Research Problem Review 76-9

LEVEL II

AN ASSESSMENT OF FACTORS INFLUENCING GUNNERY PERFORMANCE IN AN ARMY NATIONAL GUARD ARMOR BATTALION

AD A078235

DDC
DEC 3 1979
E

DDC FILE COPY



79 Army 1 30 005

Research Institute for the Behavioral and Social Sciences

October 1976

Approved for public release; distribution unlimited.

U. S. ARMY RESEARCH INSTITUTE
FOR THE BEHAVIORAL AND SOCIAL SCIENCES

A Field Operating Agency under the Jurisdiction of the
Deputy Chief of Staff for Personnel

J. E. UHLANER
Technical Director

W. C. MAUS
COL, GS
Commander

NOTICES

DISTRIBUTION: Primary distribution of this report has been made by ARI. Please address correspondence concerning distribution of reports to: U. S. Army Research Institute for the Behavioral and Social Sciences, ATTN: PERI-P, 1300 Wilson Boulevard, Arlington, Virginia 22209.

FINAL DISPOSITION: This report may be destroyed when it is no longer needed. Please do not return it to the U. S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: The findings in this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

Army Project Number
(16) 2Q763743A775

TCATA

(14) ARI-Research Problem Review-76-9

(6) AN ASSESSMENT OF FACTORS INFLUENCING GUNNERY PERFORMANCE IN AN ARMY NATIONAL GUARD ARMOR BATTALION

(10) Edwin R./Smutz

FORT HOOD FIELD UNIT
George M. Gividen, Chief

Accession For
NTIS GRA&I
DDC TAB
Unannounced
Justification
By
Distribution/
Availability Codes
Dist | Avail and/or special
A

Submitted by:
Joseph Zeidner, Director
ORGANIZATIONS & SYSTEMS
RESEARCH LABORATORY

Approved By:
J. E. Uhlaner
TECHNICAL DIRECTOR

U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

Office, Deputy Chief of Staff for Personnel
Department of the Army
1300 Wilson Boulevard, Arlington, Virginia 22209

(11) October 1976

(12) 128

Research Problem Reviews are special reports to military management. They are usually prepared to meet requirements for research results bearing on specific management problems. A limited distribution is made--primarily to the operating agencies directly involved.

MT

408 410

FOREWORD

The Fort Hood Field unit of the Army Research Institute for the Behavioral and Social Sciences (ARI), by assessing the human performance aspects of man/weapons systems evaluations in field situations, provides support to Headquarters, TCATA (TRADOC Combined Arms Test Activity, formerly called MASSTER--Modern Army Selected Systems Test Evaluation & Review). The present report is responsive to a request by the Training Development Branch of the Operations and Plans Division of TCATA for assessment of the training program and gunnery performance of a National Guard Armor battalion; it is intended as a first step in identifying ways to improve training in armor reserve units. Full utilization of the results will depend upon adequate comparisons with similar studies of armor units in the future. The work was done under RDTE Project 2Q763743A775.

J. E. UHLANER
Technical Director

Accession For	
NTIS GRA&I	☐
DDC TAB	☐
Unannounced	☐
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or special

AN ASSESSMENT OF FACTORS INFLUENCING GUNNERY PERFORMANCE IN AN ARMY NATIONAL GUARD ARMOR BATTALION

BRIEF

Requirement:

This report was prepared in response to a request by the Training Developments Branch of the Operations and Plans Division, TRADOC Combined Arms Test Activity (TCATA), Fort Hood, Texas. The report involves an assessment of the training program and gunnery performance of a National Guard Armor battalion and is intended as a first step in identifying ways to improve training in armor reserve units. Full utilization of the results will be accomplished primarily by comparisons with similar studies of armor units in the future.

Procedure:

Data were obtained from four different sources, to include gunnery records from Tank Table VIII, questionnaires administered to tank crewmen, personnel and medical records, and the battalion training schedule. Analysis of the data resulted in a description of a National Guard Armor Battalion (1-263 Armor, South Carolina Army National Guard), to include tank crew characteristics, gunnery performance on Tank Table VIII, and the training program during the year that preceded the test on Tank Table VIII. Factors which might have influenced tank gunnery performance are discussed.

Principal Findings:

- Tank Crews. Most of the individuals in the unit were indigenous to the area in which they lived. They were white, married, and had a high school education. Their morale was relatively high, which was reflected in the fact that they had been in the National Guard for a fairly long period of time (over 14 years on the average for tank commanders), felt that their job was important, and were relatively satisfied with the conditions in which they had to work.

- Training Program. Seventy-seven percent (96 hours) of the training time available in the year preceding the two week annual training period at Fort Hood was spent on tank gunnery and related subjects. Most of this time was spent on four subjects:

  a. Tank crew qualification course (dry run).

  b. Tank Tables I, II, and III.

  c. Prepare to fire procedures.

  d. Preliminary gunnery exam.

The Annual Training period at Fort Hood involved one week on Tank Tables IV, V, and VI, two days on Tank Table VII, and culminated with the gunnery test on Tank Table VIII. The amount of ammunition fired on the Tank Tables was comparable to that listed for tank crew qualification in FM 17-12.

- Gunnery Performance. That battalion performed very well on Tank Table VIII. Only 3 (7 percent) of the 47 tank crews failed to qualify in tank gunnery. Sixty-one percent were Qualified and 33 percent were Qualified Distinguished. The average hit rate with the main gun was 57 percent for the first round, 64 percent for the second round, and 61 percent for the first and second rounds combined. Night performance was frequently better than day performance, and there was no significant correlation between day and night performance. Most main gun misses were found to be due to ranging error rather than lateral error. There was no correlation between how fast a tank crew fired the first round at a target and its probability of hitting the target.

- Variables Associated with Gunnery Proficiency. Only a few of the variables examined in this report correlated with high gunnery performance. Those biographical variables which showed a positive association with tank gunnery included age of the tank commander and grade of the gunner. There was no relationships between the length of time that a tank commander and a gunner had served together as a crew, and their performance in tank gunnery.

- Utilization of Findings:

The results of this investigation will be extended to other National Guard and Army Reserve units. Comparisons will be made with respect to training programs, crew characteristics, and gunnery performance. Such comparisons will be used to identify training programs and crew related variables which lead to superior performance in tank gunnery. The research will then be extended to regular Army units in order to determine the extent to which training procedures in the Army are appropriate for training in the Reserves.

TABLE OF CONTENTS

	Page
INTRODUCTION	5
METHODOLOGY	7
RESULTS	13
DESCRIPTION OF TANK CREW PERSONNEL	13
DESCRIPTION OF TRAINING PROGRAM	33
GUNNERY PERFORMANCE	38
VARIABLES ASSOCIATED WITH GOOD GUNNERY PERFORMANCE	57
CONCLUSIONS	62
REFERENCES	67
APPENDIX I. TANK TABLE VIII A & B	69
APPENDIX II. SURVEY OF TANK CREWS IN THE ARMY NATIONAL GUARD	73
APPENDIX III. PERSONNEL PROFILE	95
APPENDIX IV. TANK COMMANDERS' OPINIONS OF ARMOR AIT (ATTENDERS)	99
APPENDIX V. TANK COMMANDERS' OPINIONS OF ARMOR AIT (NONATTENDERS)	103
APPENDIX VI. GUNNERS' OPINIONS OF ARMOR AIT	107
APPENDIX VII. LOADERS' OPINIONS OF ARMOR AIT	109
APPENDIX VIII. DRIVERS' OPINIONS OF ARMOR AIT	111
APPENDIX IX. OPINIONS OF WORKING CONDITIONS	115
APPENDIX X. OPINIONS OF CREW TRAINING	117
APPENDIX XI. CORRELATIONS BETWEEN SELECTED VARIABLES AND GUNNERY SCORES FOR TANK COMMANDERS	119
APPENDIX XII. CORRELATIONS BETWEEN SELECTED VARIABLES AND GUNNERY SCORES FOR GUNNERS	121

LIST OF TABLES

Table		Page
1.	MILITARY TRAINING AND EXPERIENCE PROFILE OF ENLISTED TANK COMMANDERS	19
2.	MILITARY TRAINING AND EXPERIENCE PROFILE OF GUNNERS	21
3.	MILITARY TRAINING AND EXPERIENCE PROFILE OF LOADERS	21
4.	MILITARY TRAINING AND EXPERIENCE PROFILE OF DRIVERS	22
5.	PERSONAL BACKGROUND PROFILE OF TANK COMMANDERS, GUNNERS, LOADERS, AND DRIVERS	28
6.	APTITUDE TEST SCORES FOR TANK COMMANDERS, GUNNERS, LOADERS, AND DRIVERS	29
7.	PHYSICAL PROFILE OF TANK COMMANDERS, GUNNERS, LOADERS, AND DRIVERS	30
8.	TANK GUNNERY TRAINING SUBJECTS AND NUMBER OF HOURS DEVOTED TO EACH DURING TRAINING YEAR 1974-75	35
9.	AVERAGE DAY, NIGHT, AND TOTAL GUNNERY SCORES FOR EACH COMPANY AND THE BATTALION	39
10.	NUMBER AND PERCENT OF CREWS ACHIEVING GUNNERY RATINGS OF QUALIFIED DISTINGUISHED (QD), QUALIFIED (Q), OR UNQUALIFIED (U)	40
11.	NUMBER AND PERCENTAGE OF HITS AND TYPES OF MISSES FOR EACH MAIN GUN TARGET ON TABLE VIII A-DAY	53
12.	NUMBER AND PERCENTAGE OF HITS AND TYPES OF MISSES FOR EACH MAIN GUN TARGET ON TABLE VIII B-NIGHT	54
13.	NUMBER AND PERCENTAGE OF HITS AND TYPES OF MISSES FOR EACH MAIN GUN TARGET ON TABLES VIII A-DAY AND VIII B-NIGHT COMBINED	55
14.	MAIN GUN HIT RATE (%) ON TANK TABLE VIII FOR 1-263 ARMOR, SCANG (NG), AND A COMPARABLE ARMY BATTALION (A)	58

LIST OF FIGURES

Figure		Page
1.	PERCENTAGE OF PERSONNEL OF EACH GRADE FOR DRIVER, LOADER, GUNNER, AND TANK COMMANDER	15
2.	TIME TO FIRE FIRST ROUND PLOTTED AS A FUNCTION OF TARGET ARRAY	44
3.	TIME TO FIRE SECOND ROUND PLOTTED AS A FUNCTION OF TARGET ARRAY	46
4.	HIT RATE FOR FIRST ROUNDS PLOTTED AS A FUNCTION OF TARGET ARRAY	47
5.	HIT RATE FOR SECOND ROUNDS PLOTTED AS A FUNCTION OF TARGET ARRAY	48
6.	HIT RATE FOR FIRST AND SECOND ROUNDS PLOTTED AS A FUNCTION OF TARGET ARRAY	49

AN ASSESSMENT OF FACTORS INFLUENCING GUNNERY PERFORMANCE
IN AN ARMY NATIONAL GUARD ARMOR BATTALION

INTRODUCTION

The combat readiness of the National Guard and Reserve has assumed increased importance in the last several years. Reasons for this include a steady decrease in the manpower strength of our active duty forces, which causes an increased reliance on the call up of reserve forces in the event of an armed conflict, and an increased emphasis on winning early in the next war, a goal which assumes that reserve forces can be rapidly prepared for battle to provide early reinforcement for active duty forces. In light of these factors it is perhaps more important now than ever before that reserve forces be maintained in as high a state of readiness as is economically and militarily feasible.

