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Consulting Report

DETECTION AND AVOIDANCE OF MINES AND BOOBYTRAPS IN SOUTH VIETNAM

by
George J. Magner

June 1968

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HumRRO Division No. 4 (Infantry)
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The research described in this report was conducted for the Army Concept Team in Vietnam (ACTIV) as part ot the Study and Evaluation of Countermine Activities (SECMA) project. HumRRO participation in the SECMA project was directed toward evaluating present training for the detection and avoidance of mines and booby-traps, determining training requirements, and developing recommendations for improving CONUS and in-country training. To fullfill these objectives, five Army training centers (Forts Benning, Gordon, Jackson, Leonard Wood, and Polk) were visited during January 1968 to observe mine and boobytrap training, to discuss

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this training area with cadre, and to collect training materials; and in February, a HumRRO representative conducted interviews with engineer, infantry and armor personnel of five U.S. Army divisions in Vietman. Transcriptions of these tape-recorded interviews have been published as Research By-Products, Detection and avoidance of Mines and Boobytraps in South Vietnam: Training and Tactual Procedures of the (name of division). The results of the analysis of quantitative data extracted from the interviews, along with an evaluation of and recommendations for improving current CONUS and in-country mine and boobytrap training, are detailed in this report.

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FOREWORD

The research described in this report was conducted by the Human Resources Research Office for the Army Concept Team in Vietnam (ACTIV) as part of the Study and Evaluation of Countermine Activities (SECMA) project. HumRRO participation in the SECMA project was directed toward evaluating present training for the detection and avoidance of mines and boobytraps, determining training requirements, and developing recommendations for improving CONUS and in-country training.

To fulfill the above-mentioned objectives, five Army training centers (Forts Benning, Gordon, Jackson, Leonard Wood, and Polk) were visited during January 1968 to observe mine and boobytrap training, to discuss this training area with cadre, and to collect training materials; and in February, a HumRRO representative conducted interviews with engineer, infantry and armor personnel of five U.S. Army divisions in Vietnam. Transcriptions of these tape-recorded interviews have been published as Research By-Products, Detection and Avoidance of Mines and Boobytraps in South Vietnam: Training and Tactual Procedures of the (name of division). The results of the analysis of quantitative data extracted from the interviews, along with an evaluation of and recommendations for improving current CONUS and in-country mine and boobytrap training, are detailed in this report.

The study was performed at HumRRO Division No. 4 (Infantry), Fort Benning, Georgia. Dr. T. O. Jacobs is the Director of Research. Military support was provided by the U.S. Army Infantry Human Research Unit, of which LTC Ferdinand O. Barger, Jr. was Chief at the beginning of the study. LTC Chester I. Christie is presently the Unit Chief. 2LT John E. Arrington, PSG James J. Lee, SP4 Robert J. Bennett and PFC David E. Myers assisted by extracting the quantitative data from the interviews. Excellent cooperation was received from responsible personnel of the U.S. Army training centers visited. Special thanks for their generous support and cooperation is given to Colonel J. Elmore Swenson, Commanding Officer of ACTIV, Colonel Edward J. Bielecki, Project Manager of SECMA, and Captain Dennis R. Coll, the SECMA project officer who accompanied the HumRRO representative to the field. The assistance provided by personnel of the five U.S. Army divisions visited (1st, 4th, 9th and 25th Infantry Divisions, and the Americal Division) was outstanding.

The HumRRO study was performed as Technical Advisory Services under the provisions of Army Contract DA 44-188-ARO-2 and Army Project 2J024701A712 01, Training, Motivation, Leadership Research.

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DETECTION AND AVOIDANCE OF MINES AND BOOBYTRAPS IN SOUTH VIETNAM

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INTRODUCTION

The overall objective of this project was to determine if changes are needed in continental United States (CONUS) and in-country training on mines and boobytraps to meet the requirements peculiar to counter-insurgency. HumRRO was initially contacted on the possibility of providing assistance by the Chief of the Army Concept Team in Vietnam (ACTIV) on 19 October 1967. A firm requirement was then received on 18 December 1967 for HumRRO to participate in a large scale attack on this problem as part of the Study and Evaluation of Countermine Activities (SECMA) project. The SECMA project, a subelement of ACTIV, was specifically established for the purpose of providing overall solutions to the basic problem.

BACKGROUND

Mines and boobytraps are traditionally primary weapons in the type of warfare being waged in Vietnam, and as early as November 1965 the Commander, U.S. Military Assistance Command, Vietnam (COMUSMACV) initiated a priority request for equipment to detect, locate, neutralize, or destroy enemy mines without injury to friendly personnel and equipment. However, no satisfactory solution was devised and in May 1967 the Deputy Commanding General, U.S. Army, Vietnam expressed a desire for some answer to the destruction being caused by Viet Cong (VC) mine activities. In June 1967, the ACTIV proposal for the SECMA project was approved and in August 1967 the commanding officer of ACTIV was assigned the SECMA mission. At this time requests were made to COMUSMACV for data support and to the Commander in Chief, U.S. Army, Pacific for Army Scientific Advisory Panel support. The Commanding General, 1st Logistical Command was assigned the mission of supporting the physical and material aspects of the program. ACTIV then submitted a statement on the military and scientific support and funds required. A SECMA seminar was held in Saigon during the period of 27 to 31 August 1967, with experienced representatives of tactical units from all parts of Vietnam attending. The SECMA master plan was then modified to provide for nine subtasks to be undertaken concurrently. In addition to the responsibilities for training assessment assigned to HumRRO, tasks were in the areas of Armor improvement, Chieu Hoi/intelligence, mechanical detonation equipment, radio frequency (RF) detonation, mine detector evaluation, soil testing, gaming and simulation, and data bank. These tasks were to be performed in Vietnam or CONUS as appropriate.

The research task for HumRRO was to become familiar with the training being given on mines and boobytraps, first in CONUS and then in-country, to determine what changes, if any, might be needed. As a necessary contributing step, it was felt that a study also should be performed to learn how various countermine activities were being accomplished in the combat zone, to include the identification of main problem areas, any special techniques that had been developed, and training weaknesses, and the development of any recommendations for improvement. The present report details the procedures and findings obtained from each of these two parallel efforts.

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METHOD

EVALUATION OF CONUS T[redacted]

As an initial step, discussions were held with appropriate personnel of the U.S. Army Infantry School (USAIS) at Fort Benning to determine the content of current and proposed instruction on land mine warfare given in Infantry advanced individual training (AIT). The Infantry School's training areas were also visited and current USAIS programs of instruction were discussed.

Visits were then made to U.S. Army training centers at Forts Gordon, Jackson, Polk and Leonard Wood in early January 1968 to observe their mine warfare training and to discuss the instruction provided AIT trainees. Visits also were made to Fort Belvoir and Camp LeJeune in early February 1968 to attempt to clarify points of confusion on training doctrine and equipment evaluation.

EVALUATION OF IN-COUNTRY TRAINING AND COUNTERMINE OPERATIONS

To obtain a clear picture of enemy employment of mines and boobytraps in various parts of the country, the different countermine activities of U.S. units, and in-country training, five U.S. Army divisions were visited from 21 January to 20 February 1968. These units were the 1st, 9th, and 25th Infantry Divisions in the Saigon area, the 4th Infantry Division in the Pleiku area, and the Americal Division in the Chu Lai area. Plans included a visit to a Marine division in the vicinity of Da Nang, but this trip was cancelled because of the unsettled conditions following the January 1968 Tet offensive.

The procedure followed at each location was to observe training in mines and boobytraps and then discuss it with instructors; to conduct interviews with knowledgeable personnel of all ranks in engineer, cavalry, and infantry units; and to interview any other available personnel who could contribute useful information on this problem. Thirty interviews were tape recorded following a general format outlined on an interview form (see Appendix A). Nine interviews were reconstructed from notes taken when a tape recorder was impractical because of excessive noise in the vicinity or other restrictive conditions.

The number and type of units contributing to the 39 interviews, with a total of 107 subjects, were as follows:

1.	Engineer	13	
2.	Training	9	
3.	Infantry	9	(4 of which were mechanized)
4.	Cavalry	3	
5.	Division or brigade command or staff	5	

[redacted]

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Pictures of training and operations were taken and, wherever possible, instructional material was obtained.

The interviews have been published as research by-products, a separate volume of each Army division, and forwarded to SECMA for their information. These research by-products are the source of most of the information contained in this report.

RESULTS AND DISCUSSION

CONUS TRAINING

From 8 to 13 January 1968, the Infantry training centers at Forts Gordon, Jackson and Polk and the Engineer training center at Fort Leonard Wood were visited. There was insufficient time for any experimental assessment of the land mine warfare training given during AIT and what is reflected here are impressions of the training gained from observing and discussing it at the various locations.

U.S. Army Infantry Training Centers

The land mine warfare instruction at this time was generally based on the eight hours listed in Army subject schedules for the light weapons infantryman (MOS 11B10),[1] the infantry indirect fire crewman (MOS 11C10),[2] and the infantry direct fire crewman (MOS 11H10).[3] This had been modified to include instruction on the employment of the M18A1 (Claymore) and to add an hour on VC boobytraps in the eighth week of the Vietnam-oriented nine-week course. Each of the training centers had its own variations in hours and instructional procedures for these periods. However, with the exception of Fort Polk, a considerable amount of time was devoted to U.S. mines and conventional land mine warfare. This was said to be necessary in the event of a requirement to lay a minefield in Vietnam or elsewhere. Also, since the VC are using U.S. ordnance, it was felt that the men should be familiar with U.S. mines and boobytraps. The metallic mine detector (P-153) was briefly explained and demonstrated, but there was little or no opportunity for practical work. Except for Fort Polk, little emphasis was put on the visual detection of mines and boobytraps. Considerable integration of this subject into other instruction was noted at all Infantry AIT centers, particularly in the eighth-week field problems.

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[1] Department of the Army. MOS Technical Training and Refresher Training of Light Weapons Infantryman MOS 11B10, Army Subject Schedule No. 7-11B10, Department of the Army, Washington, April 1966.

[2] Department of the Army. MOS Technical Training and Refresher Training of Infantry Indirect Fire Crewman MOS 7-11C10, Army Subject Schedule No. 7-11C10, Department of the Army, Washington, April 1966.

[3] Department of the Army. MOS Technical Training and Refresher Training of Infantry Direct Fire Crewman MOS 11H10, Army Subject Schedule No. 7-11H10, Department of the Army, Washington, April 1966.

[redacted]

Some of the better [redacted] at one or more of the centers are listed below:

1. Use of mines and boobytraps in all phases of tactical problems throughout training to teach the soldier to be alert to this danger at all times. This includes their use in conjunction with sniper fire and ambushes.

2. Emphasis on not leaving material on the battlefield for the VC to reclaim and use against U.S. forces.

3. Incorporation of pertinent recent information from Vietnam into instruction.

4. Detailed instruction on the Claymore and sufficient time for practical work to insure that the men are capable of employing it properly.

5. Boobytrap lanes prepared as a tactical walk with the items positioned so that the method of setting them up and the clues for detecting them can be explained. Many of these items are later encountered on tactical problems in a realistic setting.

6. Classes on VC mine warning signs and symbols and later integration of these items into land navigation and patrolling.

7. Stress on blowing mines and boobytraps in place and using grappling hooks for removal or detonation of mines in a suspected location.

8. Assignment of Vietnam-experienced NCOs as squad leaders in the eighth week of training to take the squad through field problems and incorporate many lessons learned into on-the-spot instruction. This is done by presenting the men with special problems or correcting errors.

9. The use of an excellent training aid consisting of a board-mounted miniature village in front of the bleachers that is wired to cause explosions (off to the side) as suspicious areas are pointed out by the instructor.

Since the visit to these training centers, revised subject schedules (dated January 1968) have been published and distributed for implementation. The subject schedule for MOS 11B10 calls for 12 hours of land mine warfare instruction plus one hour on boobytraps in the eighth week. The subject schedules for MOS 11C10 and MOS 11H10 differ in that they have only eight hours of land mine warfare instruction plus the one hour on boobytraps.

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The additional four hours for MOS 11B10 consist of two hours on the use, installation, and breaching of boobytraps and two hours on night breaching operations. These four hours are the main difference between the present program and that followed at the time of the visit. Land mine warfare subjects and the amount of time devoted to each for MOS 11B10 are listed in Table 1.

Table 1

LIGHT WEAPONS INFANTRYMAN LAND MINE WARFARE

PERIOD	HOURS	SUBJECT
1	1/2	History and principles of land mine warfare and types of U.S. minefields
2	2	Characteristics, arming, disarming of U.S. mines and fuzes, and firing devices
3	1	Conference, demonstration and practical exercise on characteristics, capabilities, functioning, and installation of the antipersonnel mine, M18A1, Claymore
4	1	Minefield laying techniques
5	1	Practical exercise in mine fuzing, arming, and burying
6	1	Characteristics, detection, and neutralization of boobytraps used in conventional and unconventional warfare
7	1/2	Breaching and removal techniques
8	1	Practical exercise in mine detection and removal, to include recovery of U.S. mines
9	2	Use, installation, and breaching of boobytraps
10	2	Night breaching operations
Total	12	
	1	Viet Cong boobytraps (during eighth week of training)

U.S. Army Engineer Training Center

The land mine warfare instruction for Engineer AIT (combat engineer - MOS 12B) consisted of 23 hours (see Table 2). In a discussion of lesson

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plans with instructor [redacted] were devoted to Viet Cong mines and tactics, 50 minutes were devoted to an explanation and demonstration of the transistorized mine detector set (P-153), and 36 minutes were devoted to practical work with the mine detector. Trainees were given instruction on first echelon maintenance in their period on the mine detector. The instructors expressed a desire for a revision of their subject schedule that would provide for more Vietnam-oriented instruction. They also felt that their subject would be more effectively taught if demolitions instruction preceded rather than followed land mine warfare, because a principal method of neutralizing mines and boobytraps involves the use of demolitions. Also, a knowledge of the fundamentals of demolitions would enable them to better understand the land mine warfare instruction.

Table 2

COMBAT ENGINEER LAND MINE WARFARE

PERIOD	HOURS	INSTRUCTION	TYPE
1	1	Introduction to course	L,C
2	4	U.S. mines, fuzes and firing devices	L,C,D,PE
3	1	U.S. expedient mines	L,C,D
4	3	Hasty minefields and boobytrapping AT mines	C,D,PE
5	2	Viet Cong mines and tactics	L,C,D
6	3	Detection and breaching	L,C,D,PE
7	1	Standard pattern minefield	L,C
8	3	Minefield installation practical exercise	C,PE
9	4	Practical exercise in breaching and clearing	C,D,PE
10	1	Review, exam and critique	C,Exam
Total	23		

U.S. Army Armor Training Center

Fort Knox was not visited and there was no opportunity to discuss the AIT training of the armor crewman (MOS 11E). However, since their training was discussed with armored cavalry units in Vietnam, it was considered desirable to list their current land mine warfare training in the present report (see Table 3). Almost all of their training is devoted to U.S. mines

[redacted]

and conventional land mine warfare. No Vietnam-oriented instruction or mine detector training is noted in the subject schedule.

Table 3

ARMOR CREWMAN LAND MINE WARFARE

PERIOD	HOURS	SUBJECT
1	2	U.S. mines and minefields
2	2	Laying and breaching minefields
Total	4	

COUNTERMINE AND BOOBYTRAP OPERATIONS AND TRAINING IN VIETNAM

The intent of the visits to units in the field was to systematically obtain detailed information on how in-country countermine activities and training were conducted. However, because of the Tet offensive, which occurred during this same time period, it became extremely difficult to contact units and to obtain the number of interviews desired. Further, in many cases the time available for interviews was limited, and needed information had to be obtained in different forms such as numbers, percentages, or verbal descriptions because subjects did not have access to the precise data needed. There were some instances where the subjects were able to provide firm data from records, but in most cases answers were based on impressions gained from recent experiences.

Casualties from Mines and Boobytraps

To determine the relative seriousness of the mine and boobytrap problem, subjects were asked for data on their total casualties and on casualties suffered from this cause. They were then asked to divide the mine and boobytrap total into the relative percentage of casualties resulting from each. Replies have been summarized in Table 4. This information has been grouped by divisions in geographic locations and by like units within this grouping, because the main factors influencing the subjects' answers appeared to be the enemy activity in a general area and the mission of their particular unit. For example, an infantry unit normally concerned with operations in heavy brush was less likely to encounter mines and more likely to be affected by boobytraps than an armored cavalry unit with its normal road security missions. Also, less mine and boobytrap activity was noted in sparsely inhabited areas, such as the highlands, than in more densely populated areas. These factors will, of course, affect the amount and type of training required by different types of personnel (engineer, infantry, armor).

