disseminated (coordinating with the S3).
- c. Supervises battalion surveillance activities and prepares the ground surveillance plan (coordinating with the FSC and S3).
- d. Plans and supervises the operations of the battalion ground surveillance (radar) section (coordinating with the S3).
- e. Plans and supervises the activities of the reconnaissance or armored cavalry platoon in execution of intelligence missions (coordinating with the S3).
- f. Supervises the activities of attached intelligence specialist teams.

g. Maintains a current intelligence estimate and situation map; ensures that important items of information and intelligence are recorded in the unit journal; prepares intelligence summaries, intelligence portions of operation plans and orders, situation reports, and the unit SOP.

h. Coordinates CBR monitoring and survey operations, fallout contamination areas, and other aspects of chemical operations affecting the battalion effort.

i. Prepares air reconnaissance plans and forwards immediate and planned requests for air reconnaissance.

4. The ROAD battalions' organization and tactical doctrine increase the range of responsibilities, tasks, and problems of the intelligence section without increasing personnel. The requirement for improved capability is based upon:

a. An increase in the enemy's speed of reaction, mobility, and firepower, particularly of his nuclear and chemical weapons.

b. A reduction in acceptable reaction time.

c. The expanded capabilities of supporting intelligence and target acquisition means.

d. The importance of a sustained intelligence effort.

e. The larger battalion zone of influence, increasing the requirement for surveillance and reconnaissance.

f. The increased radio traffic among intelligence gathering and processing agencies.

g. The added importance of recording, evaluating, and interpreting information in order to locate existing and potential nuclear and chemical targets.

5. Appendix 1 suggests the possible use of an abbreviated automatic data processing system to reduce intelligence information processing time. It expedites the exchange of data with battalion reconnaissance and surveillance elements and forward observers, the transmission of target intelligence to organic, higher, and adjacent units, and the storage, display, and comparison of target information.

Recommendation

That an additional intelligence specialist (assistant intelligence NCO) be provided to improve the battalion's capability to accomplish combat tasks. A modified battalion staff organization, integrating the S2 and S3 sections, and a more expeditious transmission of intelligence information, will avoid further requirements for intelligence personnel augmentation. See Appendixes 1 and 5, Annex B, pp 79 and 89.

APPENDIX 3 to ANNEX B
RESPONSIVENESS OF INTELLIGENCE
COLLECTION AGENCIES

(Page 11)

Discussion

1. Rifle company headquarters lacks an adequate capability to receive, process, and disseminate intelligence data and target information to and from higher, adjacent, and subordinate elements. The capability to supervise and coordinate intelligence collection elements (ground surveillance radar teams, patrols, observation posts and forward observers) is also limited. Within the headquarters specialists are provided to accomplish combat tasks other than intelligence. For instance, a supply sergeant is authorized to coordinate and direct supply actions in the name of the commander. He is the on-the-spot link with the battalion logistical system and coordinates with the battalion S4. Also, a communications specialist is provided to control, in coordination with battalion communication officer, all aspects of company communications. A like individual to control intelligence tasks and activities, in coordination with the battalion intelligence effort, is needed.

2. Acquisition and development of remunerative targets are vital functions on the battlefield, particularly when nuclear weapons are employed. Company-level efforts must be directed from a central control point or the optimum capabilities of its collection means will be dissipated. With present organization, the company commander exercises personal direction of the intelligence collection effort. His primary interests and responsibilities, however, are in commanding and controlling maneuver and fire support elements. During critical combat action, intelligence and target information of immediate impact on company action will receive priority attention; other information of value to battalion headquarters or adjacent units or for future operations receives secondary attention. The company headquarters requires a full-time specialist to maintain active supervision and direction of reconnaissance activities and radar coverage. He would continuously monitor the increased exchange of intelligence information affecting the company. The intelligence specialist would operate in the immediate vicinity of the company commander to insure the latter's full knowledge of target information and intelligence. The company executive officer cannot satisfy these needs because of his other duties. The weapons platoon leader and first sergeant are normally poorly positioned for this role.

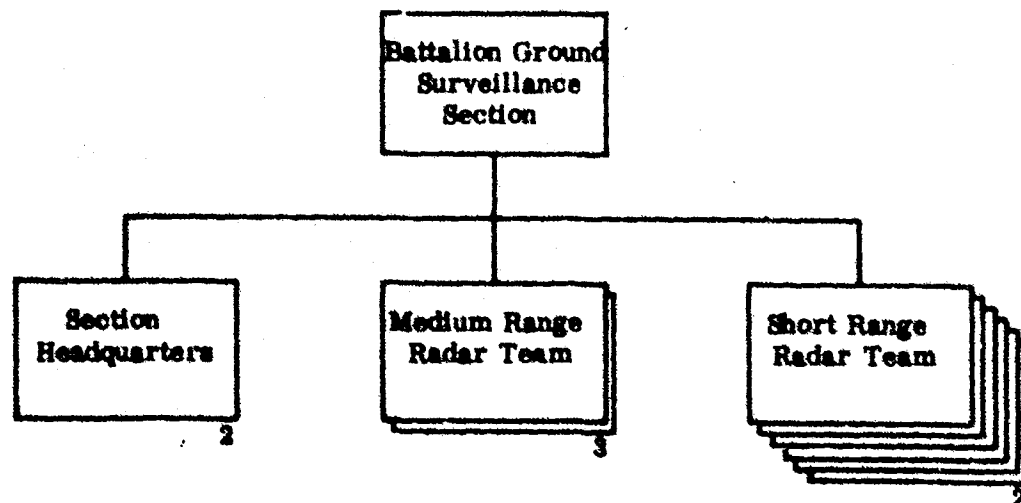
3. The present company ground surveillance radar (AN/PPS-4) does not effectively add to the battalion surveillance effort. Its equipment characteristics limit its value and usefulness to the rifle company. The

company section consists of a section leader and two short range radar teams (one senior radar operator, and one radar operator/light truck driver). Each team has one truck, utility, 1/4-ton, 4X4, with trailer, generator set, gasoline engine P-442/V, radar set AN/PPS-4, radio set AN/PRC-10, plus individual weapons and allied equipment. The radar set weighs approximately eighty pounds, is normally transported by vehicle, and is man-portable for short distances only. In broken terrain or heavily wooded areas, the radar's coverage is limited by its line-of-sight and beam penetration characteristics. Line-of-sight range is normally the governing factor and will dictate the best emplacement. Terrain conditions and tactical situations will often limit opportunity for employment. It can be employed effectively with the reconnaissance platoon on occasion. The company commander seeks to coordinate his short range radar with the battalion surveillance plan. More efficient and effective use of these radars is attained by "pooling" them at battalion level. Combining company radars at battalion level will eliminate the requirement for company section leaders.

Recommendations

1. That an intelligence NCO be authorized for each rifle company to assist the commander in planning and supervision of intelligence collection and in dissemination of intelligence.
2. That rifle company radar equipment and personnel be deleted and the battalion ground surveillance section include teams for attachment to battalion maneuver elements when appropriate. Suggested section organization is shown in Figure B-1.

FIGURE B-1
SUGGESTED BATTALION GROUND SURVEILLANCE SECTION



APPENDIX 4 to ANNEX B
EXCHANGE AND DISPLAY OF
FRIENDLY FORCE INFORMATION

(Page 11)

Discussion

1. Battalion planning and supervision requires timely and accurate knowledge of the location, situation and status of all battalion elements. Such knowledge is needed by the commander, regardless of his physical location in the battalion area, and by the staff which seeks to translate command plans and decisions into detailed directions to subordinate elements.
2. Information on friendly forces is acquired by a variety of means: visual observations; command and logistical net traffic; and situation maps, status boards, or other displays at the command post. The situation map usually provides a picture of the location and tactical situation of subordinate elements. Frequently, the status of these elements is not up-to-date. The commander and his principal staff officers located in a forward command group require a duplication of this information.
3. The provision of data for display depends primarily on oral radio or wire communications. Time involved for transmissions and recording often result in a tardy, and consequently partially inaccurate, display. Currency is further degraded in dissemination to the commander or other user. Duplication of situation overlays requires the extraction and copying onto reproduction means. The end result is that information, particularly in fast-moving combat, does not properly express the situation upon which decisions should be made.
4. This is also true of administrative and logistical information (personnel strengths, casualties, supply and equipment conditions, etc.). Accurate status is not possible with only daily or emergency reporting and consolidation. A current account of the status is needed at both the main command post and the command group to insure proper decision and to provide a continuing alternate control capability as discussed in Appendix 10, Annex B, p 99.
5. Solutions to these problems depend upon the development of new means for the reproduction of situation maps and status information and an increased data exchange capability.