The tank crewman's job is one for which even active duty units have difficulty maintaining personnel in a high state of training, yet it is essential that they do so since the tank is integral to what appears to be the most effective organization for modern combat; namely, the combined arms team. This is a particular problem for National Guard and Reserve Armor units because, unlike regular Army units, reserves seldom have adequate facilities for training with the main tank gun in order to acquire and maintain proficiency in gunnery skills.

In June 1975, the 1st Battalion, 263 Armor, South Carolina Army National Guard spent its two week annual training period at Fort Hood,

Texas under the supervision of its host unit, the 2/5 Battalion, 1st Cavalry Division (the 1-263 SCARNG is a roundout and affiliate of the 2/5 Cav). During that two week period the crews of the 1-263 were tested for gunnery skills on Tank Table VIII. The tank crews in this battalion performed unusually well on this test and as a result it was decided to study this battalion as a first step in attempting to identify factors which contribute to high gunnery proficiency in reserve units and in identifying areas in which future research should be directed. This report presents a description of the tank crews and the training program they underwent the year preceding their test on Tank Table VIII, and analyzes some of those factors which might have contributed to gunnery performance. The report focuses upon the performance of enlisted men rather than officers, although some data on officers was collected and is presented where it is appropriate.

METHODOLOGY

Data for the analysis were obtained from four different sources:

1. Gunnery records from Tank Table VIII.
2. Questionnaires administered to tank crewmen.
3. Personnel and medical records.
4. The battalion training schedule.

The data collection effort extended over a seven month period.

Gunnery records. Tank Table VIII (described in FM 17-12) is the Army's primary measure of tank crew proficiency in gunnery. The system that was used for scoring the crews of the 1-263 Armor on Tank Table VIII performance is shown in Appendix I. As can be seen from perusal of that appendix, the particular Table VIII used at Fort Hood was on Crittenberger range. Weather conditions at the time were as follows: Temperature ranged from the low 90's (F) during the day to the high 70's at night; wind was around 18 knots with gusts up to 27 knots; and visibility on the ground ranged from 15 miles during the day to 7 miles at night, with scattered clouds throughout the day and night. The crews were required to traverse Table VIII in M60A1 tanks during both the day and night (the night run always followed the day run) and they encountered nine different targets during each run. Four targets required use of the main gun with either HEAT or HEP ammunition, three targets involved the coaxial machinegun, and two required the Cal. 50 machinegun. The gunner was required to fire at the main gun targets and the coaxial machinegun

targets, while the tank commander fired at the two Cal. 50 machinegun targets. An examiner who sat on the tank itself and a safety officer who followed behind in a jeep scored each target engagement. For main gun targets, the examiner determined 1) the time that elapsed between the tank commander starting his fire command and the first round being fired, and 2) the time between the firing of the first and second rounds. Both the examiner and the safety officer assessed whether or not the target had been hit. For machinegun targets, the examiner on the tank determined 1) the amount of time which elapsed between the tank commander's first command and opening fire, 2) how long it took to engage all parts of the target (if the target involved several troops, for instance), and 3) how many parts of the target were engaged in those instances that the gunner or tank commander exceeded the time or ammunition allotment for that particular target. Points were given for firing within a prescribed period of time, for hitting the target, and for using correct conduct of fire procedures. The first two main gun targets required precision firing and were stationary whereas the third target required precision firing but was moving. The last main gun target utilized the battlesight method and was stationary. Second round hit points on the last main gun target were scored according to a sliding time scale (see Appendix I).

At the conclusion of running the course a tank crew's points were totaled across both day and night portions of the test and the crew was rated as follows: Less than 1650 points - Unqualified; 1650-1919 points -

Qualified; 1919-2400 points - Qualified Distinguished. This rating scheme is similar to the one presented in FM 17-12 (pages 23-40) in that the cut-off point for qualification is 1650 points (i.e., a total score of less than 1650 points received the rating of Unqualified). However, FM 17-12 presents three rating categories to which qualified crews are assigned (1650-1799 points - Marksman; 1800-1999 points - Sharpshooter; and 2000-2400 points - Expert) rather than just two categories as in the present scheme.

The points each crew was awarded served as one measure of gunnery proficiency in this study. Other measures included firing times and hit rate. Although gunnery scores were obtained on 47 tank crews, one gunnery score sheet was incomplete and had to be discarded and constraints in the computer program used to analyze the gunnery data required that each company have an equal number of gunnery scores. Thus, two sets of gunnery data were randomly selected to be dropped from each of two companies, leaving a total of 42 gunnery scores that were used in statistical analysis.

Questionnaires. A questionnaire (Appendix II) was administered to the tank crewmen two months after they returned to their home station in South Carolina. (Since relatively few officers (4) completed the questionnaire, their responses are not included in this report). Some individuals had left the unit within that time and their responses could not be obtained. In addition, several completed questionnaires had to be discarded because they could not be matched up with names on gunnery score

sheets. This left 128 questionnaires that were used in the analysis (31 tank commanders, 39 gunners, 28 loaders, and 30 drivers).

The questionnaire was essentially the same questionnaire being used in the Department of the Army NET assessment study of tank crew training in the U.S. Army, with a few changes to make it appropriate for administration to National Guard personnel. Selected questions were used to obtain the following:

1. Information about tank crew assignments (questions 3 through 12).
2. Information on demographic variables (questions 13 through 23).
3. Opinions about working conditions (questions 24 through 50).
4. Opinions about quality of training (questions 51 through 67).
5. Opinions of AIT training (questions 68 through 116).

Personnel and medical records. Appendix III shows the data sheet that was used to record information about each tank crewman's military experience (obtained from personnel files - DA Form 20) and his physical condition (obtained from medical records). Data was obtained on 167 individuals in this manner (7 officer tank commanders, 34 enlisted tank commanders, 45 gunners, 38 loaders, and 41 drivers). This information, along with information obtained from the questionnaires was used to describe the tank battalion and was analyzed using the statistical technique of correlation in an attempt to identify variables which were related to high gunnery proficiency.

Battalion training schedule. The training schedule used by the 1-263 SCARNG the year preceding their annual training at Fort Hood was

obtained and used to determine what kind and how much training on tank gunnery the battalion had received. In addition, a series of training related questions was submitted to the senior Company Commander and analysis of his answers to those questions along with information from the training schedule allowed for a summary description of the training programs.

It should be noted that the decision to analyze the performance of this battalion was made after the unit had already completed its Annual Training at Fort Hood and had returned to its home station in South Carolina. Gunnery score sheets were simply obtained from the sponsoring unit at Fort Hood (2/5 Cav.) while the questionnaries were administered by a representative of the sponsoring unit during one of his liason trips to the National Guard unit's home station. Company clerks and a representative from TCATA filled out the forms requiring information from personnel files and medical records, and much of the data was analyzed by using computer programs which were already being used for other projects at TCATA. Thus, this study was actually very inexpensive, with the majority of the cost coming from just the time it took for the author to analyze the findings and write the report. A disadvantage resulted from this general procedure, however, in that it was not possible to obtain all of the information that was desired from all of the crewmen who traversed Tank Table VIII. This was due to the fact that some crewmen left the unit shortly after Annual Training at Fort Hood, while other crewmembers were not present at the weekend drills when the questionnaires were administered.

These problems would have been avoided if the questionnaires had been administered immediately after the tank crews completed their test on Tank Table VIII and the personnel and medical information were collected at the same time. This latter procedure is strongly recommended in future studies of this type.

RESULTS

The results of the analysis are presented under four different headings:

1. Description of tank crew personnel.
2. Description of the training program.
3. Description of gunnery performance.
4. Variables associated with good gunnery performance.

DESCRIPTION OF TANK CREW PERSONNEL

This part of the analysis is based on data from questionnaires, DA Form 20, and medical records.

Demographic Characteristics. The battalion was almost completely made up of individuals who were white and were born in and resided in small communities or rural areas of South Carolina. The battalion headquarters was in Mullins (population 6,006) Company A headquarters was in Myrtle Beach (population 8,536), Company B headquarters was in Dillon (population 5,991), and Company C headquarters was in Conway (population 8,151). Although these population figures are probably somewhat low since they are from the 1970 U.S. Census, they nevertheless indicate that the battalion was located in a rural, small town-type area. In addition, the questionnaire responses show that 58 percent of the men grew up on a farm or in a rural area, 30 percent grew up in towns with population less than 10,000, while the remainder (only 12 percent) grew up in towns of population

10,000 or greater. Eighty-six percent of the enlisted men and 78 percent of the officers were born in South Carolina, while another 8 percent of the enlisted men were born in the neighboring states of North Carolina and Georgia. Eighty-two percent of the enlisted men were White, 11 percent were Black, and 4 percent were American Indian. All of the officers were White.