Divisions Located Near Saigon

Engineer Battalions. The company commander of A Company, 65th Engineer Battalion, was able to give exact figures from his records of the

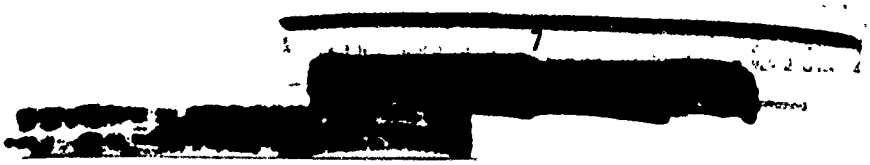

Table 4

MINE AND BOOBYTRAP CASUALTY DATA

		Divisions Located Near Saigon								4th Inf Div-Highlands Area				Americal Div-I Corps Area			
		Engr Bn		Mech Inf Bn		Inf Bn			Entire Div	Engr Bn	Armed Cav Sqdn		Mech Inf Bn	Entire Div	Engr Bn	Armd Cav Sqdn	Inf Bn	Entire Div
		A Co, 65th	3d Plat, A, 65th	CO, S2 & S3 2/42d	B Co, 2/42d	Asst S3 1/27th	B Co, 1/27th	S-4 2/14th		S3 & A Co, 4th	S2 & S3 1/10th	XO & S3 2/1st	S3 2/8th	S2 & 4th Engr Bn	Personnel from 26th and 39th	NCOs 1/1st	Co C, 1/52d	Div Engr CO & XO
	% of tot casualties fr mines & boobytraps	36[a]	Unk	50[d]	Unk	15	50	80		Few WIAs	33	15	1.5	1 KIA & 45 WIA	20	15	99	46
	% of this total from mines	81[b]	Next	80	30	10	2	5		All	Most	Most	Most	Most	Almost All	All	5	50
	% of this total from boobytraps	19[c]	Most	20	70	90	98	95		None	Few	Few	Few	Few	Few	None	95	0
						Co A, 2/28th Bn			From S2, 1st Engr Bn									
1st	% of tot casualties fr mines & boobytraps					Unk			32.4[e]									
1st	% of this total from mines					Next			69.1									
1st	% of this total from boobytraps					Most			30.9									
		A Co, 15th Engr Bn							Div Academy									
9th Div	% of tot casualties fr mines & boobytraps	20[f]							80									
9th Div	% of this total fr mines	25							Next									
9th Div	% of this total from boobytraps	75							Most									

[a] 31 of 86 in past year

[b] 25 of 31 in past year

[c] 6 of 31 in past year

[d] 220 of 440 in past year

[e] For past year

[f] Four of 20 in past seven or eight months

[g] Actual figures during period 10 July 67 to 4 Feb 68; 228 mine incident reports in the same period, most of which involved AT-type mines

[redacted]

unit's casualties [redacted] This considered all aspects of the company's operations to include running roads and resupply operations. It also included a single unusually bad mine incident that was responsible for a large number of casualties. His 3d Platoon, with no data available, was unable to estimate the percentage of total casualties from mines and booby-traps, but, in contrast to the company, felt that most of their casualties had been from boobytraps. Their reply was undoubtedly influenced by the nature of their current operations, as an attachment to an infantry unit in the Ho Bo Woods area. The answers from the 9th Division's A Company, 15th Engineer Battalion, reflected a very small number of casualties.

In summary, the data for engineer units in this area indicate that about a third of the total casualties are caused by mines and boobytraps, and that mines probably account for about three-fourths to four-fifths of the mines and boobytraps total. (Figures received from the 1st Infantry Division's engineers in this area reflected division figures rather than just engineer units and were not included in this analysis.)

Mechanized Infantry Battalions. The headquarters element of the 25th Division's 2/42d Infantry Battalion (mechanized) had firm data indicating that 50% of their total casualties had been suffered from mines and booby-traps. An estimate was then made that 80% of this figure was from mines and 20% from boobytraps. Enlisted personnel from their B Company, with no data available, were unable to estimate the percentage of total casualties from mines and boobytraps, but felt that about 70% of that total had been sustained from boobytraps and 30% from mines. This reversal of the battalion figures probably reflects their recent operations in the Ho Bo Woods area where boobytraps typically were more frequently a problem than mines. If it can be assumed that the battalion headquarters' figures more accurately reflect the results of all the battalion's missions, it probably can be concluded that mines and boobytraps caused about half of their casualties, and that mines, in turn, caused about three-quarters of that total. However, the obvious fact should be noted that a change in the predominant type of operation conducted will produce a change in the pattern of casualties experienced.

Infantry Battalions. No firm data were available from these infantry subjects, and the estimates of the total casualties being attributed to mines and boobytraps ranged from 15% to 80% . The subjects felt that 90% to 98% of these casualties were from boobytraps and only 2% to 10% from mines. This reflected the typical infantry unit's experience of having boobytraps the greater danger in their normal operations. To some extent, these extremely variant estimates on percentage of total casualties may accurately reflect recent past experience as to the nature of casualties suffered. (This is a limitation on the interpretability of most of the percentage-type data obtained.) That is, a unit which recently experienced direct contact with VC or North Vietnamese Army forces might have taken a substantial number of casualties, which would have changed the relative proportion of the overall total furnished by a relatively constant number of mine and boobytrap casualties.

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In summary, the interview data from infantry battalions indicate, though possibly not reliably so, that casualties from mines and boobytraps may have constituted as much as one-half the total number, of which almost all were caused by boobytraps.

Entire Division. While firm data were received from the 1st Infantry Division's engineer battalion, data received from personnel of the 9th Infantry Division Academy were estimates that primarily reflected the instructors' experiences in their previous units. Since most of this 9th Division group were initially from infantry units, their answers are probably more appropriately regarded as infantry estimates and it is noted that they are very similar to other infantry estimates.

The overall 1st Division figures indicate that about a third of the total casualties are caused by mines and boobytraps and that about two-thirds of this number are caused by mines.

Highlands Area

Engineer Battalion. Estimates of casualties caused by mines and boobytraps were obtained from only one engineer unit and their experience was very clear: few casualties had been suffered and all of these had been from mines.

Armored Cavalry Squadrons. Two cavalry squadrons were interviewed; the only difference noted between them was in their rating of the percentage of total casualties caused by mines and boobytraps. The lower figure of the 2/1st Cavalry Squadron (about one-sixth of total casualties, as opposed to about one-third for the 1/10th Cavalry Squadron) could well be attributed to the hardtop roads in their area (Highway 19E) and to a greater volume of traffic. However, in both cases mines caused most of the total mine and boobytrap casualties, as perhaps could have been expected from the nature of their typical missions.

Mechanized Infantry Battalion. The one unit interviewed indicated that few of their total casualties were from mines and boobytraps, and that most of these casualties were from mines.

Entire Division. The figures provided by the S2 of the engineer battalion indicated that relatively few of the division's casualties in the past seven months had been from mines and boobytraps, and that most of these casualties had been from mines. The problem was made more serious by a number of South Vietnamese military and civilian casualties from mines in the division area.

I Corps Area Near Chu Lai

Engineer Battalions. Comments from personnel of two engineer battalions operating in this area were obtained in one interview. While their opinions varied on some items, they agreed that about one-fifth of their total casualties had been from mines and boobytraps, with almost all of these from mines.

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Armored Cavalry Squadron. Three NCO instructors at the division school who had served with a cavalry unit in this area during the earlier portion of their tour said that few of their total casualties had been from mines and boobytraps. All of those had been from mines, with boobytraps a minor problem.

Infantry Battalion. A former rifle company commander indicated that almost all of his unit's casualties had been from mines and boobytraps. Of these casualties, nearly all had been from boobytraps and few from mines.

Entire Division. The division engineer estimated that about half of the total division casualties had been from mines and boobytraps. He estimated, further, that about half of these casualties were from mines and about half from boobytraps.

Comparison of Like Units in General Areas

Engineer Battalions. About a third of all casualties in engineer units near Saigon and in I Corps were caused by mines and boobytraps, while few casualties were sustained from them in units operating in the highlands. Mines were responsible for all casualties in the highlands, almost all in I Corps, and most in the vicinity of Saigon. Boobytraps were responsible for no casualties in the highlands, few in I Corps, and about one-fifth near Saigon for engineer units.

Armored Cavalry Squadrons. No units were interviewed near Saigon. Up to 33% of the total casualties were from mines and boobytraps in the highlands and 15% in I Corps. All of those in I Corps and most of those in the highlands were from mines.

Mechanized Infantry Battalions. No mechanized units were interviewed in I Corps. About half of the total casualties were from mines and boobytraps near Saigon and very few were from them in the highlands. Most of these casualties were from mines in both areas.

Infantry Battalions. No infantry units were interviewed in the highlands. Almost all of the casualties in the I Corps area were from mines and boobytraps. Percentages of total casualties attributable to mines and boobytraps varied too widely among units in the Saigon area for generalization. But of those so attributed in both areas, almost all were from boobytraps.

Entire Division. The division figures for these areas indicated that mines and boobytraps caused about half of the total casualties in the I Corps area, about a third near Saigon, and only a few in the highlands. Mines caused most of these casualties near Saigon and in the highlands, and about half of the casualties in I Corps. Boobytraps caused half of the casualties in I Corps, about a third near Saigon, and few in the highlands.

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[redacted]

Overall Analysis

An overall analysis[1] by type unit indicates the following:

1. Engineers suffer about a third of their casualties from mines and boobytraps, with most of these being from mines.

2. Armored cavalry units suffer about a third of their casualties from mines and boobytraps, with almost all of these being from mines.

3. Mechanized infantry suffer about a third of their casualties from mines and boobytraps, with most of these being from mines.

4. Infantry units suffer a variable proportion of their casualties from mines and boobytraps, depending on the relative incidence of direct contact with enemy troops; this proportion was found to range from about one-sixth to nearly all. However, regardless of the relative proportion of overall casualties reported, there was substantial unanimity in reporting that almost all casualties from mines and boobytraps are caused by boobytraps.

5. Divisions as a whole suffer about a third of their casualties from mines and boobytraps, with most of these being from mines.

Types of Operations On Which Most Mine and Boobytrap Casualties Occur

Subjects were asked to rank the types of operations according to the number of mine and boobytrap casualties suffered on them. Clear answers were not given in all cases and many times only the type of operation causing the most casualties was listed. Rankings were extracted from appropriate interviews and are listed in Table 5. The same data are reorganized in Table 6 to show the ranks by type of unit in a general area and totals by type of operation. As noted in previous examples, the unit's mission greatly influences the type of operation on which mine and boobytrap casualties will occur. The engineers, for example, ranked road clearing first eight times and second twice in a total of 13 ratings. The infantry, on the other hand, ranked search and destroy first five times, road clearing second four times, and pacification second and third once each. There was also a higher ranking for road clearing in the highlands and I Corps with six rankings of first and one of second in a total of nine received in these areas. The overall larger totals for road clearing in comparison with search and destroy are due to some extent to the larger number of answers received from units concerned with operations on roads.

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[1] Data obtained in these interviews reflected a normal period of operations. It was noted that during the heavy fighting of the Tet offensive the percentage of casualties from mines and boobytraps was reduced.

[redacted]

Table 5

RANKS OF TYPES OF OPERATIONS ON WHICH MOST MINE AND BOOBYTRAP CASUALTIES OCCUR, BY DIVISION

Type of Operation	25th Inf Div									1st Inf Div				9th Inf Div		4th Inf Div				Americal Div		
	Engr			Mech		Inf				Engr		Inf	Tng	Eng	Tng	Engr		Mech	Cav	Engr		Inf
	1st Plat Co A 65th	CO Co A 65th	3d Plat Co A 65th	Bn Hqs 2/42d	Co B 2/42d	Bn Hqs 1/27th	Co B 1/27th	S4 2/14th		Asst S3 1st Bn	S2 1st Bn	Co A 2/28th	Asst G3 Tng	Co A 15th	Division Academy	Co A 4th Bn	Co B 4th Bn	S3 2/8th	S2 & S3 1/10th	CO & XO 26th Bn	26th & 39th Pers	Co C 1/52d
Search & Destroy		1[a]	1	2	1	1	1	1		2		1			2			2				1
Road Clearing	1	2	2	1	2	2[b]		2		1	1	2	1	1	1	1	1	1	1	1	1	2
Pacification						3	2															

[a] 1 - Most casualties suffered on this type of operation; 2 - Next largest number of casualties, etc.

[b] Providing security for wood clearing operations.

Table 6

FREQUENCY OF RANKS OF OPERATIONS ON WHICH MOST MINE AND BOOBYTRAP CASUALTIES OCCUR, BY UNIT TYPE AND GENERAL AREA

Type of Unit	Near Saigon						Highlands		I Corps			Overall Totals					
	Search & Destroy Ranking		Road Clearing Ranking		Pacification Ranking		Search & Destroy Ranking	Road Clearing Ranking	Search & Destroy Ranking	Road Clearing Ranking		Search & Destroy Ranking		Road Clearing Ranking		Pacification Ranking	
	1	2	1	2	2	3	2	1	1	1	2	1	2	1	2	2	3
Engineer	2	1	4	2				2		2		2	1	8	2		
Mechanized	1	1	1	1			1	1				1	2	2	1		
Infantry	4			3	1	1			1		1	5			4	1	1
Cavalry								1						1			
Training		1	2										1	2			
Total	7	3	7	6	1	1	1	4	1	2	1	8	4	13	7	1	1

[redacted]

Mines and Boobytraps Most Frequently Encountered

To determine the type of mines and boobytraps providing the greatest threat, subjects were requested to list in rank order those items encountered most frequently. The answers varied considerably, with some subjects listing just a few items and others mentioning many. Sixteen interviews contained no clear answers to this question. The available information has been summarized in Table 7 by type unit within a division. The information in Table 7 has been further consolidated in Table 8, which lists the main categories of mines and boobytraps by general area considering only those ranked first through fourth. Table 8 also contains the results of an attempt to provide an index of the relative importance of each type of item. The rankings were given relative weights as follows:

Ranking	Weight
1	4
2	3
3	2
4	1

The rankings were then summed under the various "weighted total" columns, e.g., for the first line item, grenades, in the "near Saigon" column, the weighted total is 31, which was obtained by adding 6 x 4 (six interviews mentioned grenades as the first ranked item, which received a weight of four) plus 1 x 3 (one interview ranked grenades second, which received a weight of three) plus 2 x 2 (two interviews ranked grenades third, for a weight of two). While the numbers obtained in this manner are not particularly useful for statistical comparisons, they do provide a useful index of the relative frequency of occurrence of the various type items.

The figures under the "overall total" column were obtained by adding the weighted totals from the three "weighted total" columns. The "adjusted total" column was obtained by averaging each of the weighted totals, and then multiplying by $\frac{23}{3}$. This is a type of adjusted total which estimates what the total would have been had the 23 interviews been distributed equally among the three areas indicated. (However, this estimate is probably not too reliable because of the relatively small number of interviews in all three areas, which, in turn, was the result of limited availability of subjects during the Tet offensive.)

The adjusted totals reveal that U.S. ordnance (mortar and artillery rounds) is a primary source of material used by the enemy throughout Vietnam. In addition to the U.S. mortar and artillery rounds used in antitank and antipersonnel roles, Air Force bombs were used in some areas as very large antitank mines. This ordnance was normally used with enemy initiating devices and was often command detonated. In many instances the explosive material was removed from these dud rounds, wrapped in plastic or other material, and used in minimum metal antitank mines in the configurations noted in items 15, 16, 19, 20, and 21 in

[redacted]

Table 7

[redacted]UNTERED

Types of Mines and Boobytraps	25th Inf Div								1st Inf Div		9th Inf Div			4th Inf Div						Americal Division			
	Eng		Mech		Infantry			CO	Eng	Inf	Acd	Eng	Inf	Engineer			Mech	Cav		Engineer		Cav	Inf
	Co A 65th	3d Plat Co A	Bn Hqs 2/42	Co B 2/42d	Bn Hqs 1/27th	Co B 1/27th	S4 2/14th	2d Bde	Asst Bn S3	Co A 2/28th	Div Acad	Co A 15th	Co A 2/47th	Co A 4th Bn	Co B 4th Bn	S2 4th Bn	S3, 2/8th	S2, S3, 1/10th	XO,S3 2/1st	CO & XO 26th Bn	26th & 39th Per	NCO's 1/1st	Co C 1/52d
Grenades	1	1	6		1	1	2		3	1	1	3				2							1
U.S.	x[a]	x	x		x	x	x		x			x											x
Chicom	x	x	x		x	x	x		x			x											-
Homemade									x														-
BLU-3 (CBU)		2	5	1		2	6			2	9				4		3						3[h]
Pressure Type AP											2[e]												x
Cartridge Trap	3										6												-
.50 Cal											x												
20mm											x												
Small Arms	x																						
Boobytraps General														4									
Claymore							4		4		3	4						3[g]					4
US Ordnance	7[b]		3		2	3[c]	3		2	3	4	1		3			2			2		2[c]	2
Mortar & Artillery	x								x	x	x	x		x						x		x	
Air Force Bombs									x											x		x	
Tilt Rod (Stick Mine)		3	2	2		4	5	2				5											
M1A1 (US & Chicom) Mines														1[f]	3	1	1[f]	1[f]	1[f]				
AT & Antiveh. Mines	4				4																		
Round Chicom AT Mines							7						2										
Std. Metal Pressure AT			4	3																			
Min. Metal Pressure AT			1					1	1[d]														
Bamboo Min. Metal Pressure AT																				1[h]	1	1	
Bamboo Stake Mine																		2					
Bamboo Pull Friction																					3		
82mm Chicom Mortar													1		2			2					
Wooden Box Mine							1				5[e]							3					
Chicom INT Plastic Wrapped														2	1			4					
Wrapped Package 20-30 lbs TNT												2											
Command Det. 25 lb Av.																					2		
River Mines											8												
Punji Stakes			7		3	5	8				7		3		5		4						
Spear Trap															6								

[a] x indicates type encountered within

[b] Command detonated or with conventional VC fuze

[c] Command detonated

[d] Command detonated or offset

[e] With multiple triggering devices

[f] Used with some type of booster, usually TNT, and average 10 to 12 pounds of explosive

[g] Pressure activated as road mine

[h] Explosives from US ordnance put in a cardboard box or wrapped and averaging 20 to 60 pounds

[i] Sometimes used to initiate artillery round detonation

[redacted]

Table 8

SUMMED RANKINGS OF MAIN CATEGORIES OF MINES AND BOOBYTRAPS ENCOUNTERED

Type Item	Near Saigon Rankings					Highlands Rankings					I Corps Rankings					Overall Total [1]	Adjusted Total
	1	2	3	4	Weighted	1	2	3	4	Weighted	1	2	3	4	Weighted		
1. Grenades	6	1	2		31		1			3	1				4	38	29.5
2 BLU-3	1	3			13			1	1	3			1		2	18	15.2
3. Pressure Type AP		1			3											3	1.7
4. Cartridge Trap			1		2											2	1.2
5. Boobytraps Gen.									1	1						1	1.3
6. Claymore			1	3	5			1		2				1	1	8	
7. U.S. Ordn. Mortar & Arty	1	3	4	1	22		1	1		5		3			9	36	
8. 82mm Chicom Mortar	1				4		2			6						10	
9. Tilt Rod		3	1	1	12											12	
10. Wooden Box Mine	1				4			1		2						6	
11. Std. Metal Press. AT Mine			1	1	3											3	
12. M1A1 (US & Chicom) Mine						5		1		22						22	
13. AT & Antiveh Mines				1	1											1	
14. Round Chicom AT Mines		1			3											3	
15 Min. Metal Press. AT	3				12											12	
16. Bamboo Min. Metal Press. AT											3				12	12	
17. Bamboo Stake Mine							1			3						3	
18. Bamboo Pull Friction													1		2	2	
19. Chicom TNT Plast. Wrapped						1	1		1	8						8	
20. Wrapped Pkg. 20-30 lbs		1			3											3	
21. Command Det. 25 lbs Av.												1			3	3	5.8
22. Punji Stakes			2		4				1	1						5	3.6

[1] The overall weighted total should be interpreted with caution because the rankings contributing to that total do not meet the assumption of equal intervals between scores necessary for this type of manipulation. The weighted total was computed primarily as an approximation to aid in interpreting the data within the table, and should be regarded only as an approximation.