Recommendations

1. That communication nets and procedures be modified to allow

prompt transmission and exchange of friendly force information. See Appendix 1 for specific recommendations in conjunction with passage of intelligence information.

2. That improved reproduction and display means be sought to furnish critical friendly force information to the battalion commander regardless of his location. The use of radio operators to do this work may be practicable.

APPENDIX 5 to ANNEX B
RELATIONSHIP OF INTELLIGENCE
AND OPERATIONS SECTIONS

(Page 12)

Discussion

1. Though the infantry's tactical elements have been modified to fit ROAD, the equivalent evolution of staff concepts has not kept pace with the demands of the new environment and doctrine. The present four-sectioned unit staff at battalion level can respond only in a rather stylized, formal execution of functions. It is cumbersome and unnecessarily subdivided. The battalion executive officer is more properly called a deputy commander. Dispersion, communication, transportation, and time all limit effective staff coordination and relationships between unit and special staff personnel and activities. Physical separation of key staff members, because of their assigned roles and equipment allocations, complicates coordination. This is particularly true for intelligence and operations activities.

2. The commander is given certain latitude in applying his staff resources, though this is limited by other factors over which he has no control. TOE authorizations of rank, skill, and number of personnel, and numbers and types of vehicles and communication equipment are based on a "type" battalion headquarters fitting the present field manual division of responsibilities. Separation of the staff into a forward command group and main command post, while providing for an alternate command post, is not favored by the present organization.

3. Each battalion unit staff section is provided personnel, communications, and transportation to accomplish its functions. Radio and wire nets and command post layouts are developed in extension of these functions. Physical separation of the S2 and S3 sections often occurs, and the establishment of a forward command group may segregate them further. Coordinated planning for future operations, while simultaneously executing the present mission, is limited.

4. The commander is expected to assemble the staff, furnish guidance, receive recommendations, and with his principal staff officers, develop a selected course of action from choices presented. Staff actions are portrayed as a series of multiple coordinations with and between unit and special staff personnel. Supervisory direction of preliminary activities of specialized platoons (i.e., the S2 direction of the reconnaissance platoon) then follows. These procedures appear to be the basis for the type staff organization established for the ROAD battalion.

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5. Actually the battalion staff cannot function in this way. The principal staff officer, the S3, must be aware of both the enemy and friendly situations. The S2 seeks to keep him informed. Centralization of operations and intelligence functions is needed in ROAD operations to use all available means to counter enemy activities. Effective use and support of special staff officers and separate elements supervised by the S2 or S3 also favor centralized control.

6. The impact on staff functions and requirements when a combat support company commander is added was also examined. He became an operating staff officer and commander of the elements now supervised by unit staff. The value of possible reduction in physical coordination and personal supervision required of the unit staff was investigated. It appeared that no advantage accrued and the responsiveness of separate elements was lessened by introducing an additional command echelon.

Recommendation

That the personnel, equipment, and functions of the battalion intelligence and operations sections be integrated under the direction of an operations/intelligence officer.

APPENDIX 6 to ANNEX B

REAR AREA SECURITY

(Page 12)

Discussion

1. Present doctrine on rear area security is confusing and downgrades the importance of its planning and conduct. Doctrine states that a separate plan for rear area security is not prepared at battalion level, a separate rear area security force is not established, and no unit commander is designated as battalion rear area security commander. It does provide that rear area security missions are included in the operations order and recognizes enemy infiltration, guerrilla and airlanded capabilities. The use of patrols, guard posts, and surveillance and electronic equipment is suggested. Realistic guidance is needed to enable the commander to designate troops for this rear area security as maneuver and support elements are committed, reserves are limited and trains elements are over-extended.

2. Effective battalion control and direction must extend throughout the entire assigned area of responsibility. Action within the forward portion of this area is dictated because of its physical nearness to enemy strength. Command and staff guidance normally defines location, formation, source, support, and contingency planning. Equal concern and attention is rarely given to rear areas, despite the security needs and importance of the battalion's command, support, and supply facilities. Reliance is placed on a warning system and the subsequent diversion of combat elements to counter enemy threats.

3. The adequacy of this warning system, and the effectiveness of containment until substantial means can be gathered, appears to be a significant deficiency. Reserve elements are positioned to preserve their tactical unity and readiness to execute any of several contingency plans in support of forward action. Personnel in the command post and combat trains areas are fully employed to fulfill their primary tasks. The added duties of traffic control, guarding prisoners of war and prescribed nuclear loads, providing local security, and securing supply routes and prepositioned supplies lessen their effectiveness. Reconnaissance elements are seldom available because of priority missions in forward or flank areas. Without more specific guidance a security-oriented commander will unduly compromise the mission, while the aggressive commander, oriented solely toward the principle of objective, will dismiss the importance of security.

4. An active warning system is the minimum acceptable measure to satisfy the command requirement for rear area security. The components of the system (administrative and logistical leaders, elements traveling between forward units and the trains area, and established security and observation posts) must be trained and actively search for enemy activity.

Positive direction of this effort is essential. A small combat element which can temporarily contain a surprise enemy threat must be available.

Recommendation

That a small security element be included in the headquarters company to provide rear area security and surveillance.

APPENDIX 7 to ANNEX B
COORDINATION OF HELICOPTER MOVEMENTS
AND HELICOPTER-BORNE FIRE SUPPORT

(Page 12)

Discussion

1. Rapid use of Army aviation support is needed to achieve the increased speed and dispersion of ROAD battalion operations. Unforeseen changes during execution normally affect many elements and require coordination and communications. The use of simple, standardized procedures eases this requirement and lessens the danger of misunderstanding, delay, and confusion.

2. Current doctrine does not provide sufficient practical guidance for the use of helicopter support in a nuclear environment. A critical example of detailed actions requiring precise coordination is the use of Army aviation support during nuclear warfare. Helicopter troop movements, reconnaissance, resupply, casualty evacuation and fire support are common in an average battalion plan. Nuclear weapons employment will cause restrictions on aircraft use. Flash blindness to the pilot and overpressures on the aircraft require protective measures. During the critical time and place of detonation, aircraft are key to battalion operations. To exploit the helicopter capability positive control of fire support and maneuver must be maintained. Friendly forces must be alerted and organized for air movement in the minutes immediately preceding the aircraft's arrival in the battalion area. The magnitude of the coordination problem becomes most evident when engaging targets of opportunity. Warning requirements are discussed in detail in Appendix 8, following.

3. Helicopter support is of increased importance within ROAD battalion operations, particularly in a nuclear environment. Air movements of troops, supplies, and maintenance elements, airborne reconnaissance and command flights, air evacuation of casualties, and airborne fire support are specific battalion opportunities to exploit local tactical advantage.

Recommendation

That simple, uniform procedures for the rapid integration of helicopter support be developed in order to reduce coordination time and exploit tactical advantages.

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APPENDIX 8 to ANNEX B
WARNING OF EMPLOYMENT OF NUCLEAR/
CHEMICAL WEAPONS

(Page 13)

Discussion

1. The ROAD doctrine does not prescribe an adequate procedure for warning personnel in the battalion area in the event of nuclear and chemical operations. This deficiency has been previously noted in CDEC experimentation.* Warning messages announcing on-call and target of opportunity fires are sent out over all available radio and wire nets and by voice, sound and visual means. Even these composite means do not warn all affected personnel. Numerous individuals and teams operate away from their immediate headquarters without contact of any type. These may include messengers, contact and combat patrols, minelaying and road repair teams, and wire laying and repair crews. This warning problem is less critical when nuclear and chemical fires are scheduled, as additional time is usually available.