Grade Structure. A general picture of grade structure of the crews which fired on Tank Table VIII can be obtained from perusal of Figure 1. The percentage of personnel within each grade is shown for each crew position. It can be seen that most drivers (86 percent) had a grade of E-4 or E-5, most loaders (82 percent) of E-3 or E-4, gunners (82 percent) of E-4 or E-5, and tank commanders (70 percent) of E-6 or E-7. This differed from authorized Army grade structure (where driver equals E-3, loader equals E-4, gunner equals E-5, and tank commander equals E-6 or E-7) in two important ways. First, most drivers in this battalion were in a grade higher than authorized for the Army while many loaders were in a grade lower than what is authorized. Actually, drivers and loaders held the grade of E-4 more than any other grade. Secondly, and more importantly, a wider range of grades was found among gunners than among personnel in any other position, with 4 percent of them being E-2's and another 4 percent being E-3's. This resulted in situations in which the driver and loader were of higher grade than the gunner. This also appeared in several crews with E-4 gunners, in which case either the driver or the loader was an E-5. This state of affairs suggests that, in

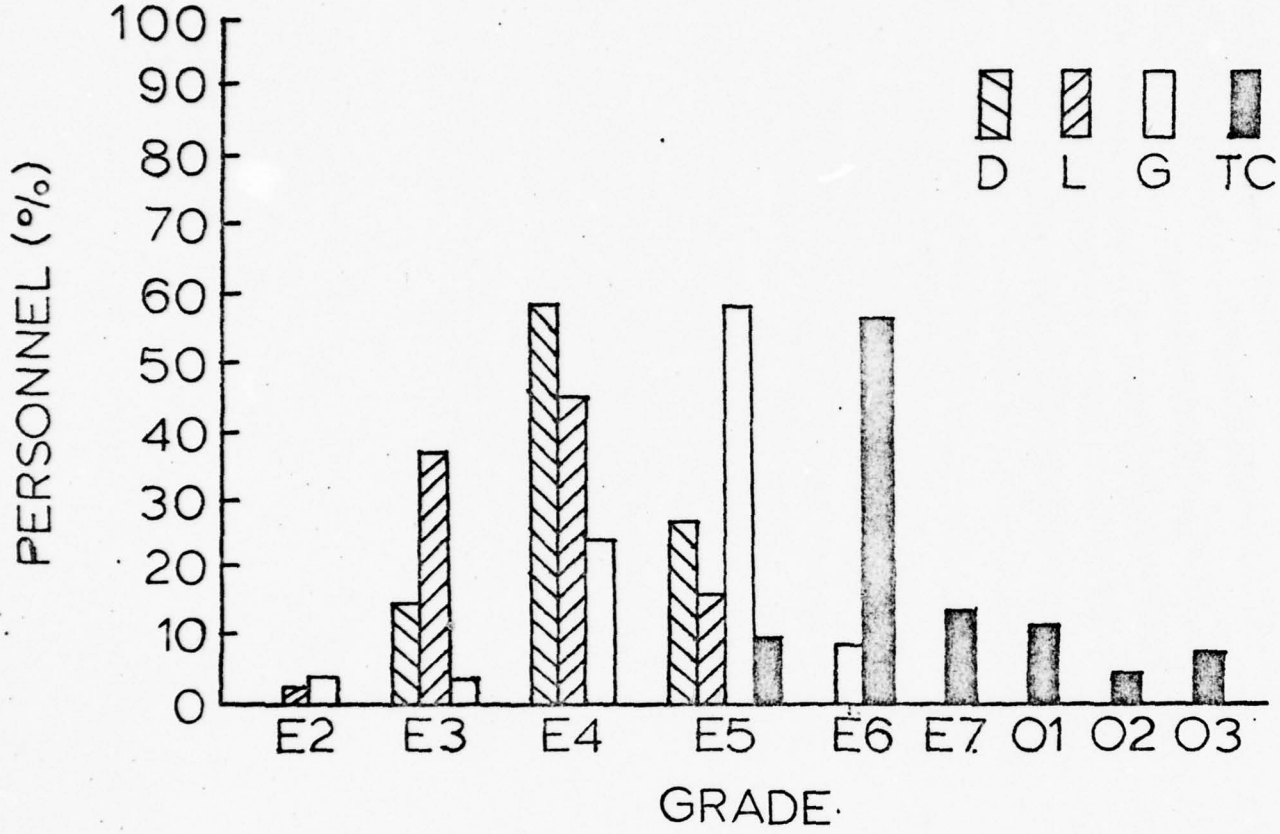


Figure 1. Percentage of personnel of each grade for Driver (D), Loader (L), Gunner (G), and Tank Commander (TC).

this battalion, individuals were selected for a crew position on the basis of criteria other than just grade. It would seem probable that such other criteria would be how well an individual was able to handle a given job (primarily with respect to the gunner's position but also, perhaps, with respect to the driver's position) and to what extent a person might enjoy the activities of a given job and want to keep that job even though it was not commensurate with his grade. These questions should be looked at in future analyses of reserve units.

Turbulence. The problem of turbulence (personnel turnover) within a tank crew is one which is of much concern to the Army because it is not known to what extent personnel turnover degrades gunnery performance. An estimate of personnel turnover in the battalion was obtained in the present analysis by asking each tank commander how many different people had been assigned to each of the positions in his crew since he had been assigned to his present crew position (Appendix II, question #7). By then determining how long each tank commander had been in his position, it was possible to calculate the number of personnel changes per year which each tank commander had experienced for each crew position. Analysis of the responses from 31 tank commanders indicated that the average number of personnel changes per year within their crew, by their estimates, was 0.49 for gunner, 0.50 for loader, and 0.32 for driver. Stated another way, tank commanders in this battalion indicated that, on the average, they had a different gunner and a different loader once every two years and a different driver once every three years. This rate of turnover

appears to be rather low at first glance and if personnel turnover does adversely affect gunnery performance then this low turnover rate in the battalion might be an important factor contributing to its high proficiency in tank gunnery.

Two factors should be noted in this regard, however. First, a typical training year in the National Guard represents only 34 training days (12 weekend drills and 10 days of Annual Training). In the regular Army there are approximately 22 working days in a month which are, theorecically, used for training. One training year in the National Guard, then, is about equal to 1 1/2 months in the Army as far as available training time is involved. From this perspective a change in the gunner and loader positions every two years in the National Guard is roughly comparable, as far as actual training time goes, to a change every 3 months in the Army, and a change every 3 years in the driver's position is comparable to a change every 4 1/2 months in the Army. From this point of view this battalion has not been as stable in the past as it would seem at first glance.

The second factor which should be taken into consideration in this regard is that the tank crews which actually traversed Tank Table VIII had not served together as crews as long as would be expected from the tank commanders' estimates. Analysis of the responses to question #6 of the questionnaire, for example, indicate that tank commanders and gunners (the two crewmembers which are most crucial to gunnery) had been together as a crew for only 9 months on the average ($n = 25$, $S.D. = 11.25$). This

represents only 26 training days (9 weekends plus 8 days of Annual Training) before traversing Tank Table VIII and is roughly comparable to only a little over a month of training in the Army. Generally speaking, then, these National Guard crews had not been together as crews for very long as far as actual training time goes.

Military Training and Experience. Profiles with respect to military training and experience are shown for tank commanders, gunners, loaders, and drivers in Tables 1, 2, 3, and 4, respectively. Perusal of these tables indicates that between one half and three quarters of the personnel in all positions attended Armor AIT. The amount of time that had elapsed since tank commanders attended AIT was, on the average, comparable to what one would expect to find in the Army based on the Army's promotion policy; for example, minimum time in service for promotion to E-6 (minimum grade for tank commander) in the Army is 6 years, which would be about 5 1/2 years after attending AIT. In comparison, it had been a little more than 6 years (74.6 months) since the average National Guard tank commander in the present study attended AIT. Minimum time in service for E-5 (gunner), E-4 (loader), and E-3 (driver) in the Army is 3 years, 2 years, and 1 year, respectively, indicating that the minimum amount of time since attending AIT would be about 2 1/2 years, 1 1/2 years, and 4 months, respectively. It can be noted that the amount of time since gunners, loaders, and drivers in the present National Guard unit attended AIT was 4 years (51.9 months), 2 1/2 years (30 months), and 3 1/2 years (40.9 months), respectively. In all cases (especially with drivers)

TABLE 1

MILITARY TRAINING AND EXPERIENCE PROFILE
OF ENLISTED TANK COMMANDERS

Training/Experience	Percent	Average	Standard Deviation	Total number of Respondents on Which Figures are Based
Tank Commanders who attended Armor AIT	55			31
Time since attending AIT (months)		74.6 (6.2 yrs)	51.26	17
Armor MOS score		104.2	13.25	32
Time in Armor MOS (months)		95.4 (8.0 yrs)	71.70	32
Time in National Guard (months)		172.5 (14.4 yrs)	103.90	32
Time in present unit (months)		76.0 (6.3 yrs)	28.75	32
Time in position of Tank Commander (months)		44.1 (3.7 yrs)	33.83	32
Tank Commanders who had combat experience in Vietnam	3			29
Tank Commanders who served in an Armor MOS in Vietnam	0			29

TABLE 2

MILITARY TRAINING AND EXPERIENCE PROFILE OF GUNNERS

Training/Experience	Percent	Average	Standard Deviation	Total Number of Respondents on Which Figures are Based
Gunners who attended Armor AIT	77			39
Time since attending AIT (months)		51.9 (4.3 yrs)	44.19	30
Armor MOS score		107.0	16.36	32
Time in Armor MOS (months)		41.0 (3.4 yrs)	27.80	38
Time in National Guard (months)		71.7 (6.0 yrs)	28.63	40
Time in present unit (months)		48.1 (4 yrs)	24.75	40
Time in position of gunner (months)		18.8 (1.6 yrs)	11.32	40
Gunners who had combat experience in Vietnam	2			40
Gunners who served in an Armor MOS in Vietnam	0			40

TABLE 3

MILITARY TRAINING AND EXPERIENCE PROFILE OF LOADERS

Training/Experience	Percent	Average	Standard Deviation	Total Number of Respondents on Which Figures are Based
Loaders who attended Armor AIT	50			28
Time since attending AIT (months)		30.8 (2.6 yrs)	13.40	14
Armor MOS score		96.1	11.07	15
Time in Armor MOS (months)		31.2 (2.6 yrs)	28.86	35
Time in National Guard (months)		67.6 (5.6 yrs)	34.67	36
Time in present unit (months)		30.4 (2.5 yrs)	15.26	36
Time in position of Loader (months)		17.5 (1.5 yrs)	11.68	36
Loader who had combat experience in Vietnam	19			26
Loaders who served in an Armor MOS in Vietnam	0			26

TABLE 4

MILITARY TRAINING AND EXPERIENCE PROFILE OF DRIVERS

Training/Experience	Percent	Average	Standard Deviation	Total Number of Respondents on Which Figures are Based
Drivers who attended Armor AIT	63			30
Time since attending AIT (months)		40.9 (3.4 yrs)	11.59	19
Armor MOS score		101.2	14.46	30
Time in Armor MOS (months)		36.7 (3 yrs)	17.96	39
Time in National Guard (months)		65.8 (5.5 yrs)	23.59	40
Time in present unit (months)		41.8 (3.5 yrs)	18.50	40
Time in position of driver (months)		21.3 (1.8 yrs)	14.90	40
Drivers who had combat experience in Vietnam	6			31
Drivers who served in an Armor MOS in Vietnam	0			31

the times are somewhat longer than the minimum times one would find with the regular Army situation.