[redacted]

Table 8. The minimum metal mine was ranked in 11 interviews as one of the four types encountered most frequently. The metal antitank mines, items 11, 12, 13, and 14, were listed among the four major types encountered in 10 interviews.

Certain types of items were listed as the major threat in a general area, indicating primary employment by the enemy in that location. For example, the U.S. and Chicom versions of the M1A1 antitank mine were ranked first in five of six interviews in the highlands; the bamboo minimum metal pressure-type antitank mine was ranked as the most frequently encountered item in three of four interviews in the I Corps area; and the tilt-rod-type AT/AP mine was ranked at least fourth in five of 13 interviews obtained near Saigon. However, little was reported on these items except for these particular areas. U.S., Chicom, and homemade grenades were encountered throughout the country in some form of boobytrap configuration. They were reported as a major threat most often in the area near Saigon where, of 13 interviews, six ranked them first and three ranked them as second or third. The BLU-3 (also called CBU or butterfly bomb) Air Force bomblet was another common item found throughout Vietnam. The Claymore (usually Chicom DH-10) and the 82mm mortar round were other items being used frequently in different parts of Vietnam.

While the main difference in the types of items most frequently encountered appeared to depend on the enemy's characteristic activity in a general area, there was also a basic difference as a consequence of the mission of the U.S. unit. For example, antitank mines are the main threat for units concerned with roads, while boobytraps are the primary problem of the infantry in field operations. The grenade, used in many different forms, was the main boobytrap threat; in this regard, it was noted that the enemy had turned to explosive-type boobytraps almost exclusively. In most interviews, punji stakes and other nonexplosive boobytraps would not have been listed if a question regarding their status had not been asked. Answers generally indicated that they were now a minor problem and that the enemy had been turning more and more toward the explosive-type boobytrap as a more effective and easily installed device. There was no mention of the enemy using the more complex nonexplosive-type devices, such as the bamboo whip and the mace. Apparently, the enemy now has an adequate supply of explosives and considers this an improvement over the nonexplosive devices used in the earlier part of the war.

Fuzes Used Most Frequently by the Enemy

In order to find out more about the fuzes currently employed by the enemy, subjects were asked to list the type of initiating actions (pull, pressure, pressure release, etc.) used most frequently by the enemy to set off fuzes and to start the detonating action of mines and boobytraps. They were also asked whether the action of most fuzes caused an instantaneous or a delayed explosion.

[redacted]

Table 9

RANKING OF TYPES OF INITIATING ACTION ENCOUNTERED MOST FREQUENTLY

TYPE ACTION	25th Inf Div												1st Inf Div				9th Inf Div			4th Inf Div								Americal Div				Frequency of Rankings and Mentions					Weighted Total
	Engineer			Mech		Infantry		Training				CO	Engr		Inf	Tng	Eng	Mech	Tng	Engineer			Mech	Cav		Tng	Engr		Inf	Cav	Tng						
	1st Plat, Co A, 55th	Co A, 65th	3d Plat, Co A, 65th	Bn Hqs, 2/42d	Co B, 2/42d	Bn Hqs, 1/27th	Co B, 1/27th	3/4, 2/14th	Min Det. Instr.	Boobytrap Instr.	Boobytrap Course	2d Bde	Asst S3, 1st Bn	Bn CO, 1st Bn	Co A, 2/28th, G3, Training	Instr, 3d Bde Sch	Co A, 15th Bn	Co A, 2/47th	Div Booby-trap Crse Instr, Div Sch	Co A, 4th Bn	Co B, 4th Bn	S2, 4th Bn	S3, 2/8th	S2 & S3, 1/10th	XO & S3, 2/1st	Div Sch	CO & XO 26th Bn	26th & 39th Bns	Co C 1/52d	NCOs, 1/1st	Div Sch	1	2	3	4	5 or x	
1. Pressure	1[a]	2	4	3	1		3	1		x			2				1		x 4	1	1	1	1	1	1	x			3	1	x	11	2	3	2	4	80
Electric[c]									x	x	x	1				x		1	x 2			2					1	1				4	2			5	33
2. Pull (Trip Wire)		1	3	4	3	3	1		x	x	x		4		1	x	2		x 1						x			3	1	x	6	1	3	2	7	54
3. Command Detonated			5	x		x	4	x	x	x	x		1	x	2	x	3	x	3	2			2		2	x	2	2	2	2		1	8	2	1	11	56
4. Tension Release (Tilt Rod)		5		1		3	2			x		2					4														1	2	1	1	2	20
5. Pressure Release		4	1		2	2[b]		2		x			3		3	x			x							x					x	1	3	2	1	4	29
6. Electrical		3	2	2	4			3																									2	2	1		16
7. Chem (Pressure)																			x							x									2	2
8. Friction (Pull-Trip Wire)																										x									1	1
9. Daisy Chain																			x																1	1

[a] 1--Encountered most frequently and assigned a weight of 5

2 to 4--Encountered in decreasing frequency and assigned weights of 4 to 2 respectively

5 or over--Equivalent to having been mentioned and assigned a weight of 1

x--Item mentioned but not ranked. Assigned a weight of 1

[b] Antipersonnel

[c] Electrical circuit mentioned in connection with pressure-activated mine or boobytrap

[redacted]

Types of Initiating Action Most Frequently Encountered

Some difficulty was experienced in obtaining answers that could be clearly classified in a specific category. The intent was to determine a rank order among the outside actions that start the chain of events leading to the explosion of the mine or boobytrap. For example, stepping on a device provides the "pressure" needed to activate it, and tripping a wire provides the "pull" necessary to start the detonation chain. Part of the problem was due to differences in interpretation and nomenclature by subjects in different areas. An attempt to consolidate rankings from appropriate interviews is listed in Table 9. In item 6, "Electrical," no indication was given by subjects as to what action caused the electrical circuit to be completed, while in item 1 the subelement "Electric" indicates an electric circuit was used in connection with a pressure-activated device.

An analysis of Table 9 indicates that pressure-activated mines and boobytraps are the type most frequently encountered, with 15 interviews ranking this type first and 24 ranking it fourth or higher. Units in the highlands were unanimous in designating pressure-type devices as those most frequently encountered. Most items in this category were the conventional or bamboo-type antitank mine, but some boobytrap devices were also included.

The following types of initiating action are mentioned in descending order, according to the highest frequency in the highest rank. The pull-type, which was usually used with a trip wire and most commonly encountered in a boobytrap configuration by the infantry, was listed first in six interviews (four of which were of infantry personnel) and among the top four in 12 interviews. The command-detonated type was encountered frequently in all parts of the country and in many forms. Units in the highlands and I Corps were highly consistent in ranking command-detonated action as second. The next item, pressure release, was primarily a boobytrap device where moving something would release the initiating action. Of tension-release items, the main type mentioned was the tilt rod where the pushing of a bamboo stick from a vertical position would release a spring-loaded pin and start the detonation chain.

Many items were noted but not ranked by subjects, particularly those connected with training, and these items have been indicated by a lower case x. These should also be considered in evaluating types of initiating actions encountered most frequently. They are included in the weighted totals and they generally reinforce the rankings noted above.

Time Factor

The ranking of "instantaneous" as the time factor used most by the enemy was almost unanimous (20 of 21 interviews) as noted in Table 10. This response was qualified in some instances where basically instantaneous fuzes had a delay effect at times, e.g., when a vehicle of a certain weight was required to detonate it or when repeated vehicles passing over caused a gradual breaking down of the device and a delayed detonation. In the one instance where a delay-type fuze was said to be used by the enemy most

[redacted]

Table 10

RANKING OF TIME FACTOR FOR MINE AND BOOBYTRAP FUZES

	25th Inf Div							1st Inf Div		9th Inf Div		4th Inf Div						Americal Div			
	Engr		Mech		Inf			Eng	Inf	Eng	Tng	Eng			Mech	Cav		Engr		Cav	Inf
Fuze Time Factor	CO Co A 65th	3d Plat Co A 65th	Bn Hqs 2/42d	Co B 2/42d	Bn Hqs 1/27th	Co B 1/27th	S4 2/14th	Asst S3 1st Bn	Co A 2/28th	Co A 15th	Division Academy	Co A 4th Bn	Co B 4th Bn	S2 4th Bn	S3 2/8th	S2 & S3 1/10th	XO & S3 2/1st	CO & XO 26th	26th & 39th Pers	NCOs 1/1st	Co C 1/52d
Instantaneous	1	1	1	1	2	1	1	1[b]	1	1	1	1	1	1	1	1	1	1[c]	1[c]	1[c]	1
Delay	2	2	2	2	1[a]	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

[a] Most frequent item hit was the boobytrapped hand grenade with a few seconds delay built into fuze.

[b] Instantaneous fuze but offset sometimes causes slight delay. Some delay also possible until vehicle of appropriate weight can compress bamboo.

[c] Instantaneous fuze but semicircular bamboo initiating device sometimes causes delay by breaking down gradually to make contact after several vehicles have passed over it.

frequently, an infantry unit was reflecting their experience in encountering mostly hand-grenade-type boobytraps with a few seconds delay built into the fuze. In many other instances where the enemy used grenades as boobytraps, they had removed the delay fuzes from U.S. grenades and replaced them with instantaneous fuzes, or used Chicom grenades which were equipped with instantaneous fuzes.

Conditions Under Which Enemy Mines and Boobytraps were Encountered

As a means of determining the conditions under which enemy mines and boobytraps were encountered, subjects were asked to name the areas where they were found (see Table 11) in order of decreasing frequency of occurrence. They were then asked to describe the locations within these general areas that most mines and boobytraps were found (see Tables 12 through 16).

Roads were listed as the primary area where mines and boobytraps were encountered (first in 24 of 32 rankings). However, it should be noted that most of the subjects furnishing answers were from units concerned with the use of roads (engineers, mechanized infantry, cavalry). The infantry's main problem areas were the areas in which they operate: the jungle, which is next to roads in numbers of mines and boobytraps encountered; VC base camps; and VC-dominated villages. Strategic terrain and the vicinity of friendly positions were other areas where mines and boobytraps were encountered in lesser numbers. Antitank mines were the main items encountered in the vicinity of roads while boobytraps were the primary threat in the jungle and enemy base camps.

Locations in the Vicinity of Roads

In an attempt to establish some pattern for the enemy's activities, subjects were asked to specify where in the vicinity of roads most mines and boobytraps were encountered (see Table 12). "In the ruts" was the main location mentioned for those found in the road, with "center of the road" next. "Shoulder of the road" was the third most often mentioned category. The enemy planted mines on the shoulders in an attempt to damage the larger American vehicles that extend onto the shoulders of narrow Vietnamese roads. The next largest category, "side of the road," includes command-detonated Claymores and boobytraps in the brush near the road that were meant to harass clearing and security elements.

Locations in the Jungle

The density of the enemy's mines and boobytraps was understandably much less in the jungle than in the more remunerative vicinity of roads. However, certain danger areas were pointed out by subjects and, as expected, trails were most often mentioned (see Table 13). The enemy anticipates the natural desire of U.S. personnel to travel faster and easier on the trails and uses a great variety of devices to make this a dangerous luxury. Among these are trip wires, small serrated can lid pressure devices in loose dirt, and command-detonated antipersonnel mines in trees next to

[redacted]

Table 11

RANKING OF GENERAL AREAS WHERE MOST MINES AND BOOBYTRAPS ARE ENCOUNTERED

Divisions Near Saigon

25th Inf Div	Engineers: 1st Plat, Co A, 65th	Engineers: CO, Co A, 65th	Engineers: Mine Swpr, Co A	Engineers: 3d Plat, Co A, 65th	Mech: Bn Hqs, 2/42d	Mech: Co B, 2/42d	Infantry: Bn Hqs, 1/27th	Infantry: Co B, 1/27th	Infantry: S4, 2/14th	Tng: EOD Instr	Tng	C&S: CO, 2d Bde
Roads	1[a]	3	1	2	1		3	2	4	1		1
Jungle		1		3		1	2	3	1			
VC Base Camps		2		1	2	2	1		2			
Villages				4	3			1	3			
Friendly Positions												
Strategic Terrain										2		

1st Inf Div	Engineers: Asst S3, 1st Bn	Engineers: S2, 1st Bn	Engineers: CO, 1st Bn	Engineers: Sweepers, Co A, 1st	Mech	Mech	Infantry: Co A, 2/28th	Infantry	Infantry	Tng: G3, Training	Tng: Bde Instr	C&S
Roads	1	1	1	1			x			1	1	
Jungle							x				2	
VC Base Camps	2											
Strategic Terrain											3	

9th Inf Div	Engineers: Co A, 15th	Engineers	Engineers	Engineers	Mech: Co A, 2/47th	Mech	Infantry	Infantry	Infantry	Tng: M & BT Instr	Tng: Acad Instr	C&S: G2, Div
Roads	1				1					1	1	
Jungle	3									2	3	
VC Base Camps											2	
Villages	2										4	
Friendly Positions												1

Areas	Totals-Saigon Area Rankings 1	2	3	4	x
Roads	15	2	2	1	1
Jungle	3	3	4	0	1
VC Base Camps	2	6	0	0	0
Villages	1	1	2	2	0
Friendly Positions	1	0	0	0	0
Strategic Terrain	0	1	1	0	0

4th Inf Div

Areas	Engineers: Co A, 4th Bn	Engineers: Co B, 4th Bn	Engineers: S2, 4th Bn	Mech: S3, 2/8th	Cav: S2 & S3 1/10th	Cav: XO & S3, 2/1st	D. Sch: M & BT Instr	C&S: CO, 2d Bde
Roads	1	1	1	1	1	1	x	1
Jungle				2			x	
VC Base Camps				4			x	
Villages	2			3	2	2	x	
Friendly Positions				x				
Strategic Terrain							x	

Areas	Totals-Highland Area Rankings 1	2	3	4	x
Roads	7	0	0	0	1
Jungle	0	1	0	0	1
VC Base Camps	0	0	0	1	1
Villages	0	3	1	0	1
Friendly Positions	0	0	0	0	1
Strategic Terrain	0	0	0	0	1

Americal Div

Areas	Eng: CO & XO, 26th Bn	Eng: 26th & 39th Per	Inf: Co C, 1/52d	Cav: NCOs, 1/1st
Roads	1	1	4	x
Jungle	2			
VC Base Camps			2	
Villages	3		3	
Friendly Positions			1	
Strategic Terrain		2		x

Areas	Totals-I Corps Rankings 1	2	3	4	x
Roads	2	0	0	1	1
Jungle	0	1	0	0	0
VC Base Camps	0	1	0	0	0
Villages	0	0	2	0	0
Friendly Positions	1	0	0	0	0
Strategic Terrain	0	1	0	0	1

Overall Totals

Areas	Rankings 1	2	3	4	x
Roads	24	2	2	2	3
Jungle	3	5	4	0	2
VC Base Camps	2	7	0	1	1
Villages	1	4	5	2	1
Friendly Positions	2	0	0	0	1
Strategic Terrain	0	2	1	0	2

[a]1--Encountered most frequently

2-4--Encountered in decreasing frequency

x--Area mentioned but not ranked by subjects

[redacted]

[redacted]

Table 12

RANKING OF SPECIFIC LOCATIONS IN THE VICINITY OF ROADS WHERE MOST MINES AND BOOBYTRAPS ARE ENCOUNTEPED

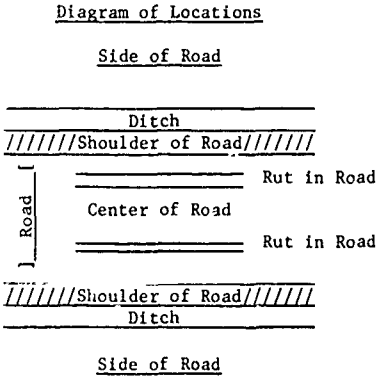
		Engineer Interview				Mech Intrv		Infantry Intrv			Cav Intrv		Tng Intrv		Overall Totals Rankings				
		1	2	3	4	1	2	1	2	3	1	2	1	2	1	2	3	4	x
25th Division	Road[a]		x	1[c]	1	1[b]		1	x				1		7	1	1	0	7
	Center of Road									2					0	3	1	0	2
	Rut in Road									3					5	0	2	0	2
	Shoulder of Rd				2	2				1					5	7	0	0	3
	Ditch(beside Rd)														0	0	0	0	1
	Side of Road			2	3	3		2	x	4					0	2	2	2	3
1st Division	Road	3[b]			2			x					x						
	Center of Road	2																	
	Rut in Road												x						
	Shoulder of Rd.	1	1		1								x	x					
	Ditch(beside Rd)												x						
	Side of Road												x						
9th Division	Road												x						
	Center of Road	x																	
	Rut in Road				x									1					
	Shoulder of Rd.													2					
	Ditch(beside Rd)																		
	Side of Road	x																	
4th Division	Road										1		x						
	Center of Road		2																
	Rut in Road	1	1								3								
	Shoulder or Rd.	2									2	1							
	Ditch(beside Rd)																		
	Side of Road										4								
American Division	Road	1										x							
	Center of Road		3					x											
	Rut in Road		1[b]								1[b]								
	Shoulder of Rd.	2	2					x											
	Ditch(beside Rd)																		
	Side of Road																		

[a]Listed in this category when no specific location in the road is given.