2. Unless the commander can assure himself that all personnel endangered by the weapon's effect have received the warning message, he has two choices. He must either accept the risk of inflicting casualties and damage to his own forces and order the weapon fired, or he must delay firing until he is assured that all troops have received the message. Either solution is undesirable. In the first case, serious damage to the battalion's morale and troop confidence may result. In the second case, the enemy target may disappear by dispersion, may "hug" friendly forces, or take other protective action. The commander must be able to assure himself that affected personnel have received the warning. The warning message must contain the minimum information to permit the receiver to take proper protective measures.

3. The nature of DAVY CROCKETT-type targets dictates that fires be delivered rapidly with minimum times for nuclear warnings. The major time requirement in a nuclear fire mission involves warning of friendly forces which will be affected and the notification of higher and adjacent headquarters. A suitable warning time for DAVY CROCKETT employment must not exceed time required (approximately 10-15 minutes) to compute data, adjust and fire the weapon.

4. The commander employing a nuclear weapon is responsible for friendly troop warning, including notification of higher and adjacent

* See CDEC Report, Controllability of PENTANA-Type Companies in Mobile Operations; Volume IV, DAVY CROCKETT (B), CDEC Final Report, ATCDC-58-1111, 18 December 1958.

headquarters. The higher headquarters normally imposes restrictions on the employing commander as to when a nuclear weapon may be fired after receipt of intention to fire. This lengthy "wait" time (20 + minutes), imposed by higher headquarters, is often caused by the need to notify users of airspace over the employing commander's zone of influence. The final, last-second authority to fire is in the hands of the commander allocated the weapon. In the event a change occurred between the battalion commander's initial approval of the nuclear fire mission and the expected time of firing, he could delay or cancel the mission. Changes resulted because of the enemy target moving in too close to friendly frontline troops, delays in accomplishing nuclear warnings, appearance of friendly aircraft within the weapon's effect radii, and the disappearance of the target.

Recommendations

1. That a revised battalion radio net, as suggested in Appendix 1, Annex B, p 79, be established to provide warning of nuclear or chemical employment.

2. That responsibility for nuclear/chemical warning coincide with area responsibility (i.e., rifle company commander for all elements within his area) rather than follow command channels (i.e., engineer commander for all his elements within the battalion area).

3. That the following warning techniques be considered:

a. Furnish a radio receiver to individuals or teams when separated from their parent element, or develop a small, two-way short range CW type radio with an encode-decode capability.

b. Authorize the battalion commander to visually clear the airspace prior to giving final authority to fire the DAVY CROCKETT warhead; require his notification of an adjacent force prior to TOT time only if greater than negligible effects to unwarned, exposed troops would affect that force.

c. Eliminate minimum time restrictions by higher headquarters.

d. Require users of airspace above the battalion area to clear with the battalion headquarters prior to entry.

APPENDIX 9 to ANNEX B
DAVY CROCKETT PLANNING AND EMPLOYMENT
(Page 13)

Discussion

1. Each DAVY CROCKETT weapons system has a different set of characteristics. The limited range of the DAVY CROCKETT light (XM28) system often limits its usefulness. It is highly sensitive to the tactical factors of troop disposition, safety risk criteria, and target and launcher location. The light system requires time for deliberate positioning of the launcher in forward company areas and frequently adjustments in dispositions for troop safety are required. The heavy system can fire into areas at the minimum range of the light weapon, as well as on targets exceeding the light weapon's maximum range.
2. The range of the heavy system permits coverage of the battalion area from a position several hundred meters in rear of friendly forces. The light weapon is normally employed on the COPL or FEBA in the defense, and with the lead elements in the attack. When firing the light weapon from these forward positions, enemy counterfire is a consideration. It is rarely desirable or feasible to attach the light system.*
3. Advantages and disadvantages of the Heavy (XM29) DAVY CROCKETT Weapon System are as follows:

ADVANTAGES

- a. Range
- b. Flexibility of employment
- c. Compatible with centralized battalion control

DISADVANTAGES

- a. Weight
- b. Size
- c. Requires Zones 1 and 2 propellants
- d. Signature effect of spotting rounds

* See CDEC Reports, Integrated Combat Group Components Experiment, Phase I, Volume III - Weapons Systems - DAVY CROCKETT & Direct Fire (S), ATCDC-60-1118, February 1960, and Phase II, Volume I - Tactical Components, CDEC Final Report (S), ATCDC-60-1466S, December 1960.

4. Advantages and disadvantages of the Light (XM28) DAVY CROCKETT Weapon System are as follows:

<u>ADVANTAGES</u>	<u>DISADVANTAGES</u>
a. Mobility	a. Range
b. Signature effect	b. Less flexible employment
c. Requires only Zone 1 propellants	c. Not compatible with centralized battalion control

5. Either DAVY CROCKETT system, mounted on a 1/4-ton truck, is transportable with a crew of four in a light transport helicopter. The light weapon system is portable on the ground using portapaks. Inasmuch as the DAVY CROCKETT weapon system is frequently employed to fire on targets of opportunity using indirect fire methods, this portability advantage is not as critical a consideration as the disparity in range.

6. No significant benefit accrues to the ROAD battalions because of the two systems. Adoption of only one system would benefit control as follows:

- a. Only one set of planning factors is applied by battalion command and staff personnel.
- b. The numbers of different components used within the battalion are reduced.
- c. DAVY CROCKETT squad members and augmentation personnel need learn only one weapon system.

7. Within the CONARC-designated nuclear allocation for the experiment, it was possible to satisfy requests for nuclear support with only two launchers and related equipment. There appears to be little relationship between the number of launchers and number of maneuvering companies as the range and effects of the weapon permit support of more than one company.

Recommendation

That the light DAVY CROCKETT weapon system be eliminated from the battalion mortar and DAVY CROCKETT platoon.

APPENDIX 10 to ANNEX B
BATTALION COMMAND AND CONTROL FACILITIES
(Page 14)

Discussion

1. Under present doctrine the command and control of the battalion emanates from the battalion command post, except when the commander temporarily operates in forward areas with a small command group. This group represents a forward extension of the actual battalion nerve center. It normally rejoins the command post when the tactical situation permits. Radio communications permit continued direction of the battalion effort by the battalion commander and maintains his familiarity with the immediate situation throughout the battalion area.

2. Battalion plans and standing operating procedures provide procedures for the establishment of an alternate command post. It is formed as a contingency headquarters to assume control and direction when the command post proper is destroyed or made ineffective through enemy action. It is manned by temporary diversion of personnel charged with other primary tasks and is equipped with communications and vehicles authorized for other purposes. Resources remaining or available from the original command post are also applied.

3. ROAD battalion operations, particularly in a nuclear environment, demand a habitually-separated, two-location, control capability. This appears feasible with minor modification of the present command post/command group relationship and division of authorized equipment. The present emphasis on a single location for the headquarters must be changed, and a built up command group is needed to ensure the battalion commander's present freedom of movement. His inability to keep fully informed can be overcome as discussed in Appendix 4, Annex B, p 87. Habitual establishment and maintenance of a forward command group in communication with the battalion command post, establishes an effective alternate CP within the current capabilities of the battalion. The placement of the command group in close proximity to one of the rifle companies limits the local security requirement.

Recommendation

That permanent division of battalion command post functions, personnel, and equipment, be developed as normal doctrine.

APPENDIX 11 to ANNEX B

ENTAC AUTHORIZATION

(Page 14)

Discussion

1. ROAD mechanized infantry was designed for employment in terrain and tactical circumstance where armor-protected mobility is decisive and essential. Mission, terrain, weapon transportability, and compatibility of the unit's several component elements appear to be the factors determining equipment authorizations and unit structure.