Opinions of how well Armor AIT trains men to be gunners, loaders, and drivers are presented in Appendices IV through VIII. Tank commanders who attended Armor AIT (Appendix IV) and tank commanders who did not attend Armor AIT (Appendix V) gave opinions on all crew positions (i.e., gunner, loader, and driver) whereas the other crewmen gave opinions only about their own crew position. Furthermore, only the opinions of gunners, loaders, and drivers who attended Armor AIT are given (Appendices VI, VII, and VIII, respectively). Perusal of these Appendices indicates that in general, most individuals who attended AIT felt that it provided adequate training for most duties that gunners, loaders, and drivers perform. Tank commanders who did not attend AIT themselves expressed opinions similar to those of crewmen who had attended AIT.

With respect to gunner duties, there was a general indication among tank commanders and gunners that AIT provides little or no training on firing the missile from an M60A2 tank or M551 vehicle (question 76), or on operating the laser rangefinder (question 78). Mean ratings for both tank commanders and gunners were over 3.0 (Under Trained) for these questions. This finding was expected since National Guard units are not yet supplied with tanks that are equipped with a missile weapons system or a laser rangefinder. Of more interest, perhaps, is the fact that a substantial number of tank commanders and gunners felt that AIT provided undertrained or inadequately trained gunners (mean rating of 2.5 or

greater) with respect to using the passive/IR sighting system (question 77) and applying range estimation (question 79). Tank commanders also indicated undertraining with respect to knowledge of tactics (question 83) and knowledge of gunner duties in battalion level maintenance (question 85). Mean ratings for all other duties were below 2.5, indicating adequate training in those areas.

Tank commanders and loaders both indicated that AIT did not produce adequately trained personnel with respect to loading the missile in the M60A2 or M551 (question 106) although, again, one would expect such to be the case for National Guardsmen. Additionally, tank commanders felt that loaders were not adequately trained to boresight and zero the searchlight (question 113). This is indicated by mean ratings of 3.0 and 2.9 for tank commanders who attended AIT and for tank commanders who did not attend AIT, respectively, and is supported by a relatively high mean rating (2.4) by the loaders. For the rest of the loader duties, the indication was that AIT produced adequately trained or fully trained individuals.

Drivers indicated that they were adequately trained at AIT for all of their duties that were listed in the questionnaire. Tank commanders generally agreed, although tank commanders who had attended AIT indicated undertraining in performing evasive maneuvers (question 92, mean equals 2.5) while tank commanders who did not attend AIT generally indicated that drivers were undertrained in using night vision equipment (question 93, mean equals 2.6) and selection of alternate firing positions (question 99, mean equals 2.6).

In overview, the general consensus among the respondents seemed to be that AIT generally provided adequately trained personnel for the positions of gunner, loader, and driver with deficiencies in just a few areas.

Scores on the Armor MOS test ranged from 96.1 for loaders to 107 for gunners on the average. The average amount of time spent in the Armor MOS was roughly comparable to the amount of time since attending AIT, except for tank commanders, in which case attendance at Armor AIT occurred several years after they had begun serving in an Armor MOS.

National Guardsmen seem to differ from Army personnel in terms of how long they have been in the military. For tank commanders the average amount of time in the National Guard was 14 1/2 years (172.5 months). Similarly, gunners, loaders, and drivers had been in the National Guard for averages of 5 1/2 or 6 years (71.7 months, 67.6 months, and 65.8 months, respectively), a period of time far greater than one would expect to find in the regular Army. Since the normal enlistment period of National Guardsmen is 6 years, it appears from the above averages (and standard deviations in Tables 1-4) that all positions had a substantial number of individuals who had stayed in the Guard beyond their minimum enlistment period and therefore were most likely in the Guard because they wanted to be in it. It is interesting to note that gunners had been in the National Guard about the same amount of time as loaders and drivers, a fact which supports the notion that personnel are selected for positions on the basis of criteria other than just rank.

Another difference between National Guardsmen and Army personnel lies in the fact that the Guardsmen had been in their present unit for a much longer period of time than Army personnel normally remain in their units. Tank commanders indicated that they had been in their unit for 6 years (76 months) on the average, gunners had been in for 4 years (48.1 months), loaders for 2 1/2 years (30.4 months), and drivers for 3 1/2 years (41.8 months). The average amount of time they had spent in their crew positions was almost 4 years (44.1 months) for tank commanders, 1 1/2 years (18.8 months) for gunner, 1 1/2 years (17.5 months) for loader, and almost two years (21.3 months) for driver.

Very little combat experience was represented in this unit. Nineteen percent of the loaders and between 2 percent and 6 percent of the tank commanders, gunners, and drivers said they had served in Vietnam. None, however, had served in an Armor MOS in Vietnam.

In summary, the following profile can be drawn of the military training and experience of individuals in this unit: Over half of the personnel attended Armor AIT and the amount of time since attendance was somewhat longer than what one might find as a minimum in the regular Army. They had been in the National Guard and in their present unit for a relatively long span of time, although very little combat experience was represented among them.

Personal Background. A profile of personal background variables is presented in Table 5. It can be seen that most individuals were married. They had, on the average, the equivilent of a high school education

(12 years of schooling) with very few of them having received a college degree. Almost none of them had ever been subject to a court martial and very few had a flagging action on their record.

Military Aptitude. Aptitude scores for military jobs are presented in Table 6. It should be noted that for many individuals the scores were not available and in the instances where scores were available they were usually from AA Pre-1973 rather than the more recent ACB-1973. Only those scores from AA Pre-1973 are included in this analysis.

The Army's aptitude area tests have norms of mean equal to 100. Using this as a reference, it appears from the figures in Table 7 that the National Guardsmen in this study were quite close to the Army's norms in all aptitude areas. Tank commanders fell slightly above the norm in most aptitude areas (especially in AE and RC), but the aptitude for various military tasks found among gunners, loaders, and drivers in this unit was very close to average.

Physical Profile. Table 7 presents a profile of the physical characteristics of tank commanders, gunners, loaders, and drivers. Tank commanders, of course, were the oldest as a group, but it is rather surprising that gunners, loaders, and drivers were of about the same age. This is further evidence that, as mentioned earlier, individuals were being placed in crew positions on the basis of criteria other than grade alone.

Overall, about 20 percent of the crewmen wore glasses, with drivers having the lowest percentage in this category. Everyone had acceptable

TABLE 5

PERSONAL BACKGROUND PROFILE OF TANK COMMANDERS, GUNNERS, LOADERS, AND DRIVERS

(M = Mean, S.D. = Standard Deviation, n = Number of individuals on which figures are based. Data are from DA Form 20).

	Tank Commander	Gunner	Loader	Driver
Percent who are Married	91% (n = 34)	88% (n = 41)	75% (n = 36)	90% (n = 40)
Amount of Civilian Education (yrs.)	M = 12.4 S.D. = 2.08 (n = 32)	M = 12.8 S.D. = 1.80 (n = 40)	M = 11.7 S.D. = 1.26 (n = 35)	M = 12.5 S.D. = 1.45 (n = 40)
Percent who have a college degree	6% (n = 32)	8% (n = 40)	0% (n = 36)	5% (n = 40)
Percent who have been subject to a Court Martial	0% (n = 31)	0% (n = 40)	0% (n = 36)	5% (n = 40)
Percent who have been subject to a Flagging Action	3% (n = 31)	8% (n = 40)	3% (n = 35)	12% (n = 40)

TABLE 6

APTITUDE TEST SCORES FOR TANK COMMANDERS, GUNNERS, LOADERS, AND DRIVERS

(M = Mean, S.D. = Standard Deviation, n = Number of individuals on which figures are based. Data are from DA Form 20).

Aptitude Area	Tank Commander	Gunner	Loader	Driver
IN (Infantry)	M = 99.6	101.8	93.1	100.5
	S.D. = 14.43	18.49	13.87	17.04
	n = 9	13	7	15
AE (Armor, Artillery, and Engineers)	M = 111.3	101.1	97.6	99.6
	S.D. = 18.65	12.9	11.37	16.38
	n = 15	23	15	26
EL (Electronics Repair)	M = 102.9	99.4	96.8	96.5
	S.D. = 17.81	15.50	13.46	18.76
	n = 18	28	17	30
GM (General Maintenance)	M = 104.4	99.4	96.2	96.4
	S.D. = 12.80	15.09	13.95	16.23
	n = 19	28	17	30
MM (Motor Maintenance)	M = 109.7	103.3	101.8	103.2
	S.D. = 14.50	13.64	13.49	16.18
	n = 19	28	17	30
CL (Clerical)	M = 109.9	107.1	100.2	105.8
	S.D. = 14.66	13.45	13.00	16.15
	n = 19	28	17	30
GT (General Technical)	M = 109.8	105.2	96.2	102.7
	S.D. = 17.61	15.26	14.59	16.75
	n = 19	28	17	30
RC (Radio Code)	M = 112.2	102.8	108.3	101.5
	S.D. = 17.13	16.74	14.16	17.60
	n = 12	23	10	24

TABLE 7

PHYSICAL PROFILE OF TANK COMMANDERS, GUNNERS, LOADERS, AND DRIVERS

(M = Mean, S.D. = Standard Deviation, n = Number of individuals on which figures are based. Data are from DA Form 20).

Physical Characteristics	Tank Commander	Gunner	Loader	Driver
Average Age (yrs.)	M = 33.5 S.D. = 6.94 n = 31	27.2 5.10 40	26.1 4.99 35	25.8 3.81 40
Average Height (in.)	M = 70.5 S.D. = 2.42 n = 32	70.6 2.34 40	69.9 2.41 36	69.7 3.19 40
Average Weight (lbs.)	M = 177.3 S.D. = 25.38 n = 32	172.4 21.12 40	170.4 28.85 36	168.0 20.17 40
% with PULHES Profile of 111111	100% n = 29	98% 40	94% 36	100% 39
% who Wear Glasses	28.1% n = 32	20% 40	25% 36	12% 40
% with passing Color Vision	100% n = 32	100% 40	100% 36	100% 39
% with passing Hearing	100% n = 32	100% 40	100% 36	100% 40
% with a Physical Related Limitation	0% n = 32	0% 40	0% 36	0% 40

color vision and hearing, and almost all of them had a high level of medical fitness within each of the factors of the Army's physical profile system (as indicated by a "1" in each of the following areas: P - physical capacity, U - upper extremities, L - lower extremities, H - ears, E - eyes, and S - psychiatric). Furthermore, no one had a physical related limitation. In general, the unit was highly medically fit.