[b]Offset mine with initiating device in rut and explosives in center.

[c]1--Encountered most frequently
2-4--Encountered in decreasing frequency
x--Location mentioned but not ranked

Diagram of Locations



[redacted]

[redacted]

Table 13

RANKING OF SPECIFIC LOCATIONS IN THE JUNGLE WHERE MOST MINES AND BOOBYTRAPS ARE ENCOUNTERED

Locations	25th Inf Div								1st Div		9th Div			4th Div		Am Div		Overall Totals of Rankings			
	Engr		Mech	Inf			Tng		Inf	Tng	Eng	Tng		Mech	Tng	Eng	Inf				
	CO Co A 65th	3d Plat Co A	Co B 2/42d	Bn Hqs 1/27th	Co B 1/27th	S4 2/14th	B. Trap Instr	B. Trap Course	Co A 2/28th	G3 Tng	Co A 15th	M&BT Instr	Division Academy	S3 2/8th	Division School	CO 26th	Co C 1/52d	1	2	3	x
On Trails		1[a]	1	1	x	3	x	x	x	x	x	x		1	x		2	4	1	1	8
Side of Trail		2	2		x						x		x				1	1	2		3
In Vegetation (tree)							x	x	x			x			x						5
In Overgrown Area				3		2													1	1	
Old Pineapple Planta.						1												1			
Hedgerows			3	2	x														1	1	1
Across Path (trip wire)								x	x												2
In Loose Sand									x			x									2
Near Log in Path												x									1
At Bridge												x									1
At Ambush Site									x												1
Unmarked Allied Mine																x					1
In Jungle	1																	1			

[a] 1 - Encountered most frequently
2-4 - Encountered in decreasing frequency
x - Location mentioned but not ranked

[redacted]

the trail. Many U.S. units do not use the trails, but rather move off to the side and guide on them. Consequently, the enemy also pays particular attention to this area, with boobytraps in the brush. Boobytraps are difficult to detect while moving through the heavy brush of overgrown areas or old pineapple plantations and these, therefore, are other favorite spots. In many instances, the enemy was said to be moving ahead of U.S. units and planting boobytraps on their anticipated route.

Locations in the Vicinity of Enemy Base Camps

From comments of subjects, it was obvious that the enemy uses mines and boobytraps extensively to help protect his base camps. The majority of the mines and boobytraps are located on the avenues of approach and the entrances and exits of the base camps (see Table 14). They serve the purpose of warning the enemy as well as delaying and inflicting casualties on U.S. forces. Some are also emplaced on the base camp perimeter; food and ammo caches are often boobytrapped. If the enemy moves out of the base camp, he will often leave various types of devices in his bunkers, living areas, and tunnels to welcome investigating U.S. forces.

Locations in the Vicinity of Villages

The villages discussed here are those that are either VC dominated or under strong VC influence. It was noted that in most cases the mines and boobytraps were employed in the area outside but near the village, i.e., on the avenues of approach or at the entrances and exits of the village (see Table 15). Trails inside the village were sometimes boobytrapped with devices which were armed after the warning that U.S. forces were approaching was received. Some living quarters and storage facilities within the village were boobytrapped, but most of these devices were employed where there was less danger to the villagers. Reportedly, warning signs were often used in these areas.

Locations in Vicinity of Friendly Positions and Strategic Terrain

Strategic terrain features and friendly positions have been listed together since they are areas of special interest to friendly forces and, therefore, receive more attention from the enemy (see Table 16). For example, the enemy often mines and boobytraps potential helicopter LZs, clearings U.S. units are expected to cross, river banks, river crossings, and the military crests of hills that U.S. forces habitually like to occupy. When units occupy a night position where they can be observed, they often run into mines or boobytraps on routes used the next morning to move out. The enemy also uses mines and boobytraps to harass U.S. forces as they move into or out of base camps, and to hit patrols as they operate in the area around the base camp. In some instances the enemy has even attempted to mine or boobytrap base camp perimeters or buildings within the camp.

[redacted]

Table 14

RANKING OF SPECIFIC LOCATIONS IN VICINITY OF ENEMY BASE CAMPS
WHERE MOST MINES AND BOOBYTRAPS ARE ENCOUNTERED

Locations	25 Inf Div							9th Div	4th Div	Am Div	Overall Totals of Rankings				
	Engr		Mech		Inf		Tng	Tng	Tng	Inf					
	CO Co A 65th	3d Plat Co A	Bn Hqs 2/42d	Co B 2/42d	Bn Hqs 1/27th	S4 2/14th	B. Trap Instr	Division Academy	Division School	Co C 1/52d	1	2	3	4	x
Def. Perimeter			2					x	x			1			2
Ave. of Approach	x	1	1		1	x				x	3				3
Entrances & Exits	x	2						x	x			1			3
Food and Ammo Caches		3	4	3		x	x						2	1	2
Trails Inside Camp								x	x	x					3
Bunkers	1		3					x			1		1		1
Living Areas			x	1							1				1
Tunnels				2								1			

1 - Encountered most frequently
2-4 - Encountered in decreasing frequency
x - Location mentioned but not ranked

Table 15

FREQUENCY OF LOCATIONS NAMED IN VICINITY OF VILLAGES
WHERE MOST MINES AND BOOBYTRAPS ARE ENCOUNTERED

Location	25th Inf Div			9th Div		4th Div				Am Div		Total
	Mech	Inf	Tng	Eng	Tng	Eng	Mech	Cav	Tng	Eng	Inf	
Area Near Village		2		1			1	1	1	1		7
Avenues of Approach				1		1		1	1	1	1	6
Entrances & Exits	1					1						2
Trails Inside			1							1	1	3
Living Areas			1								1	2
Hedgerows Around		1										1
VC-Controlled Area			1							1		2
Storage Facilities					1							1

Table 16

FREQUENCY OF LOCATIONS NAMED IN VICINITY OF FRIENDLY POSITIONS AND STRATEGIC TERRAIN FEATURES WHERE MOST MINES AND BOOBYTRAPS ARE ENCOUNTERED

Location	25th Div	1st Div	9th Div	4th Div		Am Div			Total
	Tng	Tng	C&S	Mech	Tng	Eng	Inf	Cav	
Strategic Terrain Feature	1[a]	1[b]			1[c]	1[d]	1	1[e]	6
Nearby Area Around Base Camp			1				1	1	3
Routes Leading into Base Camp				1			1[f]		2
Perimeter Wire Around Base Camp							1		1
Buildings in Base Camp							1		1

[a] Helicopter LZs

[b] Clearings

[c] River banks

[d] River crossings

[e] Military crest of hill

[f] When location of night position observed

[redacted]

Primary Methods of Detecting Enemy Mines and Boobytraps

To determine the mine and boobytrap detection methods being used most successfully by U.S. units, subjects were asked to rank the most effective methods used in their detection efforts (see Table 17). They were then asked to list the specific means of detection that assisted them most within these general methods (see Table 18).

Visual detection was found to be the primary method (named in 15 of 30 top rankings), with mine detector second, tactical conditions third, and other sensory means (tactually or aurally) last. The infantry, in particular, ranked the visual method first in that they felt it was almost their only means of detection in the brush. In a number of cases, engineers also ranked it first in that spotting a suspicious area was often their first indication of a mine, which they could then confirm with a detector.

The mine detector was ranked first (11 of 30) by units primarily concerned with roads. Although "tactical conditions" is not a method per se and ranked first only a few times, it was considered a major factor overall. Units often exercised extra caution or obtained valuable clues by recognizing dangers presented by the tactical situation.

Visual Method

Within the visual method, the main means of detection were enemy warning signs, seeing the mine or boobytrap device, and seeing a trip wire or triggering device. Other visual clues were generally unusual conditions, such as a disturbance in the road and fresh dirt or foliage out of place.

Mine Detector

The P-153 mine detector was generally well regarded and was virtually the only one used successfully by the subjects (in 21 of 23 interviews mentioning it). The PRS-3 was used very little and the PRS-4 was generally disliked by personnel who had used it in the past.

Tactical Conditions

Exercising extra caution in suspected areas was the primary means of detection in this category. Hitting a mine or boobytrap was often the first indication of trouble, as in the case where spotting one mine necessitates looking for others that are probably nearby. It was noted that the enemy often planted a large amount of junk metal in the road to cause carelessness and the subsequent overlooking of a mine.

Tactual Method

Careful probing to locate a mine by feeling for it and clearing around it was the primary tactual means. This was usually a follow-up procedure after the suspected area had been located visually or by a mine detector.

[redacted]

[redacted]

[redacted]

MEANS OF DETECTING ENEMY MINES AND BOOBYTRAPS

Method	Means of Detecting	Frequency
Visual	1. Visual (no other information on how item was spotted)	4
	2. Enemy warning signs and markings	13
	3. Seeing mine or boobytrap device	10
	4. Fresh, scuffed up dirt	7
	5. Foliage out of place	3
	6. Disturbance in condition of road	5
	7. Seeing triggering device	4
	8. Seeing trip wire	8
Mine Detector	1. P-153 (metallic)	21
	2. PRS-3 (metallic)	1
	3. PRS-4 (nonmetallic)[a]	1
Tactical Conditions	1. Hitting mine or boobytrap	7
	2. Attitude and behavior of local people	2
	3. Intelligence on area	1
	4. Familiarity with certain (critical) areas	3
	5. Unusual amount of enemy planted junk metal in road	4
	6. Looking for others in vicinity when one is spotted	6
	7. Certain locations habitually re-mined	3
	8. Logical suspect areas (ambush sites, hedgerows, potholes, graveyards, obstacles, etc.)	10
Tactual or Aural	1. Probing	5
	2. Feeling in tunnels, bunkers, etc.	2
	3. Hearing	2

[a]This detector was discussed a number of times but it was generally considered ineffective.

[redacted]

[redacted]

Table 17

RANKING OF PRIMARY METHODS OF DETECTING ENEMY MINES AND BOOBYTRAPS

		Engineer Interview				Mech Interv.		Infantry Interview			Cav Interv.		Training Interview			Totals of Rankings			
	Detection Method	1	2	3	4	1	2	1	2	3	1	2	1	2	3	1	2	3	x
25th Div	Visual		2	2	1	1	1	1	1	x			x	x	x	15	9	1	4
	Mine Detector	1	3	1	2	2	2			x			1			11	6	5	2
	Tact. Conditions		1		3			2	x	x			x	x	x	3	6	6	6
	Tactual					3[a]		3[b]	x	1			x			1	0	2	3
1st Div	Visual	1				1							1	2					
	Mine Detector	2				x								1					
	Tact. Conditions	3											2	3					
9th Div	Visual	1	2					1					2	1					
	Mine Detector	2	1					3					1						
	Tact. Conditions	3						2					3						
4th Div	Visual	1[c]	1			2					2	2							
	Mine Detector	3[d]	2			1					3	3							
	Tact. Conditions	2	3								1[e]	1[e]							
Americal Div	Visual	1[f]	2					1			3								
	Mine Detector	1[f]	1								1		1						
	Tact. Conditions	x						2			2								
	Tactual	x																	

[a] Located by probing

[b] Someone hits a mine or boobytrap

[c] During monsoon season

[d] During dry season

[e] Hitting mine during clearing run

[f] Subject considered these methods to be equally effective

[redacted]

Enemy Mine Marking System

The enemy is reported to use some type of marking system for warning the local people or his own troops to avoid his mines and boobytraps. Subjects were asked if they had observed any of these warning signs and if so, to describe them. The consensus of opinion was that such warning signs were used, and that they provided useful clues to mines or boobytraps that might be located nearby. However, many had never seen these signs and knew about them only from hearsay and official reports. Some didn't believe that these warning signs were used in their areas and others felt the signs were often misleading (actual mines not found in vicinity of sign) or only partially correct.

There was general agreement that the types of warning signs and their meanings were pertinent only to a local area. Wide distribution of interpreted meanings for these local signs was considered unwise. The important point to be emphasized was that warning systems were often used and that they could best be spotted by looking for anything that was out of place or unnatural in an area. Examples of the types of marking signs used should be distributed, especially within local areas where interpreted meanings might well be valid.

Types of marking systems reportedly used in various parts of Vietnam are listed in Table 19. The most common type was some combination of sticks placed, tied, or stacked in varying shapes. This was reported by subjects in 16 interviews in all parts of the country. The next most common item reported was some type of grass or weeds tied together in various forms. Following that were actual drawings or written signs which were generally, but not always, valid. There were also combinations of rocks, bamboo in different forms, and even cuts on, or cloth tied to, trees as mine warning indications. In one instance it was reported that the warning system was a verbal passing of the word locally. This verbal passing of the word was also thought to be an important back-up to any warning system used.

Chieu Hois[1] are the acknowledged experts on finding these signs and it was suggested that they be used for this mission as well as in an instructor's role to teach U.S. personnel what to look for and where to look.

Types of Assistance Used in Mine and Boobytrap Detection

The purpose of this section was to determine what types of aids to mine and boobytrap detection were being used by the units and how successful the various methods were. Subjects were asked specifically about the use of dogs and mechanical equipment as detection aids and to list other methods

[1] A Chieu Hoi is a defector from the Viet Cong (military or civilian supporter) who has surrendered under the current "open arms" policy which promises certain amnesty to such defectors.

[redacted]

[redacted]

Table 19

TYPES AND FREQUENCY OF ENEMY MINE AND BOOBYTRAP MARKING SYSTEMS REPORTED

Type	Unit and Area Reporting					Total
	Near Saigon			Highlands	I Corps	
	25th	1st	9th	4th	Americal	
Writings and drawing (signs, pictures, etc.)	2		3			5
Unusual stick arrangements (sticks tied, placed or stacked in varying shapes)	4	1	6	1	4	16
Unusual rock arrangements (varying numbers of rocks in different shapes)		1	1		1	3
Grass or weeds tied together (tied tufts, wreaths or other grass arrangements)	2	2	3		1	8
Trees (cut in tree or cloth tied to it)	1	1				2
Bamboo (slivers woven together or pieces tied together)	2		1			3
Verbal warning				1		1

that did not fall in these categories. Their replies are presented in Table 20 by the number of interviews that mentioned the various items. Many of these items were listed in connection with actions taken to counter command-detonated mines, as noted in the table.

Most subjects had not had enough experience with dogs in Vietnam to assess their value in detecting mines and boobytraps. In most of the nine interviews in which dogs were discussed, the subjects felt the dogs had been of some help by alerting them at certain points where further search sometimes revealed mines or boobytraps. Some subjects felt that dogs were very helpful, while others saw no evidence of their value in this area.

Of the mechanical aids, grappling hooks, the long probe, and the rooter were used primarily in attempting to counter command-detonated mines by hooking or exposing wires and were generally regarded as very helpful. Experimental items mentioned were jeep-mounted mine detectors and rollers designed to be pushed ahead of tanks. Earlier versions of these items had not been too successful, but later developments in the roller area by the 25th Division seemed to offer more promise. Visual reconnaissance from light aircraft was listed as a means of detecting the mines as well as

[redacted]

[redacted]

FREQUENCY OF TYPES OF MINE AND BOOBYTRAP DETECTION ASSISTANCE MENTIONED

	25th Inf Div					1st Div			9th Div				4th Div				Americal Division			Totals		
	Engr	Mech	Inf	Tng	Cmnd & Staff	Engr	Inf	Tng	Engr	Mech	Tng	Cmnd & Staff	Engr	Mech	Cav	Cmnd & Staff	Engr	Inf	Cav	Normal Assistance	Counter C.D.Mines	Totals
Dogs		2	2						1	1	1	1	1							9		9
Mechanical																						
Rooter						2[a]		1[a]													3	3
Roller	1[c]					2[b]														3		3
Rome Plow	1							1												2		2
Jeep-Mounted Detector						2[b]														2		2
Loaded 5-Ton Truck																	1			1		1
Grappling Hook		1[a]	1[a]			1			1[a]		1[a]						1[a]	1[d]	1	3	5	8
Killer Eye		1[a]		1																1	1	2
Aircraft Visual Recon								1			1[a]				1	1				3	1	4
Running Road								1							1[a]	1				2	1	3
Long Probe		1[a]								1											2	2
Other																						
Chieu Hois						1					1									2		2
ARVN											1									1		1
Civilian Volunteers											1									1		1
Children															1					1		1
Animals																		1		1		1
Pay Program						1									1		1			3		3
Recon by Fire	1[a]	1[a]	2[a]					1[a]	1[a]	1[a]	1[a]			1	1[a]	1		1[a]		2	10	12
Strong Points					1		1	1							1					4		4
Observation Towers																1				1		1

[a]Mentioned in connection with command-detonated mines.

[b]Past unsuccessful test of this item mentioned.

[c]Roller developed by division mentioned.

[d]Used in tunnels.

[redacted]

personnel engaged in planting them. Running the road with armored vehicles was another common (but often expensive) method of detecting mines.