2. Despite terrain restriction on armor, limited attachment of tanks and dismounted infantry rifle companies is frequently made to give a direct fire support capability. Armor attachment also provides the rifle company with a significant antitank capability. ENTAC substitutes for or supplements the latter capability, though its usefulness and effectiveness suffers from the same terrain limitations as affects tanks. It assures a minimal antitank capability in terrain unsuited to armor.

3. The ENTAC's characteristics (i.e., inability to engage close-in targets), and the rifle companies' limited capability to acquire distant targets and provide ENTAC firing positions, limit the effectiveness. The restricted cross country mobility of wheeled vehicles of the infantry rifle company's ENTAC section often forces an off-carrier movement of the weapon. Observation and minimum acquisition range are unacceptable in many company areas. At ranges below the operator acquisition range dependence must be placed on other company weapons such as the M72 and recoilless rifles. Greater flexibility without regard for company areas of responsibility favors battalion control. The normal employment of dismounted rifle companies occurs in terrain and against enemy forces which do not favor a weapon of ENTAC's present characteristics.

4. More effective company organization is possible with 106mm or 120mm recoilless rifles; however, their wheeled vehicle restriction poses the same disadvantages. Effective range and response time (i.e., operator acquisition to hit time) is improved, though the lethality of the 106mm round, when compared to that of the ENTAC, is a disadvantage. The transfer of all company ENTAC elements to the battalion antitank platoon retains the number of weapons now in the organization while adding to the flexibility of employment. It reduces the forward companies' vehicle density and simplifies the companies' training and replacement requirements.

Recommendation

That ENTAC be replaced in the rifle companies with a 106mm recoilless rifle until such time as a suitable replacement AT/assault weapon becomes available. (Latest LOE replaces ENTAC with 106mm recoilless rifle.)

APPENDIX 12 to ANNEX B
VEHICLE REQUIREMENTS OF THE INFANTRY
BATTALION'S RIFLE COMPANY
(Page 14)

Discussion

1. The existing vehicle authorization of the ROAD infantry battalion's rifle company frequently degrades the company's cross-country movement and combat capability. Excessive transportation is an expensive luxury as it magnifies personnel and logistic requirements and complicates security, scheme of maneuver, and other tactical considerations.

2. Company vehicles (14 trucks and 9 trailers) are furnished to satisfy requirements for command and control, logistical support, and transport of weapons, ammunition, and equipment which are unsuited to hand carry. Vehicles are used as weapons carriers for speed in displacement and to assure immediate availability of ammunition. The number of vehicles can be reduced by combining weapons of the vehicles commonly employed in the same area. The present authorization preserves the organizational separation of squads or teams; in some instances it even subdivides the small squad or team. It also provides full-lift for weapons crews which support a dismounted rifleman's advance within the rather small company area. Movement of the weapon to firing position is frequently a hand-carry operation. Substitution of trucks with greater load capacity permits consolidation of small loads and the reduction of vehicle types and numbers without an appreciable decrease of responsiveness.

3. The increased lift will facilitate the placement of maximum combat power at the proper place and time when a road net is present; however, excessive motorization reduces the company's combat capability when the cost (personnel, maintenance, supply, security requirements) exceeds the level needed to satisfy the normal tactical demands of dismounted combat.

4. The need for a light weight, easily maintained, cross-country weapons platform for company mortars, antitank weapons and ground surveillance radars is self evident. The 1/4 and 3/4-ton trucks are inadequate weapons carriers. There is also a need to improve the dismounted infantryman's maneuver capability by weight reduction rather than by an increase in the number of vehicles. Reduced weights of infantry mortars illustrate a possible saving. The organization of ground surveillance equipment and heavy antitank weapons at battalion level offers a reduction in company vehicular and equipment density and adds to the flexibility of tactical employments. See Appendixes 3 and 11, Annex B, pp 85 and 101.

Recommendation

That the number of rifle company vehicles be reduced by combining and reducing equipment and basic loads and dismounting weapons crew personnel.

APPENDIX 13 to ANNEX B
INTERNAL BATTALION MORTAR AND DAVY
CROCKETT PLATOON CONTROL

(Page 15)

Discussion*

1. The primary duty and responsibility of the battalion mortar and DAVY CROCKETT platoon leader is command and control of the several elements of his platoon. Also, he advises the battalion command and coordinates with both the battalion fire support coordinator (artillery liaison officer) and the S3. In the absence of the battalion fire support coordinator, he acts in that capacity. The additional functions often necessitate his absence from firing positions and the platoon fire direction center. His duties of command and control concern reconnaissance, supervision of fire missions of both the DAVY CROCKETT and mortar squads, coordination and supervision of platoon forward observers, resupply of both nuclear and non-nuclear ammunition, and decisions affecting the delivery of fires. The dispersal of mortar elements and the DAVY CROCKETT squads compound his control and communications problems. The platoon may be located in as many as nine different, widely separated positions (three forward observers, three DAVY CROCKETT squads, platoon FDC and split 4.2-inch mortars). The platoon sergeant must accept portions of these duties. Without separate transportation the platoon sergeant must either accompany the platoon leader when he travels or remain in the vicinity of a selected platoon element without a vehicle. Either solution is unsatisfactory.

2. The only radio nets presently available are the platoon fire direction and DAVY CROCKETT nets. During periods when fire missions are being processed over the platoon FDC net and/or DAVY CROCKETT net, the platoon leader or other control personnel are restricted in their transmission of instructions. Artillery batteries provide a separate net to accomplish each function. Other battalion platoons (i. e., reconnaissance platoon or armored cavalry platoon) are authorized a platoon command net to command and control their elements. The temporary use of the DAVY CROCKETT or fire direction net does not satisfy the requirements for platoon command and direction nor is an alternate emergency net available for either purpose.

* See CDEC Final Report, Integrated Combat Group Experiments, Phase I, Volume III - Weapons Systems - DAVY CROCKETT and Direct Fire (S), ATCDC-60-111S, February 1960.

3. Tasks to be performed within the DAVY CROCKETT section when the environment is non-nuclear include maintenance, movement, and security of weapons, vehicles, equipment and communications. While the section is normally located in the field trains area, its operational readiness must be maintained. Section personnel must be aware of the tactical situation and perform route and area reconnaissance. When the section is augmented for nuclear operation additional tasks of link-up, orientation, and organization are imposed. Actual employment requires exacting supervision and coordination. The orientation of team leaders includes issuing instructions for emplacement, displacement, and movement of each team, and insuring effective communications, security and resupply. Imposing these duties on the senior team leader who already has a full time job as team leader does not solve the problem. Positive section leadership is essential regardless of environment. See Appendix 18, Annex B, p 117 for further discussion.

4. The need for control and direction of the four mortar squads in the battalion mortar and DAVY CROCKETT platoon is not satisfied by assigning a dual role of section and squad leader to the senior squad leader. The section leader is responsible for all four mortar squads. He receives his orders from the platoon leader or the commander of the unit to which he is attached. He places himself where he can best control the fires of his section and is responsible for the delivery of fires required by his mission. He must select firing positions within a general area assigned by the platoon leader or the commander of the unit to which he is attached. Supervision of occupation of the position is required for each displacement. The section leader is also responsible for the continued supply of ammunition. These tasks are further complicated when dispersed formation, and fluid action of the battlefield require the mortar squads to split into two-mortar elements. In these situations the senior squad leader is physically unable to control actions of all four mortar squads. A chief of firing battery is provided in many artillery units to perform comparable duties. The ROCID mortar organization includes a lieutenant (section commander) and a staff sergeant (section sergeant) for supervision. The ROAD reduction in the number of mortars does not appreciably decrease control requirements. Assignment of added responsibility to the chief fire direction computer does not offer a solution as he is fully engaged in directing FDC functions.

5. The purpose of the platoon's fire direction effort is to achieve effective fire support under all conditions. Only four men are provided to receive fire requests from forward observers, compute data, send firing data to the mortar squads, monitor the supporting artillery fire direction net, maintain equipment, and assist in preparation of platoon fire plans. The ROCID mortar platoon was given eight men; the ROAD artillery battery six. At times the mortar section may be employed in general support with squads widely separated. Although each mortar can be issued a plotting

board, its use by mortar squads is difficult. Wire lines are needed between squads and forward observers before this method can be used as the squads lack radios. It is more reasonable to send an FDC element to produce firing data for the separated mortar element. An FDC detachment consisting of two men, would normally accompany this mortar element. In the mechanized platoon the single FDC carrier appears to limit any subdivisions.