Working Conditions and State of Training. In order to obtain an indication of the working conditions in the battalion, a series of questions was asked about crew duties (questions 24-36 and 64 in Appendix II), about fellow crewmen (questions 28 and 49), and about supervisors and commanders (questions 37-48 and 50-50b). In addition, the respondents were asked to indicate their opinion of the state of training in their crew with respect to twelve different areas (questions 51-62). The results to questions 24-48 are shown in Appendix IX and to questions 51-62 in Appendix X. The results were similar for individuals in all crew positions and so they are combined in the Appendices.

Perusal of these appendices indicates that the crewmen were quite satisfied with their crew duties and their general working situation. This is shown by average ratings of 2.6 or less on all questions but 32. In the case of question 32 it was indicated that some individuals (33 percent) feel strongly that they would change their MOS if given a choice of which other MOS they could fill.

Perhaps the most important question in this area concerned how

important the crewman felt his job was in the National Guard (question 67). Fifty-one percent responded that his job was "very important", 20 percent checked the category of "moderately important", and 10 percent indicated "fairly important". Thus, it appears that a substantial majority of the individuals in this battalion feel that they were doing an important job and were relatively satisfied with the conditions associated with it.

Responses to the questions about supervisors and commanders also indicated a general satisfaction among the crewmen. Almost all questions had average ratings of 2.3 or less, indicating a general degree of satisfaction with supervisors and commanders. In addition, the ratings of the overall performance of company commander and battalion commander were very high, (the means being 2.3 and 3.2, respectively, with standard deviations of 1.65 and 1.83) on a scale of 1 (best I ever saw) to 9 (worst I ever saw).

One other question (49) related to the working conditions of this unit. Crewmen were asked what other members of their crew they considered as close friends. Sixty-seven percent of the respondents indicated that they considered at least one other member of their crew to be a close friend. It would seem that this factor could be very important in determining whether or not a crewman was satisfied with his working situation and willing to serve in an undesirable crew position for a relatively long time.

With respect to the quality of training within a crew (Appendix X), most individuals indicated that training was adequate or better for all

subjects listed except nuclear-biological-chemical warfare, raft shipment/crossing, and deepwater fording. These latter subjects are ones which are also neglected in regular Army units. A related question (50), which involved ranking one's tank crew relative to the others in the company, revealed that almost half of the crewmen (46.4 percent) considered their crew to be the first or second best tank crew in the company. Only 5 percent of the individuals ranked their crew below the average for the company.

In general, then, the men in the battalion regard their working conditions and state of training quite favorably, they feel that the job which they are doing in the National Guard is important, and they hold their commanders in rather high regard.

DESCRIPTION OF TRAINING PROGRAM

The battalion training schedule included 12 weekend drills (23 training days) during the year preceding the battalion's annual training at Fort Hood. Four weekends were spent at the Armory and 8 were spent at Fort Jackson, South Carolina, where Tank Tables I, II, and III (FM 17-12) are available for use with the unit's 20 M60A1 tanks. The unit also utilized a Gunnery Stakes course (see TC 17-12-2) and a Tank Crew Qualification Course-Dry Run (see TC 17-12-2) at Fort Jackson.

Training Aids. That literature which was the most extensively used in developing the training program on tank gunnery was FM 17-12 (Tank Gunnery), TC 17-12-2 (Training Tank and Sheridan Crews to Shoot), and

TM 9-2350-215-10 (Operators Manual for M60A1). TM 9-1005-233-10 (Operators Manual for M73, M73A1, and M219 Machineguns) was also used to some extent. Army Subject Schedule 17-12 was used as an outline guide for developing the periods of instruction. Burst-on-target trainers and training extension course lessons on tank gunnery were also extensively used. Although 11E MOS training courses are sometimes conducted by USAR School instructors, none were conducted during this training year.

Gunnery Subjects. In the National Guard a training year schedule is designed to emphasize some particular aspect of the unit's mission. The training year 1974-75 for this battalion focused on tank gunnery and therefore a large proportion of the training time available that year was taken up with tank gunnery and related subjects. Of the 23 training days available during the year (excluding the 10 days of Annual Training), 18 had some part of them devoted to gunnery. Excluding time taken up with administrative duties and movement from one location to another, there were 125 hours devoted to training during the year. Seventy-seven percent (96 hours) were spent on tank gunnery and related subjects while the remaining 23 percent (29 hours) were used to cover topics such as civil disturbances (10 hours), tank company FTX (9 hours), drill and ceremonies (2 hours), military justice (1 hour), code of conduct (1 hour), and several other subjects.

Table 8 shows the tank gunnery subjects which were covered and how much time was spent on each. It can be seen that the bulk of the time

TABLE 8

TANK GUNNERY TRAINING SUBJECTS AND NUMBER OF HOURS DEVOTED TO EACH DURING TRAINING YEAR 1974-75

TRAINING SUBJECT	HOURS
Tank crew qualification course (dry run)-day	17 1/2
Individual weapons firing-Tables I, II, III	14
Prepare to fire procedures	10
Preliminary gunnery exam	9 1/2
Crew after operations maintenance check	4
Cal. 30 MG (Loaders and Drivers)	5
Cal. 50 MG (Tank commanders and Gunners)	5
Direct fire control system (Tank commanders and Gunners)	4
Tank crew qualification course (dry run)-night	4
Conduct of fire	3
Gunnery stakes course	3
Tank maintenance	3
Tank gun ammunition (Loaders and Drivers)	2
Tank gun malfunctions (Loaders and Drivers)	2
Turret familiarization	2
Auxilary fire control instruments	2
Range cards	2
Cal. 50 MG (M85)	2
Target acquisition	2
Range determination	2

TABLE 8 CON'T.

TRAINING SUBJECT	HOURS
Cal. 30 MG (M73)	1
Cal. 30 MG (M219)	1
Sensing and direct fire adjustment	1
Tank gunnery techniques-review	1
Tank gun ammunition	1
Preparation of tanks for night operations	1
Platoon fire distribution and control	1

was spent on the tank crew qualification course, firing on Tables I, II, and III, prepare to fire procedures, and the preliminary gunnery exam.

When the unit arrived at Fort Hood for Annual Training, it spent two days and evenings on Tank Table IV, and one day and evening each on Tank Tables V and VI. Two days and evenings were spent on Tank Table VII with these two days being separated by a day of remedial training for crews who were having difficulty. The two week Annual Training period culminated with the test for tank crew gunnery proficiency on Tank Table VIII.

A total of 7,834 main gun rounds were fired on Tables IV, V, VII, and VIII. The numbers of main gun rounds, by type, were as follows: HEP-TPT - 686; HEP-T - 400; HEAT-TPT - 5500; and HEAT-T - 1248 (DS-T was not fired). In addition, 101,160 7.62mm machinegun rounds and 36,880 Cal. 50 machinegun rounds were fired on Tables VI, VII, and VIII. The average number of main gun rounds fired per tank crew was 167, which is very close to the 156 round allotment listed in FM 17-12 (pages 21-3 to 21-4). Also, the amount of 7.62mm ammunition which was fired (2152 rounds per tank crew) is slightly greater than that suggested in FM 17-12 (2075 rounds per crew), although somewhat fewer Cal. 50 rounds (785 per tank crew) were fired than is suggested in the manual (890 rounds per crew). Overall, the amount of ammunition which this unit fired in their tank gunnery training year corresponded closely to the ammunition requirements for tank crew qualification tables listed in FM 17-12.

GUNNERY PERFORMANCE

Average Gunnery scores from Tank Table VIII are shown for each company and the whole battalion in Table 9. It can be seen that night scores were consistently better than day scores for both the companies and the battalion. In general, Company C performed the best and Company A the worst, at least when day scores and total scores are looked at. This was not the case for night scores, however, in which case Company B's performance was the lowest. A two way analysis of variance was used to statistically compare companies with each other, and day with night scores. The results indicated that the companies did not significantly differ from each other, although the night scores were significantly higher than the day scores ($F = 7.36$, $df = 1, 39$, $p < .01$).

Table 10 presents the number of crews that achieved ratings of Qualified Distinguished, Qualified, and Unqualified for day, night, and total gunnery scores. It can be seen that, for total scores, one-third of the crews earned the highest rating (Qualified Distinguished) while most of the remaining two-thirds were Qualified. Only three crews did not qualify. A general comparison of the day and night qualification rates gives a result similar to that previously obtained with gunnery scores; namely, that crews did better at night than during the day. One third of the crews fell into each qualification category for the day portion of the test, but over half of the crews attained a rank of Qualified Distinguished for the night portion while only 13 percent of the crews were Unqualified.

TABLE 9

AVERAGE DAY, NIGHT, AND TOTAL GUNNERY SCORES
FOR EACH COMPANY AND THE BATTALION

(M = mean, S.D. = standard deviation, n = number of crews)

UNIT		DAY	NIGHT	TOTAL
Company A	M =	875.5	940.7	1816.2
(n = 14)	S.D. =	127.47	116.82	189.20
Company B	M =	913.9	925.4	1839.3
(n = 14)	S.D. =	120.95	105.09	175.76
Company C	M =	925.4	1011.1	1936.4
(n = 14)	S.D. =	76.81	75.76	132.55
Battalion	M =	901.5	962.3	1863.7
(n = 42)	S.D. =	107.97	105.80	166.08

TABLE 10

NUMBER AND PERCENT OF CREWS ACHIEVING GUNNERY RATINGS OF QUALIFIED DISTINGUISHED (QD), QUALIFIED (Q), OR UNQUALIFIED (U)

(Results are shown for day, night, and total scores. The number of points needed for the ratings were as follows: QD day or night - 960 or above; QD total - 1920 or above; Q day or night - 825 to 959; Q total - 1650 to 1919; U day or night - below 825; U total - below 1650).