Some other types of detection assistance mentioned included the program of paying for information or ordnance, which was successful in some areas, attaching ARVN personnel to U.S. units as well as using local civilian volunteers for detection assistance, and watching the behavior of mothers with their children as a clue (keeping children close by indicated danger). Chieu Hois were highly praised for their ability to detect mines and boobytraps. Reconnaissance by fire was used primarily for command-detonated mines. Indirect fire was also used as a preparation on LZs or ahead of a moving unit to detonate mines and boobytraps. Recent use of trails by cattle was an indication that they were free of mines and boobytraps. Observation towers and strong points were helpful in spotting attempts to install mines.

Techniques Used to Detect or Neutralize Command-Detonated Mines

Command-detonated mines have become an increasingly dangerous threat in Vietnam. To determine what methods were being used to counteract this threat, subjects were asked to list the techniques used to detect or neutralize command-detonated mines (see Table 21).

The main detection procedure was to look carefully for the wires running from the device to the person waiting to activate it. This method was used most often by personnel moving along the sides of roads ahead of sweep teams. Probe devices, such as long rods or picks, were sometimes used along the sides of roads to uncover wires. Aerial observation was also reported to be a valuable means of detecting enemy personnel waiting to detonate a mine.

One of the primary techniques of neutralizing command-detonated mines was to employ security measures that would uncover the potential danger prior to mine detonation. Along with this was the use of dispersion to reduce a unit's vulnerability. A careful search for wires in ditches dug by rooters along the side of the road was reportedly an excellent procedure. Ambush patrols were used also to counter enemy elements moving to set up command-detonated mines.

Reconnaissance by direct or indirect fire was a principal method of neutralizing command-detonated mines. Reconnaissance by direct fire was accomplished in many ways, using M79 grenade launchers, .50 calibre machineguns, and 90mm canister. Particularly effective were the "thunder runs" by armored vehicles, firing their cannon and machineguns to the sides of the road as they moved rapidly down the road. Indirect fire ahead of moving units and along roads was also effective in countering this threat.

Some devices designed to be thrown out ahead and pulled back in or dragged along behind a vehicle to hook wires were reported to be used with success. The grappling hook was the main item used and it, like the killer eye and nylon line with weights, was usually thrown out and pulled back in attempts

Table 21

NUMBER OF INTERVIEWS REPORTING TECHNIQUES USED TO DETECT OR NEUTRALIZE COMMAND-DETONATED MINES

Technique	25th Division				1st Div		9th Division			4th Division				Americal Div			Total
	Engr	Mech	Inf	Tng	Engr	Tng	Engr	Mech	Tng	Engr	Mech	Cav	C&S	Engr	Inf	Cav	
Detection																	
Look for wires	2				2	1	1		1	2	1			2			12
Probe devices		1[a]						1						2[j]			4
Clear shoulder of rd						1				1			1				3
Aerial observation									1			1	1				3
Neutralize																	
Security	1		1	1	2	1	1			1[e]				1			9
Dispersion			1	1		1									1		4
Rooter ditch					2	1											3
Ambush patrols						1						1					2
Bangalore torpedo			1														1
Recon by Fire																	
Direct	1	1[b]	3[b,d]			1	1	1[b,d]	1						1[d]		10
Indirect		1	2[c]					1[c]	1		1[f]	1[c]	1[f]				8
Thunder run												1[h]	1			1	3
Road runner											1[g]						1
Air strikes								1	1								2
Dragging Devices																	
Grappling hook		1	2	1			1							2		1	8
Killer eye				1													1
Nylon line w/weight		1															1
Heavy metal plate with teeth														1[j]			1

[a] Long metal rod with hook

[b] .50 caliber machineguns

[c] Artillery

[d] M79 grenade launcher

[e] APCs on flank

[f] White phosphorous

[g] Artillery fired along road

[h] Tanks run the road firing 90mm canister and machineguns

[i] Sometimes dig in side of road with picks

[j] Pulled through rice paddies behind APC

[redacted]

to snag wires from command detonated mines. The grappling hooks were sometimes pulled by APCs to reduce the danger to personnel.

Night Mine Detection and Preventive Measures

In observing the CONUS training on land mine warfare, it was noted that the revised AIT subject schedule for light weapons infantrymen (MOS 11B10) had two hours added for night breaching operations. To determine what was actually being done in Vietnam in this area, subjects were asked if they ever did any mine detecting at night and, if so, how it was done.

Of the 19 interviews providing answers, subjects in three said they had done some night detection, but those in the remaining 16 said they had done none. Those answering in the affirmative had done very little night detection and were not enthused about doing any more. In most cases, those who gave negative answers gave no reason, seeming to feel that it was just not a sensible procedure under normal conditions in Vietnam. As was noted earlier, visual observation was the primary means of mine and boobytrap detection and this capability was, of course, reduced considerably at night. Since the VC use no conventional pattern, any normal breaching procedures are inappropriate. Some typical comments received were, "We can't find them in the daytime, let alone at night;" "It's just not done;" and "There's no good method of doing it." One subject said his unit hit less mines and boobytraps while moving at night because the enemy didn't know where they were going and was unable to set the devices up ahead of them, as he could in the daytime.

While collecting data on night detection, it was discovered that U.S. units were taking many other actions (see Table 22) at night designed to prevent the enemy from using this time to freely plant mines and booby-traps as he has in the past. This "offensive defense" was credited in many areas for a distinct decrease in the number of mines that were being encountered. Some of the measures reported most effective were the establishment of strong points and use of night patrols and ambushes. Radar, searchlights, and night vision devices were also of substantial assistance in detecting or neutralizing the enemy's night activities. Unscheduled running of the roads by armored vehicles was another effective method. Harassing and interdiction (H & I) fires, for which white phosphorous was employed in some instances, were also used frequently. Aerial surveillance was employed successfully in some areas to spot mining activity at night.

In summary, while mine and boobytrap detection at night was not considered feasible, preventive measures were highly recommended.

Actions Taken After Discovering an Enemy Mine or Boobytrap

The actions that a unit takes upon finding an enemy mine or boobytrap are extremely critical, for they can result in either neutralizing this danger and gaining intelligence if done correctly or suffering casualties

[redacted]

Table 22

NIGHT MINE DETECTION AND PREVENTIVE MEASURES

	25th Division			1st Div		9th Division			4th Division				Americal Division		Totals	Remarks
	Engr	Mech	Inf	Engr	Tng	Engr	Mech	Tng	Engr	Mech	Cav	C&S	Engr	Inf		
Night Detection																
Yes			1[e]						2[f]						3	
No	2	2	2	2		1		1		1	2		2	1	16	
Preventive Measures																
Road runs	1			2[b]			1[d]				1	1			6	Unscheduled runs by armored vehicles
Patrols, LPs	1[a]						1[a]	1[a]			2[a]	1[a]		1	7	
Strong points				2[c]	1[c]						1				4	
Radar			1	1	1										3	
Searchlights			1		1										2	
Night vision devices			1		1		1	1			1				5	Used by patrols, LPs, aircraft and in defen
Trip fires					1						2[g]	1[g]			4	Also used to follow-u night detection
Firefly mission													1		1	
Air surveillance					1						1[h]	1			3	
RC-3 (Chemical road cover)	1														1	Spread on road to de tect any movement

[a] Ambush patrols

[b] By mech units

[c] Night defense position (NDP) of reinforced company

[d] Using APCs

[e] Unit said, "Sometimes"--no mine detector

[f] Unit said, "Once"--mine detector used

[g] White phosphorous with VT fuze

[h] Red Baron--Helicopter team with night vision devices, illumination and gun ships

and loss of morale if done incorrectly. To find out what methods were being used, subjects were asked to list in sequence the actions taken by their unit upon detecting a mine or boobytrap.

Answers did not in all cases give a clear sequence, and often varied depending on the capabilities of the unit and the situation (see Table 23). However, there were certain typical actions taken by units. For example, the action taken first in most cases was to pass the word back to the men in the unit that something had been detected. This then alerted the men to the possibility of imminent danger, either from other mines or booby-traps in the area or from enemy action, and called for taking security measures and extra safety precautions. Next, a typical step would be for the NCO or officer in charge to come forward and investigate to determine what action should be taken. In instances where the unit was to move past the device, it was marked or physically guarded to make sure personnel moved safely by. A next step would be to report the discovery to the unit's next higher headquarters and what action was being taken to neutralize or destroy it. A typical action, in the event it was a mine, would be to probe carefully to accurately locate and uncover it, and then to sweep the area because other devices would often be emplaced nearby. To handle the technical phase of blowing the mine in place or disarming it for intelligence purposes, it was thought most desirable to use explosive ordnance disposal (EOD) men. Since EOD men are often not immediately available to units operating in the field, an infantry unit, for example, would often ask for assistance from engineers who might either be accompanying the unit or be brought in on request. In many cases, tactical units have their own trained demolitions men to blow the mines and boobytraps encountered.

The strongest point made by subjects was that mines or boobytraps should normally be blown in place since they are usually nonstandard, unstable, and extremely dangerous devices. The blowing of the mine or boobytrap usually takes place after the unit moves beyond it and takes cover. On occasion the device might be grappled out to the side of the road (mines in this case) and blown there to avoid damaging the road; on other occasions, pictures might be taken and appropriate personnel, such as trained EOD men, might disarm it for intelligence purposes. However, the average man, including the AIT-trained engineer, was not considered sufficiently well trained to disarm mines and boobytraps in Vietnam.

Some units admitted that they sometimes bypassed mines or boobytraps temporarily for tactical reasons, but that generally these were marked and reported for later destruction. Most units never bypassed them, because they felt that if they did the devices represented future trouble for another U.S. unit.

Methods of Reporting and Disseminating Information on Enemy Mines and Boobytraps

An important factor in countering enemy mines and boobytraps is the reporting and disseminating of information concerning them. To determine what

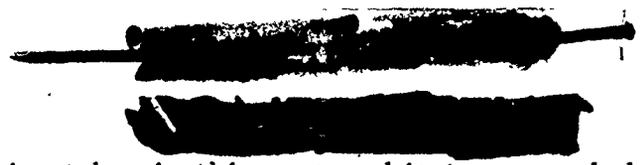
Table 23

SEQUENCE OF ACTIONS TAKEN AFTER DISCOVERING ENEMY MINE OR BOOBYTRAP

	25th Division										1st Div		9th Div		4th Division					Americal Division					Totals				
	Engineer			Mech		Infantry			Tng		Eng	Inf	Eng	Tng	Engineer		Mech	Cav		Engineer		Inf	Cav	Tng					
	1	2	3	1	2	1	2	3	1	2	1	1	1	2	1	2	1	1	2	1	2	1	1	1	1	2	3	4	x
Pass the word back		1[a]	1	1	1	2	1		4				1		1		1	x				3			8	1	1	1	1
Mark it			2	2		1	x	x						x			2								1	3			3
Report to higher hqs		x	4	x	3	3	x	x			x	1	x	1	x	x	x	x	x	x	4	5	1		3		2	2	13
Take security and fety measures									3		1	2			2				x	x	1	1			3	2	1		
be to locate									1						5	1				1	2			x	3	1			
eep area									7						4				2							1			
n in charge vestigates			3		2				2	x		3	2		3					2		2	2			6	3		
ll EOD for asst				x																		x							
ll engr for asst		2	x	x	x		3	x			x						3		1			x	x		1	1	2		
ll demo man			5		4	x	2	x	5		x	x				2				x		x	x			2			
ke pictures														2[b]						x[b]						1			
sarm for intelligence		x								x					8	x	5	2	4	5	5		4			1			
ver disarm				x						x			x	x								x		x					
pple out															6					3							1		
ow in place	1	3	6	3	5	4	4	1	6	x	2	4	3	3		3	4	1	3	4	3	4	3	x	3	1	8	6	
Blow on side of road															7								x						2
Sometimes bypass temporarily		x		x	x	x	x	x									x			x		x							9
Never bypass			7								x		x	x	x	4		x	x		x		x					1	9
Dig it up																		x[b]	x[b]										2

[a] 1--Action taken first
2-4--Succeeding actions
x and 5 and above - Other actions

[b] For intelligence purposes



actions were being taken in this area, subjects were asked to list the immediate and follow-up reporting steps taken by their units and their methods of disseminating this type of information (see Table 24).

The first step in the immediate reporting procedure was to pass the word verbally to the members of the immediate unit (platoon or company). This was accomplished by radio in elements such as armored cavalry, who normally communicate in this manner. The next step was usually to give a spot report by radio to the next higher headquarters.

Follow-up reports were seldom submitted in writing by platoon- or company-size units. Battalions submitted written reports more frequently, but normally only when an unusual type of mine or enemy activity was noted. In some instances, a form was used to report mines. Most units included information on mines and boobytraps in their after action reports, particularly if unusual circumstances were involved.

Situation reports were listed as a vehicle for reporting and disseminating information on mines and boobytraps. The primary method of disseminating such information was as part of the operations order where available details on enemy mines and boobytraps were furnished within the intelligence briefing. Periodic commander's calls or staff briefings were other common methods of disseminating this type of information. Written reports from units' higher headquarters were also mentioned as a means of dissemination. Some publications from USARV and MACV, such as mine and boobytrap booklets and lessons learned, were other dissemination methods listed.

There seemed to be no common method of reporting and disseminating information on mines and boobytraps. Some units did not think it was practical to submit written reports on all mines and boobytraps encountered. Many others felt there should be a better method of disseminating this information to insure that units were kept informed of the latest developments.

IN-COUNTRY TRAINING COMMENTS

A very important phase of countermine activities is the training given U.S. personnel. In order to determine the current status of training, subjects were asked to comment on the adequacy of CONUS mine and boobytrap training for the average enlisted replacement, NCOs, and officers. They were also asked about the type of in-country mine and boobytrap training being conducted for replacements and the availability of advanced, refresher, or mine detector training. Subjects were then asked for recommendations for improvement in CONUS and in-country training as well as for actions in the field, such as detection, destruction (of mines), and the reporting and dissemination of information.

Adequacy of CONUS Mine and Boobytrap Training

The emphasis in this area was on finding out how well the average AIT graduates were prepared to cope with the mine and boobytrap problem upon their arrival from the U.S. While a few subjects felt that these men were adequately

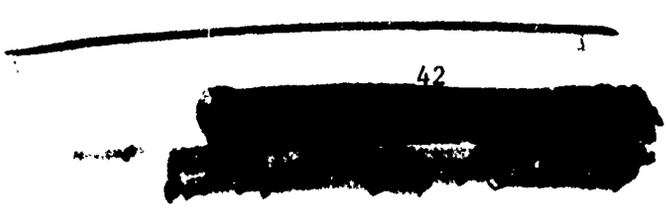


Table 24

METHODS OF REPORTING AND DISSEMINATING INFORMATION ON ENEMY MINES AND BOOBYTRAPS

(Number of Interviews within Unit Type)

Method	25th Division				1st Div		9th Div		4th Division			Americal Div			Total
	Engr	Mech	Inf	Tng	Engr	Inf	Engr	Tng	Engr	Mech	Cav	Engr	Inf	Cav	
Immediate Report															
Verbal to unit	2	1	2	1			1		2	1	2	1	1		14
Radio to unit	1	1		1				1	1		1			1	7
Radio to hqs	2[a]	2	3		1[g]	1	1	1	2	1	2	2[g]	1	1	20
Tactical log			1[e]												1
Follow-Up Report															
Written by plat or co								1	1	1		1[j]			4
Written by battalion		1[a]			1[a]			1[a]	1	1		1[j]	1		7
Situation report					1				2[k]		1	2			6
After action report	2	2[a]	2[a]		1				1[j]			1		1	10
Dissemination of Information															
Briefing	2[a,b]	1[c]	1						1	1[f]	1				7
Operations order	2	2	3[f]		1[f]							1	1		10
Written report			1[d]				1	1[i]			1			1	5
Publications			1				1[h]		1[h]	1[i]	1[h]	1[l]			6

[a] If unusual situation exists

[b] Commander's call or staff briefing

[c] Daily intelligence report

[d] Monthly

[e] At battalion

[f] By S2

[g] Spot report

[h] Booklet on mines

[i] Interim & monthly from division

[j] Mine incident report form

[k] From division

[l] Lessons learned

trained, most felt that the men's training was inadequate in one or more areas (see Table 25). A common evaluation was that their training had been oriented too heavily toward conventional land mine warfare and not enough toward problems encountered in Vietnam. A principal area of weakness mentioned, particularly by engineer units, was in realistic mine detector training. More actual practice was felt needed, for example, in detecting the minimum-metal-type mines encountered in Vietnam and in the maintenance of the detector. Replacements were said to need more confidence, and the need for on-the-job training prior to putting them on their own was generally recognized.

The NCOs were generally considered to be adequately trained and to have sufficient basic knowledge in the mine and boobytrap area. However, their training was felt to have been insufficiently oriented toward the special problems of Vietnam, and they needed OJT in the mine and boobytrap area to be properly prepared. Some of the newer NCOs were said to need more leadership ability and self-confidence in this area.

The officers (questions concerned junior officers), like the NCOs, were generally considered to be adequately trained and to have sufficient knowledge in this area. However, their training had been oriented more toward conventional land mine warfare and not enough toward the problems encountered in Vietnam. They were said to have had insufficient training on the use of the mine detector and needed on-the-job training. Some junior officers were said to need more self-confidence, judgment, and maturity.

The comments on lack of confidence concerning all three groups mentioned above generally were obtained in a context relating to a lack of practical application and opportunity for "hands-on" experience during training. It is probable that the noted lack of confidence stemmed from this lack of opportunity to practice, during training, the skills required.

Type of In-Country Mine and Boobytrap Training Conducted

In order to get a clear picture of the in-country training on mines and boobytraps, a visit was made to the schools in each division area to observe and discuss their courses for replacements, NCOs and special elements. In addition, when units were visited, interview subjects were asked to describe the mine and boobytrap training given either at division and brigade schools, or in their units.