6. With present communications equipment, processing fire missions by battalion mortar and DAVY CROCKETT forward observers is slowed by readback and repeated copying. Forward observers must establish contact via radio, or wire if available, and send the fire request and subsequent corrections by voice. Transmissions must be acknowledged by the fire direction center and readback for verification. This procedure is followed each time the forward observer sends a transmission or receives information from the FDC. Reduced time for request and adjustment by forward observers appears possible with automatic data processing equipment of the "message entry device" type. Equipment to expedite transmissions between forward observers and the platoon FDC would not replace but augment radio and wire voice traffic.

Recommendations

1. That an additional vehicle, driver and communications be furnished the platoon sergeant so he may properly assist the platoon leader.
2. That mortar and DAVY CROCKETT section leaders be authorized for control and supervision of those elements. A vehicle, radio, and driver are also required for the DAVY CROCKETT section leader.
3. That an additional fire direction computer be authorized for the FDC.
4. That a platoon command net be established, and that the use of message entry devices between forward observers and the FDC be evaluated. See Appendix 1, Annex B, p 79.

APPENDIX 14 to ANNEX B
DIRECTION AND COORDINATION OF COMBAT
TRAINS OPERATIONS

(Page 15)

Discussion

1. Current doctrine provides that logistical support of combat elements is funneled through the combat trains area. Here supply, maintenance and medical support, under the centralized direction and coordination of the battalion S4, are assembled and dispatched to forward company support areas. The commander of this installation must establish a control headquarters, provide local security, designate component areas, select and reconnoiter future locations, and displace to those locations.

2. The S4's ability to monitor these functions personally is incompatible with his other duties. As the battalion logistical officer responsible for logistic needs, he cannot become tied to the physical direction of the combat trains, but he must remain free to exercise overall direction of the entire logistical effort.

3. Minor modification of present organization and doctrine can provide acceptable S4 control at the combat trains location if a small logistical control point is established there. Operational direction of the combat trains area is then charged to the battalion motor officer, as previously prescribed in ROCID. One of the three men provided for the field trains (supply warrant officer, battalion supply sergeant, and assistant battalion supply sergeant) can be relocated at the combat trains to insure control when the battalion motor officer must be absent. The establishment of a station in the battalion logistical net is feasible by the relocation of the S1/S4 communications vehicle from the command post. The S4's radio-equipped vehicle will maintain his contact with the control point. The executive officer's radio is also in the logistic net. Alternatively, an added vehicle, driver, and radio could be provided in the support platoon TOE for this purpose.

4. There is a need for positive control and direction of the logistical elements traveling to and from the forward areas from the trains. This flow of support must respond to the S4's direction.

Recommendations

1. That a logistical control point be established in the combat trains area.
2. That the battalion motor officer be designated as the combat

trains commander in addition to his primary duties.

3. That one of the two battalion supply sergeants be positioned in combat trains area with a primary duty of operating the logistical control point.

4. That communication capability (in the battalion logistical net) be established at the logistical control point utilizing the S1/S4 communication vehicle or by adding a vehicle, driver and radio to the support platoon TOE.

APPENDIX 15 to ANNEX B
DIRECTION AND COORDINATION OF MEDICAL EVACUATION

(Page 16)

Discussion

1. Rapid and frequent movement of combat elements complicates adequate medical service. The present system of medical evacuation provides six battalion aid evacuation teams which serve in direct support of forward elements and function under centralized control of the medical section leader. If this evacuation capability can be applied with judgment and flexibility, it can accommodate to the varying time, density, and location of casualty occurrence. It is acknowledged that riflemen will assist the company aid men during peak casualty loads. Communications appear to be the key to solution.

2. Limited statistical findings have shown that a sustained average of 1.5 casualties per hour per ambulance can be evacuated if vehicle-mounted radios are provided. Nine casualties per hour in the battalion would saturate the evacuation system. Without radios and using point interception only, the sustained casualty evacuation rate drops to approximately .75 casualties per hour per available ambulance. A rate of 4.5 casualties per hour would saturate the battalion resources. The vehicular-mounted radio in the section 1/4-ton truck, and two portable radios for placement if desired with the evacuation teams, constitute present infantry battalion medical communications. Only the vehicular-mounted radio is in the battalion logistical net. Within the mechanized infantry battalion three armored ambulances are also stations on the battalion logistical net and are equipped with an RT-70 to monitor supported company communications. In the infantry battalion two of the aid evacuation teams may be equipped to maintain contact with the medical section and they can communicate with supported companies by relay. Rapid shifts of the casualty evacuation capability must depend on physical contact (point interception) with the aid evacuation teams. Routing of teams to other locations of casualty occurrence must often await their return to the casualty collection point. Frequently en route direction and guidance is vital to acceptable support.

Recommendation

That all medical evacuation vehicles be equipped with a communication capability to enter the battalion logistical net and monitor the supported company net. *

* See CDEC Final Report, Integrated Combat Group Components Experiment, Phase III, Volume II - Logistics, June, 1961, and CDEC Final Report (C), MOMAR Logistics, ATCDC-61-1496C, November 1961.

APPENDIX 16 to ANNEX B

EXCHANGE OF INFORMATION TO GUIDE THE LOGISTICAL EFFORT

(Page 16)

Discussion

1. The battalion logistical net handles administrative, maintenance, medical, and supply communications within the battalion. Stations are intermittently engaged in transmitting and receiving requirements and instructions. The peak traffic load can be expected to exceed the capacity of the net between 1600 and 2400 each day when supply requirements are submitted by companies to battalion, and by battalion to field trains and/or supporting elements. A back log of traffic develops until approximately 2030. By approximately 2200 the back log of traffic is gradually cleared and traffic finally fades out shortly after 2400. Strict net discipline, establishment of priorities, coding of supply traffic, and the use of short concise messages are required during the period.
2. Much of the traffic appears suitable to routine format reporting by a mechanical rather than oral description method of transmission. This would reduce traffic on the battalion logistical net. It would improve command and staff monitoring of the logistical effort and insure a more current appreciation of the status of subordinate combat elements.
3. Better understanding of the tactical situation by logistical leaders is also required. With continuous knowledge of enemy activities, terrain conditions, and trafficability, and of the precise location and situation of friendly elements, the battalion S4 and his principal assistants can apply considerations of time, status, and anticipated action. Monitoring a battalion information net would provide this knowledge.

Recommendation

That logistical elements monitor a battalion information net to maintain knowledge of the tactical situation. Use of message entry devices should be considered. See Appendixes 1 and 4, Annex B, pp 79 and 87.

APPENDIX 17 to ANNEX B
RESPONSIVENESS OF LOGISTICAL SUPPORT
(Page 17)

Discussion

1. The senior aid man is unable to serve both as the company medical coordinator and a rifle platoon aidman.* One medical non-commissioned officer and two medical aid men are associated normally with each rifle company. This requires the medical non-commissioned officer, in addition to serving as a platoon aidman, to operate the company aid post in vicinity of the company trains and coordinate and direct the activities of supporting evacuation teams. He must also keep the company commander informed as to the status of casualties and evacuation, and insure the provision of supplies and equipment for the three-man aid element. Company duties will often cause his absence from the platoon area. The field manual suggestion that he attempt to arrange for other personnel, preferably a medically-trained soldier, to operate the company aid post does not appear to be a realistic solution.