RATING	DAY SCORE	NIGHT SCORE	TOTAL SCORE
QD	15 33%	24 52%	15 33%
Q	16 34%	16 34%	28 61%
U	15 33%	6 13%	3 7%

It would seem that crews should perform better during the day than at night since visibility is obviously better in the daytime. The fact that they did better at night may be due to one of several factors. First, it is possible, as some tankers mentioned, that at night the searchlight actually puts the target in sharper contrast to its surroundings than during the day. If so, then it would probably be easier to sight on a target at night and the probability of hitting it would increase accordingly. A second reason, however, is that the examiners might not be able to detect hits or misses as well during the night as during the day, and with a tendency to give crews the benefit of the doubt when not sure of a miss, examiners might tend to give higher scores at night. A third reason for better gunnery performance at night might lie in the fact that the night portion of the test was always conducted after the day portion and the higher night scores may therefore merely be a function of a learning effect from experience with the test. All of these factors could be operating alone or in combination to produce a higher night gunnery score.

It might be noted at this point that, as will be seen later, overall main gun hit rates were just slightly better at night (62 percent) than during the day (60 percent), thus indicating that the day-night difference in Table VIII scores was due not only to differences in main gun hit rates but also to differences in performance with the machineguns and in the use of proper fire commands as well.

The day-night comparison is further complicated by the fact that the

correlation between day and night gunnery scores was + 0.21. This is a very low correlation and indicates that day score was not associated to any extent with night score. Put another way, knowing that a tank crew scored high or low on the day run does not give one much indication as to how well it scored on the night run. This means one of two things: 1) there are different skills involved in day and night gunnery, and tank crews which have skills integral to good day gunnery do not necessarily have the skills needed for good night gunnery, and vice versa, and/or 2) scoring on the day and/or the night portions of the test is unreliable. With respect to this second point, there is some recent evidence (gathered by TCATA personnel at Fort Hood) that the scoring procedure on Tank Table VIII actually is somewhat unreliable. Preliminary examination of videotape recordings of main gun firings on Tank Table VIII showed an examiner error rate of 27 percent, i.e., out of 26 main gun misses (determined by TCATA personnel via videotape) seven were erroneously scored as hits by examiners using binoculars or the naked eye on Tank Table VIII.

The present study does not allow one to determine which of the above factors, if any, influenced the performance of this National Guard Battalion, but it would seem important that these factors be examined in future studies if the Army is going to have any confidence in Tank Table VIII as its measure of gunnery proficiency, and if it is interested in providing tank crews with good training in both day and night tank gunnery.

In view of the recent emphasis on getting the first round off rapidly (for example, TC 17-12-5 suggests getting the first round off within 10 seconds during the day and 15 seconds at night, instead of 15 seconds in day and 25 seconds at night as required in FM 17-12), it was decided to analyze firing times and hit rates for the first round engagements of main gun targets. A three-way analysis of variance was used to compare companies, light conditions (day or night), and target array on these two variables. In addition, three-way analyses of variance were carried out on hit rates and firing times for second round engagements, and on hit rates for first and second round engagements combined.

The analysis of variance on first round firing times showed no significant differences between companies, although there was a statistically significant day-night effect ($F = 6.43$, $df = 1, 39$, $p < 0.05$) and a statistically significant target array effect ($F = 33.35$, $df = 3, 117$, $p < 0.001$). These results are illustrated in Figure 2. It can be seen that, overall, firing times were shorter during the day than at night, and they were much shorter for the target requiring the battlesight technique than for the other targets (a Neuman-Keuls test showed that firing times were significantly shorter ($p < 0.05$) for the battlesight target than for any of the other targets and that firing times for the other targets were not significantly different from each other). This result would be expected since with the battlesight technique a round is already loaded in the main gun chamber. What is a little surprising, however, is the fact that firing times for the moving target

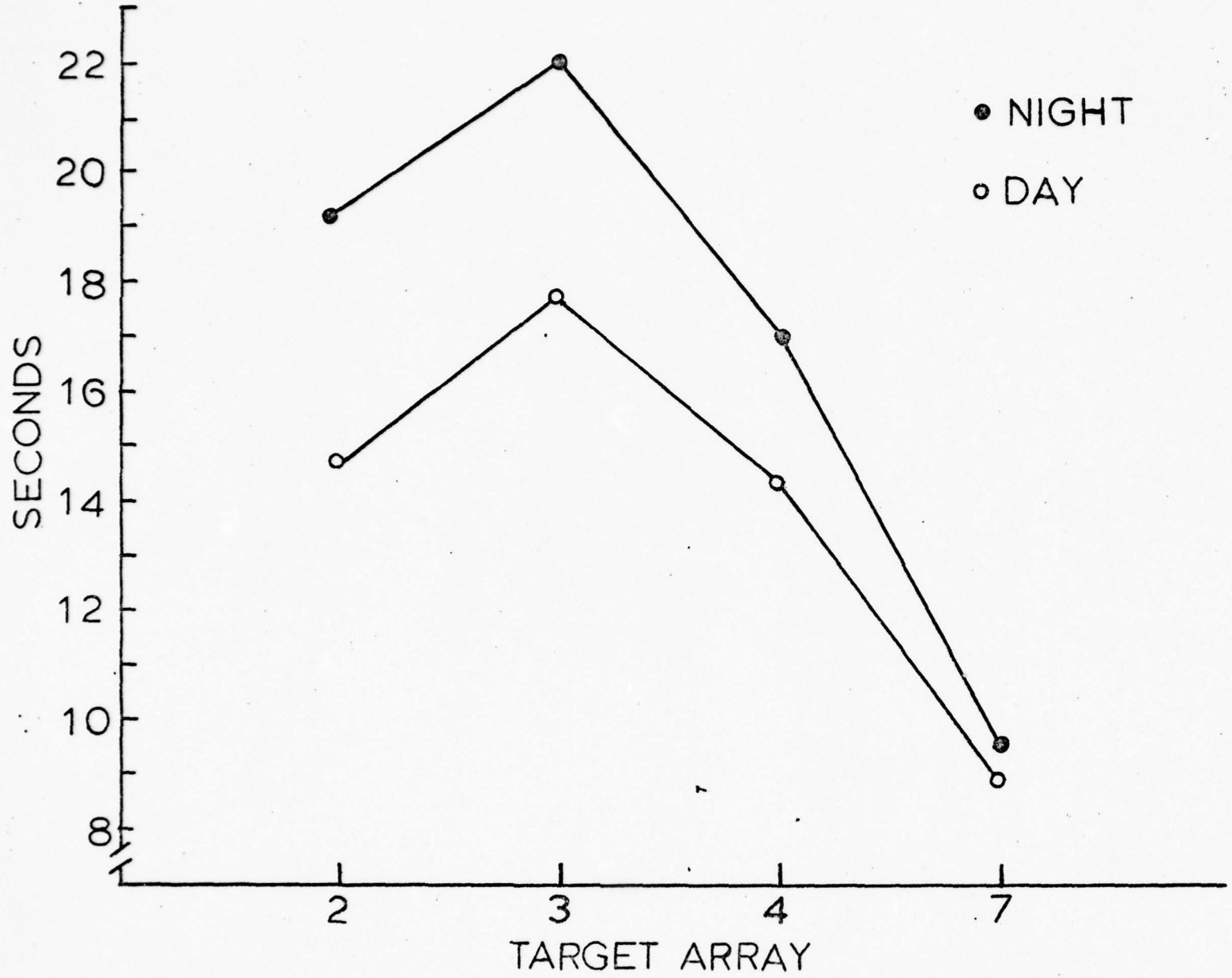


Figure 2. Time to fire first round plotted as a function of target array (Target arrays 2 & 3 - stationary target, precision technique; target array 4 - moving target, precision technique; target array 7 - stationary target, battlesight technique)

were just as short as for the preceding two stationary targets. This might have been due to a learning effect because the tank crews always engaged the targets in the order in which they are listed in the Figure, or it may have been due to characteristics of the target itself; namely, that the target was a large white rectangle.

It might be noted that the firing times were not as low as the maximum times for first round firing that are suggested in TC 17-12-5, (10 seconds for day, 15 seconds for night), although they do fall (with the exception of the second target, day run) within the limits set in the older tank gunnery manual FM 17-12 (15 seconds for day, 25 seconds for night).

Results from the analysis of second round firing times (Figure 3) were similar to those from the first round analysis. Firing times were significantly shorter during the day than at night ($F = 9.01$, $df = 1, 39$, $p < 0.01$) and were significantly shorter for the target requiring use of the battlesight technique than for any of the other targets ($F = 30.42$, $df = 3, 117$, $p < 0.05$ for Neuman-Keuls test). There was also a significant company by day-night interaction ($F = 3.33$, $df = 2, 39$, $p < 0.05$).

The results for main gun hit rate are shown in Figure 4 (first round), Figure 5 (second round), and Figure 6 (first and second rounds combined). The analysis of variance on first round hit rate showed a significant company effect ($F = 3.98$, $df = 2, 39$, $p < 0.05$) in which Company B had the highest hit rate (64 percent) and Company A had the