At each school, the training area was visited and, where possible, appropriate instruction was observed. The various courses were then discussed with instructors with the primary emphasis on mine and boobytrap training. The training listed in Table 26 represents a consolidation of comments received from these sources on the training given new replacements, advanced levels (for NCOs and special training), during refresher courses, and on the mine detector.

The primary emphasis in the division schools was on the training of new replacements. They attempted to give the new man as much Vietnam-oriented training as possible during this period, which generally lasted one week,

[redacted]

Table 25

ADEQUACY OF CONUS MINE AND BOOBYTRAP TRAINING

(Number of Interviews within Unit Type)

CONUS Training	25th Division			1st Div		9th Div		4th Division			Americal Div			Total
	Engr	Mech	Inf	Engr	Tng	Engr	Tng	Engr	Mech	Cav	Engr	Inf	Cav	
For Enlisted Men														
Adequate		1							1					2
Sufficient basic knowledge											1			1
Inadequate	1						1	1		1[j]				4
Insufficient basic knowledge				1[g]									1[g]	2
Training not RVN oriented	1		1		1	1	1	1		1			1	8
Mine detector training	3[a]			1[a,f]		1		2[a,f]		2[a,f]	1[a]			10
Need OJT		1[c]	1[c]	1[c]							1	1[c]		5
Personal characteristics								1[d]			1[k]			2
For NCOs														
Adequate		1				1			1		2	1		6
Sufficient basic knowledge							1			1			1	3
Inadequate	1													1
Training not RVN oriented	2							1		1	1		1	6
Mine detector training				1[a]				1[i]						2
Need OJT		2[c]	3[c]	1[c]				1[i]	1			1		9
Personal characteristics	1[b]						1[d]							2
For Officers														
Adequate		1							1					2
Sufficient basic knowledge						1	1			1	1			4
Training not RVN oriented	3[e]		1			1		1		1	1			8
Mine detector training	2[a]			1[a]				1[a]						4
Need OJT			1	1		1								3
Personal characteristics	1[d]						1[h]				1[h]			3

[a] Insufficient knowledge of how to employ it

[b] Insufficient leadership, common sense, and confidence

[c] After arrival in Vietnam

[d] Need more self-confidence

[e] Need more road clearing training

[f] More maintenance training needed

[g] More demolitions training needed

[h] Need better judgment and more maturity

[i] Need more practical experience

[j] Infantry oriented, not applicable to cav

[k] Need greater sense of personal responsibility

[redacted]

[redacted]

Table 26

IN-COUNTRY MINE AND BOOBYTRAP TRAINING CONDUCTED

Type of Training	Hrs	25th Infantry Division	Hrs	1st Infantry Division	Hrs	9th Infantry Division	Hrs	4th Infantry Division	Hrs	Americal Division
Replacement		In Division School:	2	VC mines and boobytraps (at one of five brigade-level schools in division), normally includes going through a booby-trap lane. Also integrated into 8 hrs of tactical training	1	Various types of VC mines and boobytraps	2	VC mines and booby-traps (by EOD instructor)	1	VC "dirty trick" devices
	1	Characteristics of VC munitions (by EOD instructor)	1	Demolitions	1	Walking boobytrap lane	4	Demolitions. Replacements do not go through Confidence Course (boobytrap lane) because there are too many of them and not enough time	1	VC firing devices
	1	Nonexplosive booby-traps		Follow-up OJT in unit		Also integrated into tactical training		Follow-up OJT in unit. Engineers have orientation program and squad leader training in the unit.	2	Boobytrap course
	1	Explosive VC mines and boobytraps				Follow-up training in unit given by engineers for their replacements, followed by OJT			2	Demolitions
	1	Moving through booby-trapped jungle trail by squad-size groups							2	Mine detector, includes 1 hr of practical work
		Plus some integration of mines and booby-traps into tactical training								Follow-up OJT in unit
		Follow-up OJT in unit								
Advanced (Frequency of classes as required)	4	Explosives and demolitions for selected personnel.		Explosives & demolitions training periodically by division for selected personnel (hours not available).	4	Mines, boobytraps, and tunnels	2	NCOs receive more detailed repeat of replacement instruction plus Confidence Course.	8	Generally, the same course given replacements is given those attending the Leadership Course.
	4	Locate, recon and destruction of VC tunnel and bunker system for selected personnel.		Instructions for new NCOs by mobile training team on visits to units.	3	Demolitions				
	8	Mines, boobytraps, and demolitions, plus integrated instruction on tactical training during 9-day Combat Leaders Course for new NCOs.		Training on new equipment and techniques by mobile training team as required.		Above hours are included in 9-day Combat Leaders Course for new NCOs.				
Refresher		Accomplished when time is available at company level or when unit is given a stand-down period. Some OJT given by leaders during operations.		Conducted on mine detectors prior to big road sweep mission. Engineers assist in conducting.		None mentioned		Engineers receive training in monthly program unless operations prohibit. Also squad leader training.		None mentioned
								Infantry receive battalion training in 5-day rotation break. Engineers give classes as requested.		
Mine Detector	8	Engineers periodically run brigade-level school to train selected personnel from tactical units on mine sweeping operations	8	Mine detector course run by division engineers as required.		Assistance in training personnel in tactical units provided by attached engineers as requested.		Instruction not usually given but engineers may provide assistance and give OJT help. Engineers are training CIDGs on mine detectors.		Engineers send teams to brigades and give classes for units. Infantry selects most alert men for training.
		Training also accomplished at unit [redacted] by OJT.		Training also conducted at unit level by trained NCOs or with engineer assistance.						Replacements receive two hours (see above).

[redacted]

[redacted]

to enable him to be a more effective member of his unit upon joining it. The mines and boobytraps portion of the replacements' course had from two to six hours of instruction, depending on the emphasis given to this area by the division. It generally consisted of instruction on the various types of explosive and nonexplosive devices used by the enemy, some information on how the enemy employs these devices, and then an opportunity to negotiate a boobytrap lane. The boobytrap lane generally had a number of difficult-to-detect devices which might be encountered by an infantry unit moving along a jungle trail. One division also had a two-hour period on mine detector training. Hours on demolitions are also shown because this was considered a related subject. Except for some training conducted by certain engineer units, there was little follow-up training in the unit other than OJT. New men were generally put with older men, and after gradual exposure, were permitted to take over key jobs such as point man or mine detector operator.

In advanced training, most units had courses for NCOs, usually new NCOs, where mine and boobytrap instruction similar to that given replacements was presented. Due to the smaller groups involved and better background knowledge of these students, this instruction was considered more effective than that given to replacements. The exchange of current information with these combat veterans was also of value to instructors. Some units conducted special courses on tunnel and bunker destruction and explosives and demolitions for selected personnel. One division used a mobile training team to provide instruction for NCOs and information on new equipment and techniques.

There appeared to be little time for units to conduct refresher training in this area because of the pressure of constant operations. However, a few units were able to conduct some training during brief stand-down periods or by making a special effort prior to a major road sweeping mission.

The need for mine detector training for personnel from tactical units was generally recognized, in that the engineers were often not capable of accomplishing all of the sweeping missions assigned a division. There was also the acknowledged need for the tactical units to be capable of conducting their own limited sweep missions when necessary. This training was generally accomplished either by having periodic engineer-conducted brigade-level schools or by having attached engineeer elements provide this instruction for units. In some instances, trained NCOs from the tactical unit provided instruction on the mine detectors. In either case, the instruction was followed by a period of OJT under the supervision of experienced personnel.

Recommendations for Improvement in CONUS Mine and Boobytrap Training

Following questions on the adequacy of mine and boobytrap training in CONUS, subjects were asked to give recommendations for improving the instruction in CONUS. The primary area of concern was the training of the

[redacted]

AIT graduate who comes to Vietnam soon after completing this course, joins a unit, and is quickly involved in performing a job in a combat area.

The recommendations of personnel answering this question are consolidated in Table 27. As might be expected, there are some differences in the recommendations of the various branches, but in some areas they are unanimous. For example, of 22 interviews, 20 recommended that CONUS training be more Vietnam oriented. For the engineers this meant more realistic training, to include road sweep missions. For the infantry, it meant more boobytrap training. For the armored cavalry, it meant more training on the type of route clearing required in Vietnam and mine sweep missions. Almost all engineer personnel interviewed felt that more training was needed on the mine detector, with the emphasis on practical work in using the detector in attempts to detect the minimum metal mines now being encountered in Vietnam. Additional maintenance training was also mentioned. Cavalry and mechanized elements also recommended more mine detector training based on their Vietnam experience.

Most personnel recommended more instruction on VC devices and techniques to give men more information on what to expect from the enemy. For example, more information was desired on enemy marking systems and the enemy's minimum metal mines.

Each type of unit recommended that more attention be devoted to the key area of detecting and avoiding mines and boobytraps. This was particularly true of infantry units[1] which, again, expressed a desire for more boobytrap training, reflecting their concern about this major problem.

To gain the additional time needed for more of the instruction listed above, it was recommended that much of the conventional land mine warfare currently in training programs be deleted. Most of this training was considered inappropriate for the current situation in Vietnam. Recommendations were made to revise the mine probing instruction by reducing the time spent in Engineer AIT in breaching conventional mine fields (non-existent in Vietnam) and stressing careful scraping with bayonets rather than jabbing at a 45-degree angle in areas where certain types of mines are encountered (where the bayonet might complete the circuit between two pieces of metal).

It was also recommended that Vietnam-experienced cadre be assigned as instructors in training centers to increase the effectiveness of the instruction. Three engineer interviews contained recommendations for a refresher course for NCOs prior to their arrival in Vietnam. The subjects felt that the Vietnam-orientation training given at various posts for Vietnam-bound cadre was primarily infantry-oriented and that they needed to know the problems of the engineers in Vietnam

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[1] Mechanized units are, of course, infantry units, but they have been reported separately because of the difference in their normal missions in Vietnam.

[redacted]

Table 27

RECOMMENDATIONS FOR IMPROVEMENT IN CONUS MINE AND BOOBYTRAP (LAND MINE WARFARE) TRAINING

(Number of Interviews by Unit Type)

Recommendation	25th Div			1st Div		9th Div		4th Div			Americal Div			Totals by Unit Type					Overall Total
	Engr	Mech	Inf	Engr	Tng	Engr	Tng	Engr	Mech	Cav	Engr	Inf	Cav	Engr	Mech	Inf	Cav	Tng	
More training on Mine Detector	3[b]			1[b,e]		1[b]	1[b]	2[b,j]	1[b]	2[b]	2			9	1	0	2	1	13
Instruction More RVN Oriented	3[a,c]	2	3[f]		1[g]	1[g]	1[i]	2	1	2[k,l]	2[c]	1	1[a]	8	3	4	3	2	20
More on VC Devices and Techniques	2[d]	1[e]	1		1	1[e]	1	2		2		1	1	5	1	2	3	2	13
More on Methods of Detecting & Avoiding	1	1	1[f]		1			1	1	2	1	1	1	3	2	2	3	1	11
Less Conventional Land Mine Warfare Tng	3		2					1		2			1	4	0	2	3	0	9
Refresher Course for NCOs in CONUS	1							1[k]			1		1	3	0	0	1	0	4
RVN-Experienced Cadre at Training Center			1							1				0	0	1	1	0	2
Revise Mine Probing Instruction						1[h]					1[m]			2	0	0	0	0	2

[a] More demolitions training

[b] More practical work with detector

[c] Realistic road sweeping training

[d] More on enemy marking systems

[e] Train to detect minimum metal mines

[f] More boobytrap training in AIT

[g] Train in realistic conditions, i.e., jungle school

[h] Reduce time devoted to conventional probing

[i] Train to counter VC mine planting elements

[j] More maintenance training

[k] To include mine sweeping

[l] Armor route clearing and defensive teaching

[m] Use scraping procedure, not stabbing at 45-degree angle

[redacted]

Proposed Changes in CONUS Training

The recommendations for improvement appear to cover most of the major problem areas listed in comments on the adequacy of CONUS mines and boobytrap training and observations of the HumRRO team following their visits to U.S. Army training centers. It is interesting to note the consistency with which the need for more Vietnam-oriented, and less conventional, land mine warfare instruction is mentioned. The need for more mine detector training and more emphasis on visual detection are other areas consistently noted. Based on the recommendations of personnel interviewed and personal observations both in-country and at CONUS training centers, certain proposed changes to current training programs have been developed. These changes are suggested primarily for Engineer, Armor, and Infantry AIT instruction in land mine warfare. Some of these suggestions might also be used in land mine warfare training at different levels, as appropriate, to improve and update instruction.

Engineer AIT (Combat Engineer MOS 12B10). It is recognized that the entire output of Engineer AIT does not go to Vietnam and that there is a need for all AIT graduates to have a basic knowledge of conventional land mine warfare tactics and techniques. However, because of the seriousness of the mine and boobytrap problem in Vietnam, it is felt that there should be an increase in Vietnam-oriented training at the expense of the conventional instruction. What is visualized is additional time on Viet Cong mines and tactics to provide better knowledge of the enemy, his materials, and his mode of operating. Then there should be a substantial increase in time to permit "hands-on" mine detector training in a realistic environment. This could include a road or area sweep mission similar to those assigned in Vietnam with various types of mines (including minimum metal devices) and boobytraps carefully concealed in the area.

The difficulty of putting large groups of men through this type of training with limited equipment and facilities is recognized. A suggested method of accomplishing this would be to stagger the instruction so that smaller groups would be involved in using the mine detector while others received some other phase of the training. Also, trainees could be used in an opposing force concept: a small group would plant and camouflage these devices and then change areas with another group to try to detect their concealed devices. A better understanding of the enemy's techniques could probably be gained by putting the trainees in the position of employing them to deceive other elements.

The importance of using visual detection to supplement the mine detector should be stressed in this instruction. Additional emphasis also should be placed on the care and maintenance of the mine detector because malfunctions due primarily to rough handling have been a major problem. Comments from personnel in Vietnam support the recommendations from instructors at Fort Leonard Wood for demolitions training to precede land mine warfare. It was felt that a basic knowledge of explosives would promote an understanding of mine warfare.

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In summary, [redacted] and an on-the-job breaking-in period will still be necessary, it is felt that the AIT graduate should arrive in Vietnam better prepared to assimilate this instruction and to quickly become an effective member of his new unit.

Armor AIT (Armor Crewman MOS 11E10). The basic mission of the armored cavalry units contacted in Vietnam did not usually include mine sweeping, but there were many occasions when they were required to use mine detectors to clear specific areas. It was recommended that more training on mine detectors be provided so that the AIT graduate would be capable of operating one in Vietnam with a minimum of additional on-the-job training. Some additional instruction is recommended on the tactics and techniques of the enemy in Vietnam and methods used by armor elements to counter the mine and boobytrap threat. The need for conventional land mine warfare training as listed in the present four-hour course for armor crewmen is recognized in view of commitments in areas other than Vietnam. However, in view of the seriousness of the problem in Vietnam, it is recommended that either time be added or some of the currently allotted time be used for the Vietnam-oriented training mentioned above.

Infantry AIT (Light Weapons Infantryman MOS 11B10). The suggestions listed here are directed primarily toward the light weapons infantryman's land mine warfare instruction (13 hours, including one hour in eighth week) as listed in Army Subject Schedule 7-11B10 (RVN-oriented) dated January 1968. However, they can be used where appropriate for the direct (MOS 11H10) and indirect (MOS 11C10) fire crewman training (9 hours, including one hour in eighth week).

The primary emphasis in the proposed program, shown in Table 28, is to orient instruction toward problems currently being encountered in Vietnam. For the infantry, by far the greatest problem has been the explosive boobytrap and it consequently receives the bulk of the hours. The trainee receives only a short orientation on conventional mine laying techniques in the first period because this type of requirement does not currently exist in Vietnam. If this type of action should become necessary, it could be accomplished under the supervision of engineers.

The second period is primarily intended to orient the trainee on the way fuzes and mines operate so that he will know what type of action (pressure, pull, etc.) can initiate the detonation. U.S. mines and fuzes are used as types of devices to demonstrate these actions. The Claymore is given additional time in the third period since it is the only type of mine reportedly being used by U.S. forces and it is felt that a thorough knowledge of it is needed to make maximum use of its capabilities.

An analysis of comments made in Vietnam indicates that to successfully counter the enemy's boobytrap efforts it is necessary to know as much as possible about his tactics and techniques. After learning what to look for, it is then necessary to know what clues will help a man to detect the enemy device. The first half of the fourth period is intended to tell the trainee what to look for and how to neutralize the device when it is located.

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Table 28

PROPOSED LAND MINE WARFARE INSTRUCTION FOR THE LIGHT WEAPONS INFANTRYMAN

Period	Hours	Instruction
1	1	History and principles of land mine warfare, types of U.S. minefields, and minefield laying techniques. (The first half hour of this period would be the same as presently listed in Period 1. The second half hour would be a conference and demonstration on conventional minefield laying techniques to familiarize the trainee with this procedure.)
2	2	Characteristics, arming, disarming of U.S. mines and fuzes, and firing devices. (This period would be essentially the same as that presently listed for Period 2, with emphasis on insuring trainee understanding of the action of fuzes and firing devices so he can follow the cause and effect of the detonation chain.)
3	2	Conference, demonstration, and practical exercise on characteristics, capabilities, functioning, and installation of the antipersonnel mine, M18A1 Claymore. (This period is as presently listed for Period 3 except that an hour has been added, based on the training centers' recommendation, for more practical work to insure that trainees are capable of employing the Claymore properly.)
4	2	Characteristics, detection, and neutralization of boobytraps used in unconventional warfare. (The first hour of this period would be devoted primarily to a conference on the tactics and techniques used by the enemy in Vietnam in the employment of boobytraps, and the most effective methods of countering them. Methods of detection and neutralization would be stressed. The second hour would be devoted to a tactical walk through a boobytrap lane with assistant instructors showing trainees how various enemy devices are set up and providing valuable clues on how to detect them.)
5	1	Detection and neutralization of enemy mines. (Conference, demonstration, and practical work on operations of a mine sweeping team to include use of the mine detector, probing methods employed after locating the mine, and neutralizing procedures.)