2. Gasoline tankers of 1200-gallon capacity (two for the infantry battalion, four for the mechanized infantry battalion) resupply gasoline to organic battalion elements. These tankers are normally sent forward to refill the individual vehicles. The use of 5-gallon gasoline cans is minimized. Tankers may be positioned with the company trains or held in the battalion trains as a mobile Class III distribution point. These procedures, though applying advantageous bulk-handling methods and reduced labor requirements, have limited application in many tactical situations. Delayed refueling of selected vehicles of the supported unit will frequently demand a prolonged positioning of tankers in forward areas. The fueling of isolated vehicles and the few outlets (normally two) of each tanker for multiple, concurrent refueling detract from the desirability of tanker delivery in forward areas. Experience indicates that refueling takes approximately three minutes per vehicle per outlet when tankers are used. A mechanized infantry battalion (176 vehicles, four tankers) will require approximately one hour; an infantry battalion (130 vehicles, two tankers), approximately one and one-half hours. Wait and travel time in the company area is not included. Refueling during darkness will increase the time requirement. The deletion of one tanker in both battalions, and the substitution of 5-gallon cans and a 2-1/2-ton truck and trailer in the infantry battalion or one 5-ton truck and trailer in the mechanized infantry battalion will provide more flexibility and speed in the refueling operation. When required, cans can be dropped for use of units at a time and location compatible with the tactical situation.

* See CDEC Final Report, MOMAR Logistics, (C) ATCDC-61-1496C, November 1961.

3. The rated capacity of the cargo-type vehicles of the transportation section of the infantry battalion is inadequate to transport its prescribed load of cargo. Its six 2-1/2-ton trucks and two 1-1/2-ton trailers can lift 18 of the estimated 29 tons. The tonnage figure was developed from the rounds-per-weapon information supplied in ROCID reference data. Mines and prescribed nuclear load for the DAVY CROCKETT weapons have not been considered. DAVY CROCKETT ammunition handling regulations require transportation of loads no larger than 5 rounds per vehicle. Two trucks of the transportation section are needed. This is a further reduction of section capacity from 18 to 13 tons. Modification of these arrangements is required unless unloading and shuttling is accepted. Personnel for shuttling are not available, nor does time often make this method an acceptable substitute for complete mobility.

Recommendations

1. That an additional company aidman be authorized.
2. That battalions be provided with a partial capability for 5-gallon gasoline can transportation and distribution, and that multiple outlets be added to each 1200-gallon gasoline tanker.
3. That basic load and transport capacity of the infantry battalion be reviewed to insure their compatibility.

APPENDIX 18 to ANNEX B
MINIMUM REQUIRED STRENGTH FOR THE
DAVY CROCKETT SECTION

(Page 2)

Discussion*

1. In a non-nuclear environment the tasks of maintaining the DAVY CROCKETT delivery systems, moving and securing vehicles and equipment, and maintaining communications can be performed by the three team leaders authorized. However, additional tasks associated with operational readiness, such as coordination and reconnaissance, now the responsibility of the senior team leader, require the assignment of a non-commissioned officer as section leader.
2. Each team leader is charged with the care and maintenance of his team's DAVY CROCKETT equipment. This includes a 1/4-ton truck (or armored personnel carrier in the mechanized infantry battalion), a DAVY CROCKETT delivery system (XM28 or XM29), radio, and wire communication equipment, and aiming circle. If a team is equipped with the heavy delivery system (XM29), spotting rounds and their pistons and charges are also carried. Complete nuclear rounds (warhead, pistons, and charges) are not carried until employment is anticipated. One man can handle all items of equipment except the recoilless barrel without assistance. At least two men are needed to handle the recoilless barrel.
3. In a non-nuclear environment DAVY CROCKETT teams are normally located with the battalion field trains. Night operation of the tracked carrier or the 1/4-ton truck requires the services of a guide to assist in moving in and out of trains areas. The co-location of the team's vehicles and equipment with other field elements offers limited local security. More positive security measures to protect the nuclear ammunition suggests brigade control of consolidated nuclear loads. Guards must be drawn from personnel or made available from the battalions concerned. A section leader is needed to coordinate the actions of the battalion section.
4. To reduce reaction time when the weapon is brought forward for employment, the senior individual with the section must be familiar with the tactical situation and battalion posture. His periodic absence to maintain this knowledge is not compatible with his responsibilities as a team leader. A section leader tasked to actively supervise and direct three DAVY CROCKETT teams in a nuclear environment is fully used in a non-

* See CDEC Final Report, Integrated Combat Group Components Experiment, Phase I, Volume III - Weapon System - DAVY CROCKETT & Direct Fire (S), ATCDC-60-1118, February 1960.

nuclear environment to perform preparatory tasks and functions. His preparations include continuing reconnaissance and selection of tentative firing positions. Though a map reconnaissance may occasionally suffice, a personal reconnaissance of the firing positions and of routes to and from the positions are necessary. Weapon firing characteristics of mask and backblast clearance, consideration of ground material contributing to the backblast cloud, local security of friendly units, and a piston impact area clear of friendly troops warrant advance study and selection. The availability of individual team leaders to conduct this reconnaissance is doubtful because of other duties. It is better to have an additional individual (section leader) available for these tasks.

5. Assessment of minimum required strength of individual DAVY CROCKETT teams is based upon an organic team leader for each of three teams and the six-man augmentation authorized by the Department of the Army (providing two additional crew men for each team). The team is then composed of a team leader, gunner (DA augmentation), and assistant gunner (DA augmentation).

6. The rapid movement to and occupation of a position by a DAVY CROCKETT team are dependent upon advance reconnaissance and selection of position by the team leader. These preparations include choice of firing position and nearby "hide" positions when appropriate, and routes of movement to and from these locations. Immediate displacement after firing to another location is preplanned. The choice is critical because of the weapon's backblast and detectable trajectory of piston and round. The team leader's actions are accomplished while the team is concealed nearby awaiting his instructions for occupation of position. Other team personnel are engaged in readying equipment.

7. Duties of each individual within the three-man team during occupation of position and firing the heavy delivery system (XM29) are outlined in Table B-1. The team leader must plot and compute with exactness. Little time is available for him to supervise other team members' actions, to inspect equipment, and to check the final warhead settings. The tasks of the gunner and assistant gunner are equally complex and sensitive to timing of actions of the other members of the team. Some tasks required of one member of the team are more effectively accomplished by two men (i. e., in assembling the piston launcher to the barrel). In addition to the previously described tasks, the installation and maintenance of communications must be accomplished. Three radios are employed, as well as wire on occasion. The establishment and monitoring of these communications must be a combined effort of the entire team. See Appendix 22, Annex B, p 129 , for further discussion of wire employment.

8. Table B-2 lists the individual member's tasks for a five-man team. The expectation that a team leader, plus two augmentation personnel, can

TABLE B-1
DAVY CROCKETT THREE-MAN TEAM ACTIONS
INDIRECT FIRE, HEAVY DELIVERY SYSTEM, XM29

Sequence	Squad Leader	Gunner	Assistant Gunner
1	Designates location of tripod. Announces mounting azimuth. (Receives fire mission.)	Removes sight from vehicle. Checks sight. (Removes aiming posts from vehicle.)	Removes tripod and propellant from vehicle. Checks tripod. (Removes piston launcher from vehicle.)
2	Assists in carrying and mounting barrel. Operates radio. (Removes fire direction equipment from vehicle.)	Removes barrel from vehicle; mounts barrel on tripod.* <u>Checks assembled launcher.</u>	Sets up tripod; selects proper zone.* (Assists in carrying and mounting barrel.)
3	(Sets up FDC equipment. Plots weapon and target location.)	Attaches sight to launcher. <u>Checks seating of sight.</u>	<u>Checks propellant container.</u> <u>Inspects barrel and chamber.</u> <u>Checks piston launcher.</u> Assembles two aiming posts.)
4	Inspects propellant and piston launcher when loaded. (Announces charge for nuclear projectile.)	Determines line of fire.† Measures angle of site. <u>Checks mask and overhead clearance.</u>	Loads propellant. (Loads piston launcher.‡ <u>Checks piston launcher and barrel assembly.</u>)
5	(Determines data for spotter rounds.)	Lays launcher on direction stake.	Sets out direction stake on command of gunner. (Moves 100 meters with aiming posts.)
6	(Announces deflection and elevation for spotter rounds.)	Refers sight. Aligns aiming posts.†	Prepares spotter round. (Sets out aiming posts.† Moves vehicle 25 ft from launcher.)
7	(Determines time setting for nuclear projectile.)	Sets off data for spotter round. (Assists in attaching spotter round. †)	Attaches spotter round.†
8	(Applies correction to nuclear projectile data.)	<u>Checks area in vicinity of launcher.</u> Fires spotter rounds.	Prepares nuclear projectile. <u>Checks dimple motors.</u>
9	(Announces deflection and elevation for nuclear projectile.) (Reports ready to fire.)	Checks time setting. (Attaches nuclear projectile.†) Sets off data for nuclear projectile.	Sets off time setting. Attaches nuclear projectile on piston launcher. †)
10	Reports firing of nuclear projectile.	Checks switches and LEDC. Fires nuclear projectile.	Sets switches. Removes LEDC.