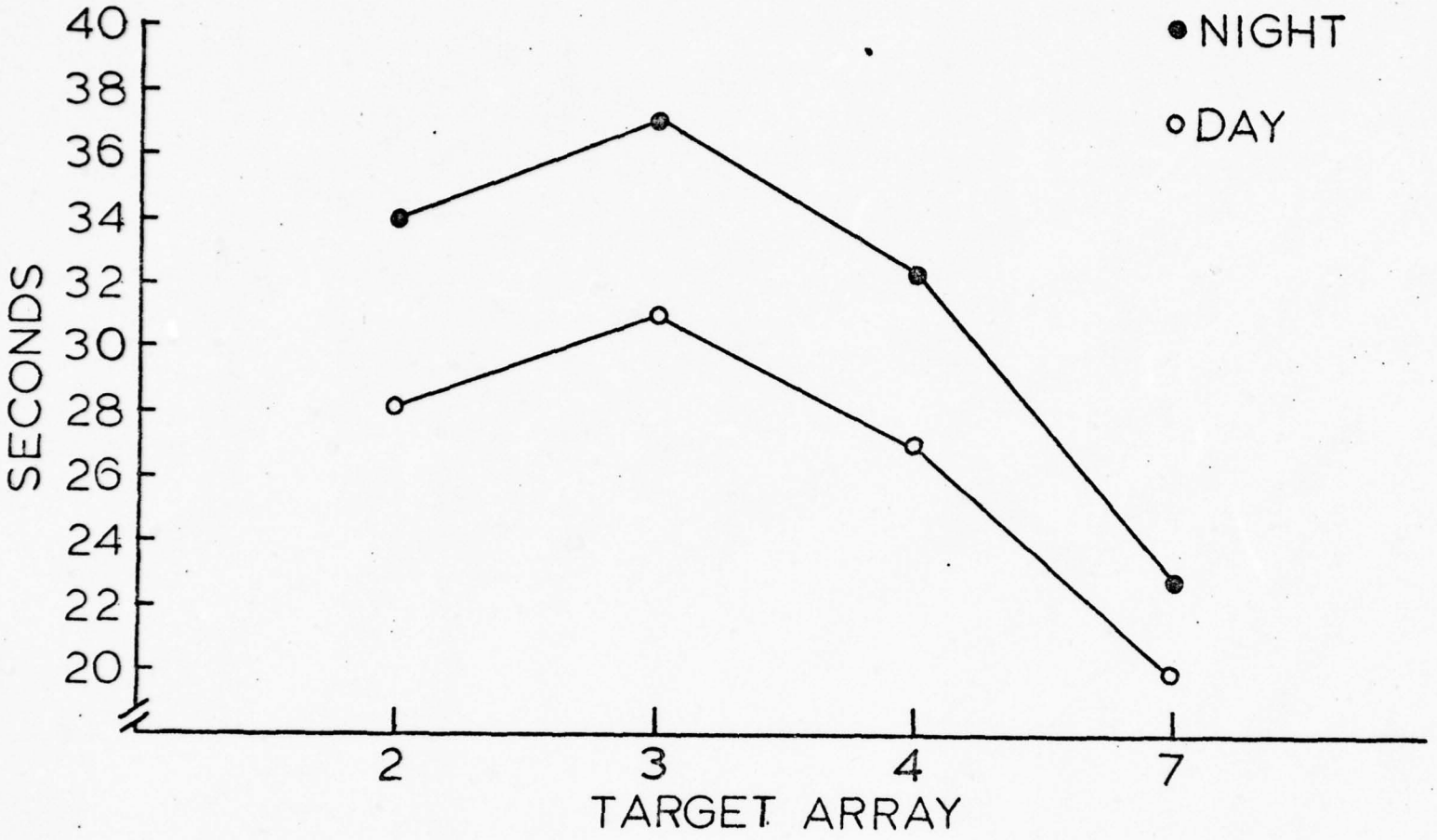


Figure 3. Time to fire second round plotted as a function of target array (Target arrays 2 & 3 - stationary target, precision technique; target array 4 - moving target, precision technique; target array 7 - stationary target, battlesight technique).

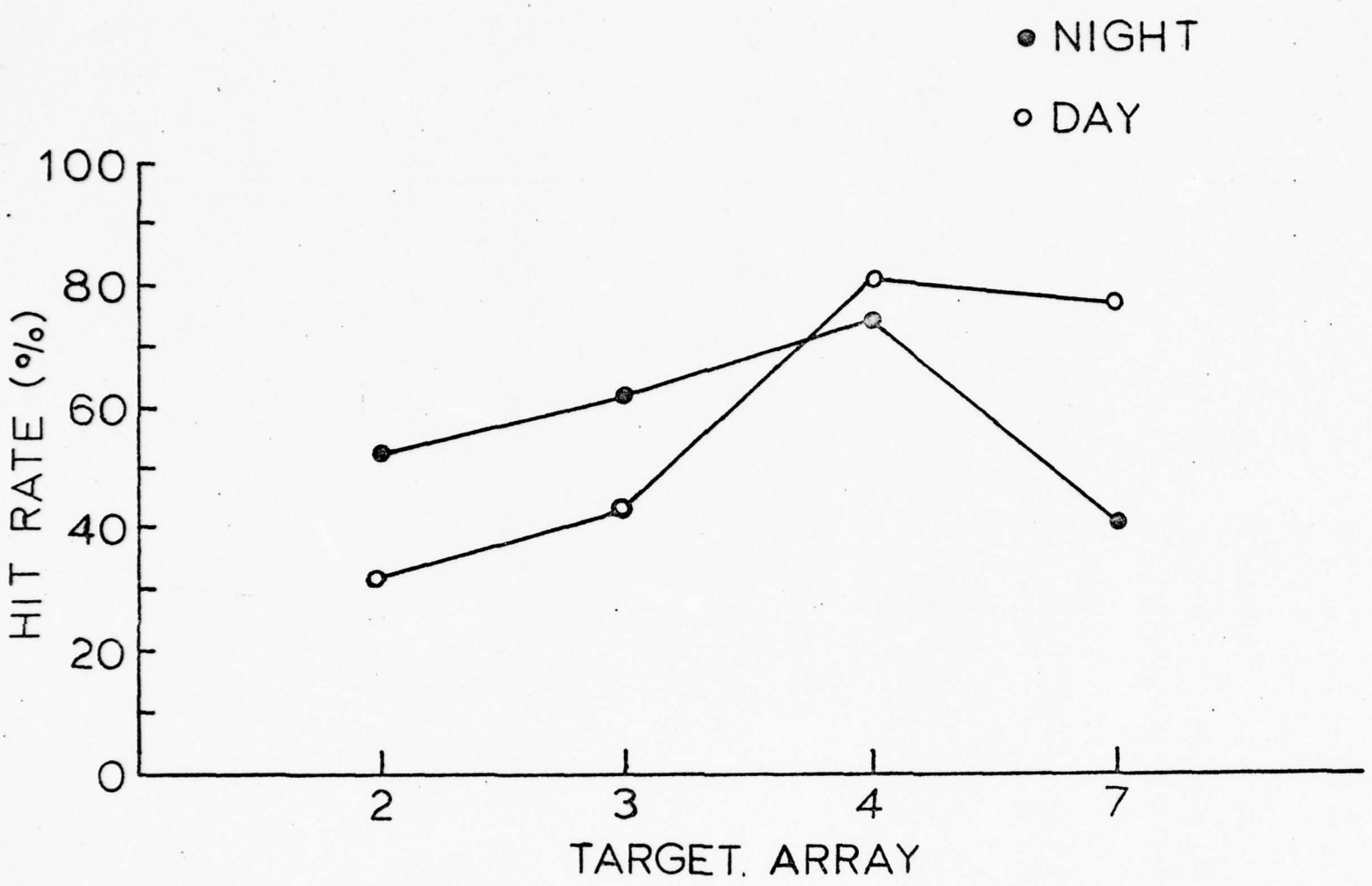


Figure 4. Hit rate for first rounds plotted as a function of target array (Target arrays 2 & 3 - stationary target, precision technique; target array 4 - moving target, precision technique; target array 7 - stationary target, battlesight technique).

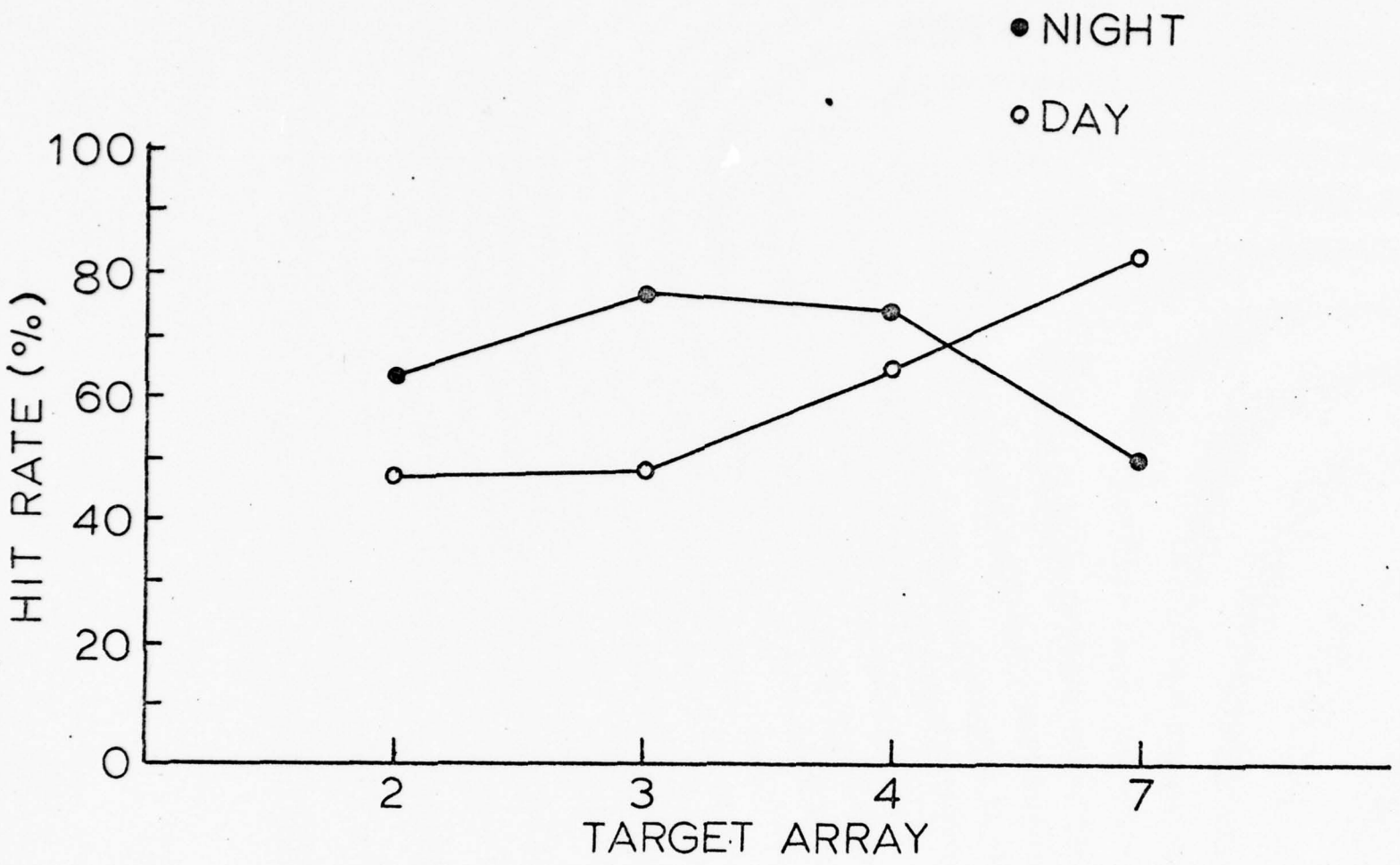


Figure 5. Hit rate for second rounds plotted as a function of target array (Target arrays 2 & 3 - stationary target, precision technique; target array 4 - moving target, precision technique; target array 7 - stationary target, battlesight technique).