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Table 28 (Continued)

PROPOSED LAND MINE WARFARE INSTRUCTION FOR THE LIGHT WEAPONS INFANTRYMAN

Period	Hours	Instruction
6	4	Use, installation, detection, and neutralization of boobytraps. (In this period the class would be divided into 10- to 15-man groups and the opposing forces concept would be used. During the first two hours, each group would move to a separate area within a larger general area and install a number of boobytraps which they would carefully conceal and camouflage. The groups would then exchange areas and attempt to tactically move through the new area in a given time period. A grading system could be used where groups would be awarded points for avoiding or detecting and properly neutralizing boobytraps and have penalty points assessed for exploding undetected devices. Bonus points could be given to the group installing the boobytraps based on the degree of difficulty experienced by the group going through the area. The group's actions would then be critiqued by an accompanying assistant instructor.) The one-hour Viet Cong boobytrap period in the eighth week would remain essentially the same with the emphasis on explosive versus nonexplosive devices. To reinforce this instruction, boobytraps would be liberally integrated in the tactical training during the eighth week.)

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In the last half of this period, the device is placed in a realistic setting and the trainee is shown clues that will aid in its detection. Visual detection is practically the only method the infantryman can use to locate these devices in the brush, and it is a skill that must be developed.

It was noted in Vietnam that infantry units, particularly mechanized infantry, were often required to assist in mine sweeping missions. They were given special classes and assisted by engineers in order to qualify selected men to operate mine detectors. The fifth period, consequently, is intended to give at least a degree of preliminary instruction on the mine detector, as well as training in probing to uncover any devices located and in taking the proper action to neutralize them, which is usually to blow them in place.

The sixth period is intended to give the maximum amount of practical work in installing, detecting, and neutralizing boobytraps. Installing the devices should give the trainee a better understanding of the things the enemy must consider when planting them. Also, some type of grading or rating of their efficiency both in planting (if not detected by another group) and detecting should provide the incentive needed to get the most out of the training.

In addition to much of the conventional land mine warfare, there is some other instruction that has been intentionally omitted. This instruction, with reasons for its deletion, is listed below:

1. Breaching and disarming boobytraps. Probably the strongest recommendation from Vietnam was to blow mines and boobytraps in place. If there is a need to disarm one of these devices, this should be done by an EOD man. The point was made frequently not to tamper with these unstable devices and it would appear that men should have this point stressed, rather than receive training that might encourage them to attempt an extremely dangerous action.

2. Night breaching operations. Comments in Vietnam indicated that almost no units did any night mine detecting, and that it was not recommended. They felt it was not practical under existing conditions. With only nonstandard, scattered devices being encountered, no normal breaching procedure could be used. So much depends on visual means of detection, which would be sacrificed in a night mission, that the value of this type of action is questionable. Since daytime detection of boobytraps is still a very weak area, it was felt that the time previously devoted to night breaching could be utilized to greater advantage on daylight detection training.

3. Nonexplosive boobytrap devices. Data from Vietnam indicate that nonexplosive devices are now a minor problem and, therefore, should receive less training emphasis.

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Recommendations for Improvement in In-Country Mine and Boobytrap Training

As noted previously, in-country mine and boobytrap training was conducted by all divisions, in courses of varying lengths, as a part of the indoctrination training for new replacements. This was then usually followed by some form of on-the-job training program in the unit, and possible additional periodic courses for selected personnel in division- or brigade-level schools.

To find out how the in-country training could be improved, subjects were asked for their recommendations. The recommendations received have been grouped and listed in Table 29 under four general areas: changes in the schools, mine detector training, on-the-job training, and familiarization with the environment.

One of the main points made on the division school was that it was needed and should be improved since units in the field on operations did not have time to train. Other recommendations called for an advanced course for engineer NCOs, periodic refresher courses for any special problems noted in the division area, the early shipment of men to Vietnam so they could get more training in-country, cavalry unit replacement training to be tailored more to their type of operations than to infantry operations, training in countermine techniques, and additional demolitions training.

Recommendations on mine detector training strongly favored the inclusion of some training on the detector in the division replacement training, then periodic training for selected personnel from tactical units, together with training in the unit and refresher training as needed. Also, it was recommended that men start as probers and work into the mine detector job, and that standardized sweep team formations be used within a division.

The main points made for on-the-job training were that new men should always be put with experienced men in sweep teams for OJT, and that OJT was needed as a breaking-in procedure no matter how much previous training the man had. Also, it was noted that rotating units on road sweep missions provided an opportunity for periodic OJT.

Regarding familiarization with the environment in Vietnam, it was felt that the division replacement schools should more strongly emphasize the marking systems and types of mines and boobytraps found in the unit's area of operations. The difference in mine and boobytrap operations in various parts of the country must be recognized so that no single overall doctrine is applied. Also, it was thought that this is one phase that cannot be taught in detail until the man arrives in the area where he will be operating.

Personal Observations

The training given in-country has tremendous potential value since the men are undoubtedly highly motivated to learn with combat imminent. With combat-experienced instructors passing out the latest information from

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Table 29

RECOMMENDATIONS FOR IMPROVEMENT IN IN-COUNTRY MINES AND BOOBYTRAP TRAINING

Recommendations	Frequency Mentioned, by Unit Type												Total
	Near Saigon					4th Div			Americal Div				
	Eng	Mech	Inf	C&S	Tng	Eng	Mech	Cav	Eng	Inf	Cav	Tng	
Changes in School													17
More demolitions training needed	1				1								2
Continue to improve school, unit doesn't have time to train in field							1				1		2
Emphasis on mines and Cav operations, not Inf. and boobytraps								2					2
Need advance course for Engineer NCOs	1												1
Refresher course for special problems in division area	1												1
Emphasize mines and tactics being encountered in division area		1											1
Periodic courses for selected personnal to give tactical unit capability		1											1
Ship men over early and give more training in division course			1										1
Train during quarterly stand downs of unit			1										1
In-country schools should correct misconceptions men pick up in Stateside training					1								1
Teach countermining techniques to help prevent mining					1								1
Instructors in division school should all be seasoned veterans						1							1
Be prepared to take care of own demolitions, don't depend on EOD man						1							1

Continued

Table 29 (Continued)

RECOMMENDATIONS FOR IMPROVEMENT IN IN-COUNTRY MINES AND BOOBYTRAP TRAINING

Recommendations	Frequency Mentioned, by Unit Type												Total
	Near Saigon					4th Div			Americal Div				
	Eng	Mech	Inf	C&S	Tng	Eng	Mech	Cav	Eng	Inf	Cav	Tng	
Changes in School													
Revise probing procedure to scrape in certain areas												1	1
Mine Detector													16
Periodic courses for selected personnel to give tactical unit capability				1	1		1		1		1		5
Add training to present division school course	1								1				2
Have short course in unit with emphasis on practical work	2												2
Periodic courses for junior leaders		1											1
Standardized formations for mine sweep operations in division	1												1
Refresher course in units just prior to big road sweep mission					1								1
Rubber sometimes put over mines to insulate in certain areas	1												1
Be a prober initially with short periods of detector operating						1							1
Have training program in unit if required to sweep regularly								1					1
OJT needed in addition to any other training and is the most effective training										1			1

Continued

Table 29 (Continued)

RECOMMENDATIONS FOR IMPROVEMENT IN IN-COUNTRY MINES AND BOOBYTRAP TRAINING

Recommendations	Frequency Mentioned, by Unit Type												Total
	Near Saigon					4th Div			Americal Div				
	Eng	Mech	Inf	C&S	Tng	Eng	Mech	Cav	Eng	Inf	Cav	Tng	
On-The-Job Training													12
OJT in general	1								2				3
Put new man with experienced men in sweep team	2	1				1				1			5
OJT needed in addition to any other training, and is the most effective training		1				1							2
Rotating units involved in road sweep missions gives periodic OJT					1								1
Be a prober initially with short periods of detector operating						1							1
Familiarization with Environment													7
Become familiar with environment										1			1
Emphasize mines and tactics being encountered in the division's area	1					1			1				3
Conditions vary in different areas requiring changes in instruction					1								1
Can't train for many different things encountered, must learn in-country					1								1
Train on recognizing signs of mining and reaction methods								1					1

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the combat area, the result should be very effective instruction. Generally, the instruction observed was good and the men appeared to be getting quite a bit out of it. However, conducting training in-country has numerous problems that detract from its effectiveness. For example, large numbers of replacements must be processed through limited training facilities each week. This makes it difficult to keep boobytrap lanes from becoming well worn and somewhat obvious. Also, since the bulk of the replacements are usually infantry, the instruction is normally oriented toward their method of operation. This, of course, makes it less appropriate for engineer and armored cavalry replacements.

Some of the instruction went into quite a bit of technical detail about the construction of mines or boobytraps with little on how to detect them. Some instructors also covered a wide variety of devices, some of which were seldom, if ever, seen in their area. For example, much time was spent on nonexplosive devices such as punji stakes, the bamboo whip, the mace, etc. Further checking with instructors and other personnel from the division usually revealed that a limited number of devices were causing almost all of the problems in their area, and that the nonexplosive devices, which were rarely seen, were a minor problem. As noted in recommendations from personnel in Vietnam, there was a need for some training on the mine detector for all personnel since tactical units often were called on to assist in sweeping missions.

Proposed Changes in In-Country Training

Based on the comments mentioned above, the following changes are recommended in in-country training:

1. Primary emphasis should be placed on instructing replacements on the main types of mines and boobytraps found in the division's area of operations, making systematic use of incident reports to determine exactly what these types are.

2. Instruction on these items should emphasize the manner of employment by the enemy and all known clues that will aid in detecting them rather than the technical aspects of the device, though this latter aspect should not be omitted completely.

3. Prior to going through a boobytrap lane, replacements should be taken on a tactical walk in small groups by an instructor who could point out concealed devices, provide information on what to look for in the way of detection clues, and explain the precautions to be taken in neutralizing the device.

4. Boobytrap lanes should contain the main types of devices encountered in the division area, be located in terrain similar to that in which these devices might be encountered, and be relocated periodically to avoid becoming too worn.

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5. Replacement training should include instruction on the mine detector, to include practical work if time permits. As an alternate solution, practical work on the mine detector could be conducted for appropriate personnel (engineers, armored cavalry) while infantrymen are going through the boobytrap lane.

Recommendations for Improvement in Actions in the Field

As a final question, subjects were asked if they had any recommendations for improving unit actions in the field, primarily with regard to mine and boobytrap detection and destruction, and the reporting and disseminating of information. Although many points in these areas had been brought out in earlier discussions, some recommendations were made (see Table 30).

In the area of detection, the recommendation not to rush the sweeper, which had been mentioned frequently, was again made. Many improvements were desired for the mine detector to reduce maintenance problems, and to improve its functioning, construction, and design. Other recommendations were to use engineers for all mine detecting missions (this comment made by nonengineers), to look for changes or disturbances in the natural environment as visual clues, and to watch for a lax attitude on the part of sweepers if little mining activity was being encountered.

In the area of destruction, personnel were again cautioned not to attempt to disarm devices but rather to blow them in place. To do this job, an EOD or demolitions team should be called in. Additional demolitions training was recommended so that units down to squad level would have personnel with this capability. Units were urged to take proper precautions when destroying items, to include preventing a crowd from gathering around a device and insuring that everyone is under cover prior to blowing it. Bangalore torpedoes were recommended as a way of blowing gaps in hedgerows and destroying boobytraps in their general vicinity.

It was recommended that units have regular reporting procedures and that an accurate record be kept of all mines and boobytraps found in a division area. All new and unusual devices should be reported immediately and reports from various units should be cross referenced to provide complete information on trends in an area.

A frequently published bulletin or fact sheet within a division was a suggested method of disseminating information. The need for a greater exchange of information between units, and faster dissemination of information to the troops on new and unusual devices was also mentioned. An article on lessons learned written in language the average soldier could understand was another suggested method.

Some miscellaneous recommendations were (a) to blacktop the roads in order to limit mine planting, (b) to use night surveillance to prevent enemy mine planting, (c) to avoid boobytraps by slow and careful movement and dispersion, and by watching for reduced alertness when men are fatigued or when it is

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Table 30

RECOMMENDATIONS FOR IMPROVEMENT IN ACTIONS IN THE FIELD

(Frequency Mentioned, by Division)

Recommendation	Division 25th	1st	9th	4th	Amer.	Total
Detection						
Don't rush sweepers	1	2	2	1	2	8
Improve mine detectors						
Reduce maintenance problems	2	3	1	1	1	8
Solve functional problems	6	3	3	2	5	19
Construction and design	6	1	2	3	0	12
Use engineers for all mine detecting	4	3	1	3	2	13
Employ aerial reconnaissance	1	1	0	2	1	5
Use assistance devices						
Chemical	1	1				2
Infrared		1				1
Look for change or disturbance in natural environment	1	1	3	2	2	9
Use reserve sweep team on slow lane	1	1				2
Watch for lax attitude by sweepers		2		2	2	6
Destruction						
Blow in place	1	1				2
Never try to disarm	1	1				2
Call EOD or demolition team	2					2
More training on demolitions	1	1				2
One man per squad trained on demolitions			1			1
Need better demolition equipment	1					1
Take precautions when blowing	2					2
Use bangalore torpedo to blow gap in hedgerow	1					1
Reporting						
Develop reporting procedure	1					1
Maintain record of mines and boobytraps in division area				1		1

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RECOMMENDATIONS FOR IMPROVEMENT IN ACTIONS IN THE FIELD
(Frequency Mentioned, by Division)

Recommendation	Division 25th	1st	9th	4th	Amer.	Total
Reporting						
Report all new or unusual devices	2					2
Report through command channels and cross reference with other units	1					1
Dissemination						
Publish bulletin or fact sheet with all the latest information	1					1
Need more exchanging of information between units	1					1
Get info on new or unusual enemy devices to units quickly	1					1
Need more time to disseminate information to troops	1					1
Simple article using plain GI language to publish training tips needed	1					1
Miscellaneous						
Increase in enemy activity results in decreased mining					1	1
No correlation found between mine incidents and weather, lunar cycles, and other factors				1		1
Enemy has mine detection equipment				1		1
Night surveillance prevents mine planting		1		1		2
Blacktopping roads would eliminate most of mine problem				1		1
Avoid boobytraps through dispersion, slow and careful movement, and alertness when fatigued late in day	1	1	1		1	4
Enemy does little mining until U.S. forces move into area				1	1	2
Police up all equipment that can be used by the enemy	1				1	2
Reduce casualties by using extended laterals on APCs and hardening vehicles	1	1				2

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late in the day, (d) to avoid leaving any equipment on the battlefield that the enemy can use, and (e) to reduce casualties by using extended laterals on APCs and by hardening vehicles. U.S. forces also should know that when enemy actions in the field increase, mining activity usually decreases, that the enemy does little mining until U.S. elements move into an area, that the enemy is known to have some mine detection equipment, and that, in at least one division, no correlation was noted between enemy mining activity and the weather, lunar cycles, or other factors.

SUMMARY

The research task was to determine what changes, if any, were needed in mine and boobytrap training in CONUS and in-country. To accomplish this, land mine warfare instruction in Engineer and Infantry AIT was observed and discussed at four U.S. Army training centers. Following this, five divisions were visited in Vietnam and 39 interviews conducted with 107 subjects on mine and boobytrap training, and current operations.

The visits to U.S. Army training centers at Forts Gordon, Jackson, Polk, and Leonard Wood revealed that, while the training was generally good, much of it was oriented toward conventional U.S. land mine warfare, particularly in the Engineer AIT.

The seriousness of the mine and boobytrap problem in Vietnam was indicated by those interviewed, who said that divisions suffered about a third of their total casualties from this cause, with most of these being from mines. Casualties varied depending on the type of enemy confronted, the area of the country, and the mission of the U.S. unit. Infantry units suffered almost all of their casualties from boobytraps, while engineer, armored cavalry, and mechanized units suffered most of theirs from mines. Casualties were fewer in the highlands from mines and boobytraps than near Saigon or in I Corps.

COUNTERMINE AND BOOBYTRAP OPERATIONS AND TRAINING IN VIETNAM

Most of the casualties from mines and boobytraps were suffered on road clearing operations, with search and destroy operations next. Again, the mission of the U.S. unit and the area of operations strongly influenced the findings. Units concerned primarily with operations on or near roads listed road clearing as the primary casualty producer, while the infantry, with their operations characteristically out in the brush, named boobytraps encountered on search and destroy operations as their main problem area. Road clearing appeared to be a proportionately greater problem in the highlands and I Corps than in the vicinity of Saigon.

An evaluation of the types of mines and boobytraps most frequently encountered indicated that U.S. ordnance (mortar and artillery rounds and Air Force bombs) was a primary source of material used by the enemy. The ordnance was normally employed with enemy initiating devices and was often command detonated. Explosives from these sources were also frequently

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wrapped in plastics or other material and used as minimum metal antitank mines. The types most frequently encountered in various areas appeared to depend on the characteristics and resources of the enemy. In I Corps, the main threat was a minimum-metal, pressure-activated bamboo antitank mine; in the highlands, it was primarily a boosted version of the M1A1 (U.S. or Chicom) metal antitank mine; and in the vicinity of Saigon, many tilt-rod-activated mines were encountered. U.S., Chicom, and homemade grenades were the primary boobytrap threat throughout the country.