NOTE 1: Duties underlined are mandatory checks.

NOTE 2: Computer and loader actions (five-man team) indicated by parentheses.

* Simultaneous operation

† Two man operation

‡ Normally a two man operation

TABLE B-2
DAVY CROCKETT FIVE-MAN TEAM ACTIONS
INDIRECT FIRE, HEAVY DELIVERY SYSTEM, XM29

Sequence	Squad Leader	Gunner	Assistant Gunner	Loader	Computer
1	Designates location of tripod. Announces mounting azimuth.	Removes sight from vehicle. Checks sight.	Removes tripod and propellant from vehicle. Checks tripod.	Removes pistons and aiming posts from vehicle.	Receives fire mission.
2	Assists gunner in carrying and mounting barrel. Operates radio.	Removes barrel from vehicle. Mounts barrel on tripod. <u>Checks assembled launcher.</u>	Sets up tripod. <u>Selects proper zone.</u>	Assists in carrying and mounting barrel.	Removes fire direction equipment.
3	Supervises team member actions.	Attaches sight to launcher. <u>Checks seating.</u>	<u>Checks propellant container.</u> <u>Inspects barrel and chamber.</u>	<u>Checks piston.</u> Assembles two aiming posts.	Sets up equipment. Plots weapon target location.
4	Inspects loaded propellants and piston launcher.	Determines line of fire. Measures angle of site. <u>Checks mask and overhead clearance.</u>	Loads propellant. Assists loader in loading piston launcher.	Loads piston launcher. <u>Checks assembly.</u>	Announces charge for nuclear projectile.
5	Checks launcher for direction.	Lays launcher on direction stake.	Sets out direction stake on command of gunner.	Moves 100 meter with aiming posts.	Determines data for spotter round.
6	Supervises team member actions.	Refers sight. Aligns aiming post.	Prepares spotter round.	Sets out aiming posts. Moves vehicle 25 ft from launcher.	Announces deflection and elevation for spotter round.
7	Checks spotting round data.	Sets off data for spotter round.	Attaches spotter round.	Assists asst gunner in attaching spotter round.	Determines time setting for nuclear projectile.
8	Insures all safety checks are made prior to firing.	<u>Checks area in vicinity of launcher.</u> Fires spotter round.	(Spotter round fired.) <u>Checks dimple motors.</u> Sets time setting. Attaches nuclear projectile.	(Spotter round fired.) Assists in attaching nuclear projectile.	Applies correction to nuclear projectile data.
9	Checks danger area vicinity launcher. Reports ready to fire.	Sets off data for nuclear projectile. <u>Checks time setting.</u>	Sets switches. Removes LEDC.	Checks projectile on piston.	Announces deflection and elevation for nuclear projectile.
10	Reports firing of nuclear projectile.	Checks switches and LEDC. Fires nuclear projectile.			

NOTE: Duties underlined are mandatory checks.

develop a smooth-functioning weapons crew with requisite level of performance is questionable. A two-man addition to each three-man team appears to offer the minimum structure to properly accomplish the occupation of position and firing. The addition of a computer to assume the handling of fire direction equipment, and to plot, determine, and announce fire data will permit the team leader to direct the team effort. The addition of a loader to work with the gunner and his assistant will realistically accomplish assigned tasks. Limited local security during occupation and firing can probably be established within an increased team.

9. The probability of obtaining suitable augmentation personnel by cross-training battalion mortar personnel is doubted. In addition, the resulting degradation of mortar support when they are placed temporarily with the DAVY CROCKETT section is undesirable. Additional personnel must be permanently assigned to the squads, as in the DA augmentation, for the period of nuclear operations. The expected decisive effects of the weapon's fire in support of the entire battalion more than warrants permanent personnel.

Recommendations

1. That the DAVY CROCKETT section during non-nuclear warfare conditions consist of three team leaders and a section leader with appropriate transportation and communications.
2. That under nuclear warfare conditions twelve additional men be furnished the section from sources external to the battalion.

APPENDIX 19 to ANNEX B
SURVEY REQUIREMENTS OF THE
BATTALION MORTAR/DAVY CROCKETT PLATOON
(Page 20)

Discussion

1. Battalion survey facilitates the massing of fires and the delivery of surprise fires. It establishes the relative positions of target and weapon locations and provides a common, connected horizontal and vertical control. This type of survey, however, is time-consuming and sometimes delays firing despite advance preparations to acquire fire control data. Accurate data from other sources, such as radar and forward troop locations, can be acquired if those elements are included in survey. Survey is provided within the ROCID battle group by a four-man survey element.

2. Fires of the battalion mortar and DAVY CROCKETT platoon can be massed without survey by adjustment or transfer from a registration point. Loss of surprise and greater expenditure of ammunition are to be expected. Massing is frequently necessary in the delivery of preparatory fires, final protective fires, and in support of counterattack. More rapid and effective combined attack of targets can be achieved using survey control.

3. Mortars and DAVY CROCKETT weapons normally attempt to deliver surprise fires. Without survey the necessary registration or adjustment discloses the planned action. This is critical in the employment of the DAVY CROCKETT as the characteristic signature of spotting rounds immediately alerts the enemy. These disadvantages are accepted, however, because of the urgency to engage the enemy target and frequent displacement of the weapons. The risk of losing the target may override the possibility of less accurate fire effects caused by unadjusted fire-for-effect. On the basis of the same reasoning, unobserved targets are often engaged, despite the more probable inaccuracies. Disadvantages can be overcome if time is available for survey.

4. The question of relative accuracies (fires using survey and without survey) cannot be statistically answered without actual firing of the weapons and conduct of field survey. Firing was not possible in this experiment. Observation and analysis of experimental exercises did not disprove the acceptability of accuracies obtained without survey. Adjustment, or transfer from a registration point (except for the DAVY CROCKETT), was allowed by the tactical situations. It was acknowledged that surprise was lost on many occasions.

5. The mortar capability without survey appeared to satisfy tactical requirements. In the DAVY CROCKETT, however, the importance of first round hits and the desire to avoid disclosure of intent to fire was critical. The relatively few DAVY CROCKETT rounds fired (based on probable allocation), the sensitivity of accurate engagement without adjustment, and the inability to conduct registration warranted the use of survey. Each time a DAVY CROCKETT weapon was fired, it represented a critical element of the battalion plan of action. It was rare that a second opportunity to engage the target was present. This was also illustrated in the protective actions taken by the battalion when the enemy used a nuclear weapon. Occasionally targets are judged to be of such concern to the battalion that probably inaccuracies are risked in order to immediately place fire on the enemy within acceptable troop safety. It appears that the role of nuclear fires so dominates the battle decision that the effort and cost to provide survey is justified.

Recommendation

That survey data be provided for the employment of DAVY CROCKETT weapons. If made available to the DAVY CROCKETT section, it should also be used to improve the accuracy of mortar fires.