An analysis of fuzes most frequently encountered indicated that pressure-activated mines and boobytraps were the greatest threat. The pull-type fuze normally used with a trip wire and usually found in a boobytrap configuration by the infantry was the next most common type. Other common fuzes, in order of ranking, were the command-detonated, tension-release, and pressure-release fuzes. In regards to the time element, the kind most frequently encountered were instantaneous fuzes, with delay fuzes a poor second.

In ranking the areas where they most often encountered mines and boobytraps, subjects ranked roads first and the jungle second, followed by VC base camps, VC-dominated villages, strategic terrain and friendly positions. Antitank mines were the major threat near roads, and boobytraps the primary items encountered in the jungle and enemy base camps. Within these general areas it was noted that for roads, most were found in the road (most in ruts in road, and next in center of road), with the next highest number on the shoulder of the road. The third category was the side of the road, which included command-detonated types and boobytraps. As expected, trails were ranked as the greatest danger area in the jungle, followed by the area to the sides of the trail, devices hung in trees, and heavy brush. Most mines and boobytraps in the vicinity of enemy base camps are located on avenues of approach and entrances to the camps. Food and ammunition caches are generally boobytrapped and devices are often left within the camp if the enemy moves out before U.S. forces enter. Booybtraps were most often employed outside VC-dominated villages on avenues of approach and entrances. Boobytraps sometimes were located within the village and often were hooked up as U.S. forces approached. Mines and boobytraps were often placed on terrain features U.S. forces were expected to use, such as potential LZs, clearings, river banks, river crossing sites, and the military crests of hills. The enemy also attempts to harass U.S. forces by employing mines and boobytraps in the area around their base camp and on routes leading out from their night positions.

The primary method of detecting mines and boobytraps was visually, with the mine detector next, followed by tactical conditions (as clue to the probable presence of devices), and other sensory means (tactually, aurally, etc.). The main means of visual detection were by seeing enemy warning signs, the device itself, or a trip wire or triggering device. Unnatural disturbances in the area were also valuable clues. The P-153 mine detector was well regarded and almost the only one used. The PRS-3 was used very little and the PRS-4 was generally disliked. Tactical conditions that called for extra precautions were hitting mines or boobytraps or spotting them

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because others would usually be nearby, logical areas such as ambush sites, areas often mined before, and the observed actions of the people. Tactual means were used to carefully probe around a device or feel in tunnels or bunkers.

Various types of enemy marking systems were reported to exist although some subjects reported they had never seen any. Signs were said to mark nonexistent mines sometimes. It was generally agreed that warning signs and their meanings were only pertinent to a local area and should not be disseminated widely. The most common type of marking system was some combination of sticks in various shapes; next was grass or weeds tied together in varying forms, followed by actual drawings or written signs and combinations of rocks. Verbal passing of the word was said to supplement the signs.

Mine and boobytrap detection assistance was said to be provided to a limited degree by dogs and by mechanical means such as grappling hooks and rooters. Some experimental devices, such as rollers, were being tried as well. Other reported means were visual reconnaissance from aircraft and running over mines with armored vehicles. Other types of detection assistance were the use of Chieu Hois, attached ARVN personnel, local civilians, and reconnaissance by fire for command-detonated mines.

Detecting and neutralizing command-detonated mines is a major problem in Vietnam The main detection procedure was to look for wires leading from the device This was usually done by security personnel moving along the sides of the road ahead of sweep teams Methods of neutralizing command-detonated mines were to employ security measures to uncover the potential danger, to reconnoiter by fire using direct and indirect fire, to conduct road runs by armored vehicles firing weapons, to use grappling hooks, to check rooter-dug ditches, and to employ aerial observation and ambush patrols to prevent the enemy from setting them up

Almost no night mine detection was being done by personnel from units interviewed Most felt that it was impractical under the conditions in Vietnam where unstable devices are being employed by the enemy, and no conventional pattern is used Among the measures being used to inhibit the enemy's planting of mines at night were strong points, patrols, ambushes, radar, searchlights, night vision devices, aerial surveillance, H and I fires, and unscheduled running of the road by armored vehicles.

Actions taken by a unit upon discovering an enemy mine or boobytrap were usually as follows: first, pass the word back to the men and have them take security and safety precautions; second, have the NCO or officer in charge come forward and investigate; third, mark it or guard it if the unit were to move on; fourth, report to the next higher headquarters; check the immediate area for other devices, and finally, have it blown in place by an EOD man, an attached engineer, or a trained demolitions man with the unit. Units strongly recommended that these normally unstable devices be blown in

[redacted]

place, although EOD men could disarm them if needed for intelligence purposes. Mines and boobytraps were seldom bypassed and left by units.

Information on mines and boobytraps were usually reported verbally to the immediate unit, and by radio (spot report) to the next higher headquarters. Occasionally, written follow-up reports were submitted, but normally only when an unusual type of mine or enemy activity was noted. After action reports usually included this information. Methods of disseminating this information were in situation reports, as part of an operations order, in commander's calls and staff briefings, and, occasionally, in some publications from higher headquarters.

IN-COUNTRY COMMENTS ON CONUS AND IN-COUNTRY TRAINING

In evaluating the adequacy of CONUS training for the average enlisted replacement (AIT graduate), most subjects felt that a common weakness was that it had been oriented too heavily toward conventional U.S. land mine warfare instruction. Engineers felt more practical work in detecting minimum metal mines under realistic conditions was needed. NCOs and junior officers were generally considered to be adequately trained. However, their training also was said to be oriented too heavily toward conventional land mine warfare instruction. In all cases, additional in-country on-the-job training was needed to properly prepare replacements for duty with a unit in Vietnam.

The in-country training of new replacements received primary emphasis in division schools and the mine and boobytrap portion of this instruction was from two to six hours, depending on the importance given to this area by the division. It generally included instruction on explosive and non-explosive devices used by the enemy and methods of employment, followed by an opportunity to negotiate a boobytrap lane. In some cases there was additional demolitions instruction, training integrated with tactical instruction, and mine detector training. There was a minimum of follow-up training in the unit other than OJT. There were advanced training courses, generally for new NCOs, where the mine and boobytrap training was similar to that given to replacements. Some tunnel and bunker destruction and demolitions schools were conducted also for selected personnel. Units were able to conduct little refresher training due to operational commitments. Special schools were conducted periodically by some units to train selected personnel from tactical units in the use of mine detectors. Some mine detector training also was conducted in the units by attached engineers.

RECOMMENDATIONS FOR IMPROVING CONUS TRAINING

Although recommendations for improving CONUS training varied by type unit, almost all subjects felt that it should be more Vietnam oriented. For the engineers, this meant more realistic training on road sweeping missions; for the infantry, more boobytrap detection training; and for the armored cavalry, more training on route clearing and mine sweeping missions. More information on enemy devices, methods of employment, and marking systems was recommended. A greater emphasis on visual detection was mentioned

[redacted]

[redacted]

particularly by the infantry. Reduction of conventional land mine warfare instruction was recommended as a means of obtaining the training time needed in other areas.

Recommendations for improving CONUS training appear to be consistent with comments on the adequacy of CONUS training and observations of the HumRRO team following their visits to U.S. Army training centers. Based on the above, changes are recommended in AIT land mine warfare training for engineers, infantry, and armor, and as appropriate for other levels of instruction. For engineers, an increase in Vietnam-oriented training is recommended at the expense of conventional mine warfare instruction. This would include additional instruction on Viet Cong mines and tactics, more practical work with the mine detector in realistic situations, and more training on the care and maintenance of the mine detector. For the armor crewman, additional training is recommended on tactics and techniques of the enemy in Vietnam, methods used by armor units to counter the mine and boobytrap problem, and use of the mine detector. In the training recommended for the infantry, the instruction is almost completely oriented toward Vietnam with most of the conventional training eliminated. The primary emphasis is on telling the infantryman what to look for, where to look for it, and then having him attempt to develop these skills by practical work in a realistic environment. Additional training on the use of the mine detector is also recommended. Emphasis is placed on blowing mines and boobytraps in place rather than attempting to disarm them. It is recommended, as a result of comments from the field, that night breaching operations be deleted and that instruction on nonexplosive boobytraps be reduced.

RECOMMENDATIONS FOR IMPROVING IN-COUNTRY TRAINING

Recommendations for improvement in in-country training favored adding some mine detector training for replacements, periodic courses for selected personnel, and training in the unit. On-the-job training was considered essential for all new men, with experienced men supervising. It was recommended that in-country schools stress the types of mines and boobytraps and enemy tactics used in their particular area of operations. The need to make training in the in-country schools as good as possible was noted since units had little time to conduct training when in the field on operations.

The in-country training is extremely important and can be of great value to the new man if properly conducted The instruction observed was generally good in spite of such problems as large numbers of replacements being processed through limited training facilities each week and replacements from all branches going through primarily infantry-oriented instruction. It is recommended that there be less technical detail on the construction of various mines and boobytraps and more emphasis on how to detect them. Also, less emphasis should be given to the wide variety of devices used in Vietnam and more to the main types of devices encountered in that division's area, to include clues on detection and how and where they are normally found. A tactical walk where this type of thing could be pointed out would be appropriate, followed by a boobytrap lane employing these devices. Some mine detector training should be included for replacements, particularly for engineers and armored cavalrymen.

[redacted]

[redacted]

RECOMMENDATIONS FOR IMPROVING ACTIONS IN THE FIELD

Recommendations for improving actions in the field in the area of detection were (1) not to rush the mine sweeper, (2) to improve the mine detector to reduce the maintenance problems and increase its capabilities, and (3) to change its construction and design. Also stressed were to be alert for any changes in the natural environment and to watch for a lax attitude by sweepers when few mines are being encountered. In the area of destruction, it was recommended that mines be blown in place by EOD men or demolitions men if possible. Additional demolitions training should be given to increase this capability within units and safety precautions should always be taken before blowing a device. Bangelore torpedoes were recommended for blowing gaps in hedgerows. In the area of reporting, units should establish regular reporting procedures and keep records on all devices found in the division area. Also, all new and unusual devices should be reported immediately. To disseminate information, publishing a regular bulletin was recommended; articles in simple soldier language on lessons learned were also recommended. The need for units to exchange information more was noted. Some miscellaneous recommendations included the following: blacktop all roads; use night surveillance to prevent mine planting; avoid boobytraps by moving slowly and carefully, using dispersion, and watching for reduced alertness in men due to fatigue; and use extended laterals on APCs and harden vehicles to reduce casualties.

[redacted]

APPENDIX

[redacted]

MINES AND BOOBYTRAPS DEBRIEFING FORM
(Information to Reflect Past Six Months Experience)

1. Casualties: %

a. Percentage of total casualties suffered from mines and boobytraps ---------- ____

(1) Of this total what percentage were from:

(a) Mines (Anti-Veh. and Anti-Pers.) ---------- ____

(b) Boobytraps ---------- ____

b. List the percentage of casualties caused by the primary types of mines and boobytraps encountered ---------- ____

(1)_____ ------ ____

(2)_____ ------ ____

(3)_____ ------ ____

(4)_____ ------ ____

(5)_____ ------ ____

(6)_____ ------ ____

(7)_____ ------ ____

(8)_____ ------ ____

(9)_____ ------ ____

(10)_____ ------ ____

c. List the percentage of mines and boobytrap casualties that were suffered on:

(1) Search and destroy type operations ---------- ____

(2) Road clearing operations ---------- ____

(3) Pacification operations ---------- ____

(4) Other _____ ------ ____

(5) Other _____ ------ ____

[redacted]

[redacted]

%

2. Under what conditions were these mines and boobytraps encountered:

a. In the jungle (percentage) ---------- _____

(1) On a trail ---------- _____

(2) Along the sides of the trail ---------- _____

(3) While moving through vegetation (off the trail) --------- _____

(4) Other _____ ------ _____

b. In the vicinity of villages (percentage) ---------- _____

(1) On paths leading into village ---------- _____

(2) Entrances to village (gates, etc.) ---------- _____

(3) While searching houses ---------- _____

(4) While searching protective positions near houses ------- _____

(5) Other _____ ------ _____

c. In the vicinity of enemy base camps (percentage) ---------- _____

(1) On paths leading to base camps ---------- _____

(2) Entrances to base camps ---------- _____

(3) Fighting positions in base camp ---------- _____

(4) Living quarters in base camp ---------- _____

(5) Tunnels in base camp area ---------- _____

(6) Food caches ---------- _____

(7) Ammunition caches ---------- _____

(8) Other _____ ------ _____

d. Road clearing operations (percentage) ---------- _____

(1) Buried in the road ---------- _____

(2) Buried along the shoulders of the road ---------- _____

(3) Command detonated from the side of the road ---------- _____

[redacted]

[redacted]

[redacted]

%

(4) Other _____ ------ _____

(5) Other _____ ------ _____

3. Types of mines and boobytraps most frequently encountered:[1]

a. _____ ------ _____

b. _____ ------ _____

c. _____ ------ _____

d. _____ ------ _____

e. _____ ------ _____

f. _____ ------ _____

g. _____ ------ _____

h. _____ ------ _____

i. _____ ------ _____

j. _____ ------ _____

k. _____ ------ _____

l. _____ ------ _____

4. Fuzes most frequently used by the enemy:

a. Time Factor:

(1) Instantaneous ---------- _____

(2) Delay ---------- _____

b. Initiating Action

(1) Pressure ---------- _____

(2) Pull ---------- _____

(3) Pressure Release ---------- _____

(4) Tension Release ---------- _____

(5) Electrical ---------- _____

(6) Friction ---------- _____

---

[1]This question was not asked separately but was included in question 1b

[redacted]

[redacted]

%

(7) Chemical ---------- ____

(8) Other _____ ------ ____

(9) Other _____ ------ ____

(10) Other _____ ------ ____

5. Primary methods of detecting enemy mines and boobytraps:

a. Visual:

(1) Signs put up to warn local people ---------- ____

(2) Signs of triggering devices (trip wire, etc.) ---------- ____

(3) Signs of mine or boobytrap ---------- ____

(4) Other _____ ------ ____

(5) Other _____ ------ ____

b. Tactual:

(1) Touch ---------- ____

(2) Hearing (alerted for search) ---------- ____

(3) Smell ---------- ____

(4) Other _____ ------ ____

c. Mine detector:

(1) P-153 ---------- ____

(2) Other _____ ------ ____

d. Tactical Conditions:

(1) Logical ambush area ---------- ____

(2) Area where troops might slow down or bunch up ---------- ____

(3) Attitude of local people (intelligence) ---------- ____

(4) Other _____ ------ ____

(5) Other _____ ------ ____

[redacted]

[redacted]

%

6. Sources of detection assistance for Infantry point man on S & D operation:

   a. Dogs ---------- ____

   b. Mechanical Equipment ---------- ____

   c. Other _____ ------ ____

   _____

7. List any techniques developed for detecting or neutralizing command detonated mines:

   _____

   _____

   _____

   _____

   _____

   _____

   _____

8. Is night detection and countering mines and boobytraps attempted (Yes - No). If Yes:

   a. How frequently _____

   b. Using what means (rank 1, 2, 3):

      (1) Visual ---------- ____

      (2) Touch ---------- ____

      (3) Mechanical (detector) ---------- ____

   c. Describe night detection procedures: _____

   _____

   _____

   _____

[redacted]

[redacted]

%

9. Actions taken after discovering mine or boobytrap:

a. Mark and pass word to men ---------- ____

b. Report to higher headquarters ---------- ____

c. Neutralize by:

(1) Disarming ---------- ____

(2) Blowing in place ---------- ____

(3) Other _____ ------ ____

d. Request assistance of engineers:

(1) From engineer personnel accompanying ---------- ____

(2) From engineer personnel brought in ---------- ____

e. Bypass due to:

(1) Need to avoid revealing your presence ---------- ____

(2) Lack of time to neutralize ---------- ____

(3) Danger of receiving casualties ---------- ____

d. Any other action taken: _____

_____

_____

_____

_____

10. Methods of reporting and disseminating information on mines and boobytraps:

a. Immediate Reporting:

(1) Verbal to members of unit ---------- ____

(2) By radio or verbal to next higher headquarters ---------- ____

(3) Other _____ ------ ____

[redacted]

[redacted]

%

b. Follow-up Reporting:

(1) Written report using form ---------- ____

(2) Included in after action report ---------- ____

(3) Other _____ ------ ____

NOTE: Get list of information required on any verbal or written report.

c. Dissemination of information:

(1) Received as part of intelligence infor. prior to an operation ---------- ____

(2) Distributed regularly in form of written or verbal information from higher headquarters ---------- ____

(3) Distributed rapidly to subordinates as received --------- ____

11. Comments on adequacy of training in mines and boobytraps for:

a. Average enlisted replacements: _____

_____

_____

_____

_____

b. NCO's: _____

_____

_____

_____

c. Officers: _____

_____

_____

_____

12. What type of mines and boobytrap training is conducted for:

a. Replacements:

(1) Formal training at division or brigade: _____hours;

Type _____

_____

_____

[redacted]

[redacted]

(2) Follow-up training in assigned unit: Describe - _____

_____

_____

_____

b. Advanced Training:

(1) For selected personnel: _____

_____

(2) For NCOs: _____

_____

(3) Other _____

_____

c. Refresher Training: Describe - _____

_____

_____

d. Training on mine detectors:

(1) For who: _____

_____

_____

(2) By Who: _____

(3) Describe Training - _____

_____

_____

13. <u>Recommendations for improvement in countering mines and booby-traps</u>:

a. Training:

(1) CONUS _____

_____

_____

_____

_____

[redacted]

[redacted]

[redacted]

(2) In-Country _____

b. Actions in the field:

(1) Detection _____

(2) Destruction _____

(3) Reporting _____

(4) Disseminating information _____

14. List the principal marking systems used in your area to warn other VC and local people:

[redacted]

[redacted]