APPENDIX 20 to ANNEX B
PROBLEMS ENCOUNTERED IN TRANSITION FROM 4.2-INCH
MORTAR TO DAVY CROCKETT AS THE PRIMARY WEAPON
(Page 21)

Discussion

1. The employment and firing of the DAVY CROCKETT becomes the priority concern of the battalion commander in a nuclear environment, as it contributes so much to the success or failure of the battalion mission. A shift to a two-weapon platoon markedly increases control tasks. The platoon sergeant continues his coordination and supervision of administrative and logistical support for the entire platoon as well as assisting the platoon leader in his command duties. His movements are often independent of the platoon leader. An established command structure, including section leaders, for the mortar and DAVY CROCKETT elements must exist at time of transition.

2. Transition problems stem from the shift of the DAVY CROCKETT from an "accompanying" posture with the trains to their physical integration with combat elements in the forward battalion area. The platoon's nuclear fire control system is established under the personal direction of the platoon leader. His preliminary tasks concern the link-up of augmentation personnel and skeletonized DAVY CROCKETT teams, if not already effected. He coordinates the forward movement and release of the prescribed nuclear load (PNL), the alert of forward observers, preparations to fire spotting rounds, and the provision of security. He normally takes position at the launcher site to control the firing. When not at the launcher site, he relinquishes control to the team leader or to another designated officer to supervise firing. The battalion commander or a designated representative normally monitors the execution of firing missions. When an officer is present, the team leader confines his actions to inspection of delivery system and ammunition, issuance of fire commands, and safety checks on launcher and ammunition. The fire direction computer develops the data for firing spotting and nuclear ammunition based on target information provided by the observer. The location of the computer at the launcher site, as opposed to being in the platoon FDC, reduces the time required to transmit fire direction data. Difficulties experienced in communication between forward observers and DAVY CROCKETT teams are discussed in Appendix 22, Annex B, p 129.

3. Augmentation of DAVY CROCKETT teams from battalion mortar elements is unrealistic. The resulting loss in sustained fire and displacement capability markedly reduces the mortar element's effectiveness. When the four mortar squads are levied up to six men and transportation, the mortar element's inability to rapidly occupy positions, fire and displace, or fire for sustained periods is decreased in proportion

to the number and skill of individuals taken from mortar crews and the duration of time which mortars are employed without full crews. Further discussion of mortar personnel augmentation is provided in Appendix 13, Annex B, p 117.

Recommendation

That changes recommended in Appendixes 1 and 13, Annex B, pp 79 and 105, be adopted to lessen transition problems.

APPENDIX 21 to ANNEX B
REQUIREMENTS FOR WIRE COMMUNICATIONS
(Page 23)

Discussion

1. More opportunities exist for profitable and reasonable use of wire communications than are indicated in present doctrine. During dismounted movement to contact, battalions can profitably install and maintain a wire link with the lead company from the battalion wire head until initial contact is made with the enemy. Two wire teams using wire dispensers MX-306/G and telephone TA-312/PT are required. One wire team accompanies the lead company; the other, the battalion command group. This procedure offers direct wire contact between the battalion commander, the battalion command post, and the lead company. This system permits radio listening silence. The present authorized wire personnel of the mechanized infantry battalion do not satisfy this need.

2. Wire communication between the battalion headquarters and dismounted rifle companies in the attack affords an alternate means of control and presents a definite advantage in reducing the volume of radio traffic. In dismounted attacks the use of battalion wire teams with advancing rifle companies to install and maintain wire circuits from the battalion switchboard proves desirable. Wire is laid from wire dispenser MX-306/G with a telephone TA-312/PT connected to the "standing end." It is also possible for rifle companies to use their own wiremen to maintain communication with the battalion switchboard. The rifle company wiremen also utilize wire dispenser MX-306/G and telephone TA-312/PT. A wire circuit between the battalion command group and battalion command post switchboard provides a switching facility for the rifle companies. Though the mechanized infantry battalion, when dismounted, has similar requirements for limited wire communication to its rifle companies, it lacks wire personnel.

3. Wire requirements of the mechanized infantry battalion in the defense conform to the normal wire systems established in current infantry battalion doctrine. The lack of wiremen delays the installation of the system.

Recommendation

That current doctrine be revised to specify additional and appropriate opportunities for the use of wire in movement-to-contact and attack operations, and to express the wire needs of the mechanized infantry battalion in defensive and dismounted operations.

APPENDIX 22 to ANNEX B
CAPABILITY TO INSTALL, OPERATE AND MAINTAIN
WIRE COMMUNICATION

(Page 24)

Discussion

1. Wire requirements of the mechanized infantry battalion in defensive postures, and to a lesser degree in attack situations, are essentially similar to the demands upon the infantry battalion's communication platoon. This stems from the common needs of dismounted employment. Therefore similar wire capability, modified to reflect the mechanized infantry battalion's differences in vehicles and structure, appears appropriate.

2. The wire communication element of the infantry battalion in the defense often organized four wire teams during peak loads, particularly during the initial installation of wire circuits. The fourth team, composed of the wire foreman, switchboard operator, and messenger, install command post lines while the other three teams install lines to units. The lack of a wire chief for one of the teams installing unit lines degrades its performance. The use of a fourth team is advisable for only short periods, as the messenger and switchboard operator must resume their assigned duties. When the infantry battalion is reinforced, the wire expenditure may exceed the battalion's basic load; however planned resupply can prevent delay in wire installation.

3. The mechanized infantry battalion's requirement for wire in the defense is similar to the infantry battalion's. Though increased numbers of vehicular radios offer an alternate means of communications, the principal means is wire. When the battalion in defense occupies a frontage approaching 3,000 meters, as prescribed in ROAD doctrine, one of the two suggested wire circuits uses the TOE wire authorization. The one wire team of the mechanized infantry battalion communication platoon is not sufficient to effect timely installation and maintenance. A significant difference exists in the wire authorizations of the two communication platoons. The infantry battalion is authorized twenty-two miles more or approximately three times as much wire as the mechanized battalion. Switching facilities of the mechanized battalion are also inadequate. The two authorized switchboards (SB-22/PT) of the mechanized battalion operate at maximum capacity in the defense. Some organic units are allowed only one circuit to the battalion switchboard. Attachments compound this problem. There is no capability to displace without removing one switchboard.

4. The mechanized infantry rifle company requirements for establishment and operation of wire communications in dismounted and defense

operations are similar to the infantry rifle company. Wire authorizations are nearly identical. However, the mechanized company does not have authorized wiremen to install and maintain the wire system or to operate the company switchboard. Riflemen must perform these tasks with the consequent disadvantages of reduced efficiency and combat power of the unit.

5. The battalion mortar and DAVY CROCKETT platoon is inadequately provided with wire communication means. It is desirable to connect the platoon FDC, the DAVY CROCKETT section, and each forward observer with wire. Present doctrine and resources do not permit establishment of these platoon lines with battalion wire personnel until after higher priority lines have been emplaced. This delay is undesirable. Two platoon wiremen are required as well as an increase in wire and related equipment. The wiremen will also operate the switchboard (SB-22/PT) in platoon headquarters or FDC, thereby freeing the FDC computer.

Recommendations

1. That an additional wire chief be authorized in the infantry battalion communication platoon.
2. That an additional three-man wire team with appropriate transportation and additional wire and switchboard equipment be authorized for the mechanized infantry battalion communications platoon.
3. That the mechanized infantry rifle company be authorized two wiremen.
4. That the battalion mortar and DAVY CROCKETT platoon be authorized a two-man wire team and increased wire and associated equipment.

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13. ABSTRACT

A field experiment was conducted to evaluate performance of ROAD infantry and mechanized infantry battalions reinforced with armor. Effectiveness of control in planning and directing battalion maneuver elements and firepower resources were investigated. Mortar and DAVY CROCKETT platoon and battalion wire requirements were evaluated concurrently. The experiment consisted of four battalion exercises -- two infantry battalion and two mechanized infantry battalion. The full range of battalion combat was evaluated -- movement to contact, attack, defense, and retrograde operations. Field performance was analyzed to expose battalion capabilities and weaknesses, their causes and consequences.

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14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Battalion Operations ROAD infantry battalion Mechanized infantry battalion Mortar platoon DAVY CROCKETT platoon Non-nuclear and nuclear warfare Command and control Wire teams Radio command net War of movement						

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