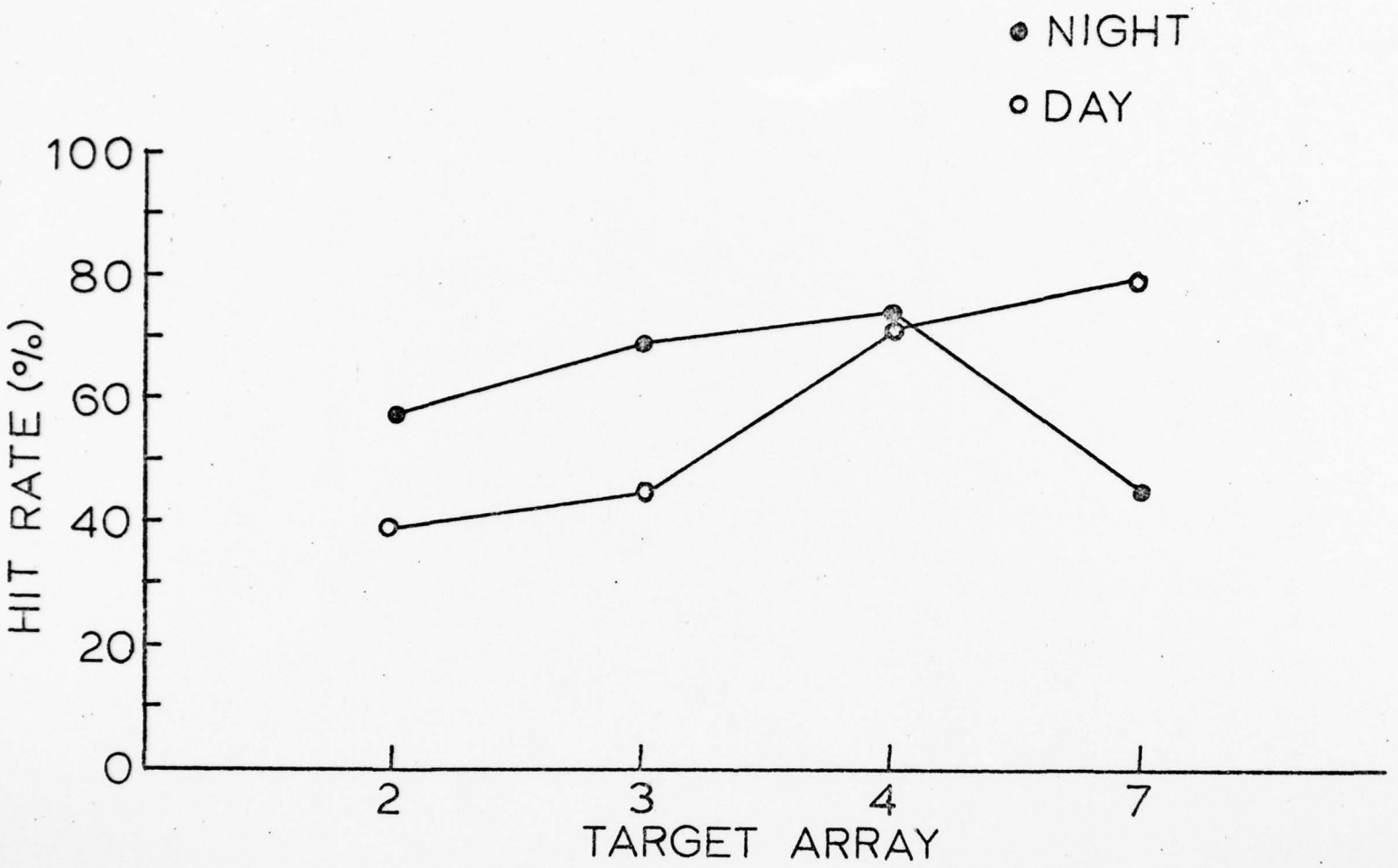


Figure 6. Hit rate for first and second rounds plotted as a function of target array (Target arrays 2 & 3 - stationary target, precision technique; target array 4 - moving target, precision technique; target array 7 - stationary target, battlesight technique).

lowest (46 percent). More interesting is the fact that there was a significant target array effect ($F = 8.97$, $df = 3, 117$, $p < 0.001$), and a significant target array by day-night interaction ($F = 7.66$, $df = 3, 117$, $p < 0.001$). Only the target array by day-night interaction was significant for second round hit rate ($F = 6.93$, $df = 3, 117$, $p < 0.001$). A test for main effects within both the first round and the second round analyses indicated that there were significant target array effects for both day and night conditions ($p < 0.05$ in all cases). The overall hit rate across all conditions was 57 percent for the first round and 63 percent for the second round.

Essentially the same results were obtained when hit rate for both first and second rounds were analyzed together. The average hit rate was 60 percent. An analysis of variance showed a significant target array effect ($F = 6.41$, $df = 3, 117$, $p < 0.001$) and a significant target array by day-night interaction ($F = 10.56$, $df = 3, 117$, $p < 0.001$). A test for main effects indicated that the target array effect was significant for both day and night conditions ($p < 0.05$ in each case).

These statistical results (graphed in Figures 4, 5, and 6) indicate that during daylight conditions hit rate generally became higher as each target was engaged so that for the moving target-precision technique (target array #4) and the stationary target-battlesight technique (target array #7) there was a much higher hit rate (81 percent and 76 percent for first round, 64 percent and 83 percent for second round, and 73 percent and 80 percent for first and second rounds combined) than for the first

stationary target (31 percent for first round, 48 percent for second round, and 39 percent for first and second rounds combined). For night conditions, however, hit rate peaked with the moving target (74 percent for first round, second round, and first and second rounds) and was lowest for the stationary target with battlesight technique (40 percent for first round, 50 percent for second round, and 45 percent for first and second rounds combined).

Two things need to be explained at this point. First is why there was a higher hit rate for the moving target than for the preceding two stationary targets. This is most probably due to the fact that the moving target was a large white rectangular panel, which was probably fairly easy to range on, in contrast to the preceding two targets which were not as symmetrical and were of darker color. The other thing that needs to be explained is why, during night conditions, the battlesight target had the lowest hit rate. It would seem that hit rate would be highest where a battlesight technique was employed because at least on the first round there would be no concern with loading and indexing ammunition but rather concern would primarily be with sighting on the target and firing. One possible explanation for the finding lies in the fact that the searchlight was used to illuminate all of the targets at night except for the battlesight target, for which flare illumination from mortars was used. It is possible that this latter technique provided less direct light on the target than did the searchlight, making it more difficult to sight on the target and thus resulting in a lower hit rate.

A breakdown of main gun rounds by type of miss is shown in Tables 11 (Day), 12 (Night), and 13 (Day and Night combined). What is most noticeable in these tables is that misses were primarily due to ranging error rather than lateral error. It can be seen in Table 13 that, of all the rounds fired, 17 percent were over the target and 18 percent were short of the target, whereas only 3 percent of the rounds were to the right of the target and 1 percent were to the left of it. Stated another way, 88 percent of all main gun misses were due to ranging error whereas only 12 percent were caused by lateral error. It can be further noted that most of the lateral error occurred with the moving target (Target #4) where tracking with insufficient lead on that target (doubtful right category) occurred overall as often as ranging over or short of the target. Tracking too far ahead of the target (resulting in doubtful left misses) seemed to be less of a problem. For the stationary targets, lateral error was almost nonexistent, with almost all of the misses being due to a ranging error. This appeared to be true for both rounds 1 and 2 and for both day and night conditions, although it should be noted that lateral error did appear with some frequency with the battlesight engagement target when the lighting conditions were worst at night (Target #7, where mortar illumination rather than searchlights were used).

Ranging error can be attributed to several causes, among which are improper use of the range finder, use of the wrong ballistic reticle for a given type of ammunition, improper use of the correct reticle, and

TABLE 11

NUMBER AND PERCENTAGE OF HITS AND TYPES OF MISSES FOR EACH MAIN GUN TARGET ON TABLE VIII A-DAY

(Some percentages differ slightly from percentages reported earlier because they are based on 46 tank crews rather than just 42 tank crews which could be used in the earlier inferential statistical analyses.)

ROUND 1

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	14 (30%)	19 (41%)	36 (78%)	36 (78%)	105 (57%)
Overline	7 (15%)	13 (28%)	3 (7%)	6 (13%)	29 (16%)
Shortline	24 (52%)	14 (30%)	5 (11%)	4 (9%)	47 (26%)
Doubtful Right	1 (2%)	0	1 (2%)	0	2 (1%)
Doubtful Left	0	0	1 (2%)	0	1 (1%)
Sum	46	46	46	46	184

ROUND 2

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	23 (50%)	22 (48%)	31 (67%)	38 (83%)	114 (62%)
Overline	4 (9%)	10 (22%)	2 (4%)	6 (13%)	22 (12%)
Shortline	19 (41%)	13 (28%)	6 (13%)	2 (4%)	40 (22%)
Doubtful Right	0	1 (2%)	5 (11%)	0	6 (3%)
Doubtful Left	0	0	2 (4%)	0	2 (1%)
Sum	46	46	46	46	184

ROUNDS 1 and 2

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	37 (40%)	41 (45%)	67 (73%)	74 (80%)	219 (60%)
Overline	11 (12%)	23 (25%)	5 (5%)	12 (13%)	51 (14%)
Shortline	43 (47%)	27 (29%)	11 (12%)	6 (7%)	87 (24%)
Doubtful Right	1 (1%)	1 (1%)	6 (7%)	0	8 (2%)
Doubftul Left	0	0	3 (3%)	0	3 (1%)
Sum	92	92	92	92	368

TABLE 12

NUMBER AND PERCENTAGE OF HITS AND TYPES OF MISSES
FOR EACH MAIN GUN TARGET ON TABLE VIII B-NIGHT

(Some percentages differ slightly from percentages reported earlier because they are based on 46 tank crews rather than just 42 tank crews which could be used in the earlier inferential statistical analyses.)

ROUND 1

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	24 (52%)	29 (63%)	33 (72%)	19 (41%)	105 (57%)
Overline	6 (13%)	14 (30%)	4 (9%)	12 (26%)	36 (20%)
Shortline	15 (33%)	2 (4%)	5 (11%)	9 (20%)	31 (17%)
Doubtful Right	1 (2%)	0	4 (9%)	2 (4%)	7 (4%)
Doubtful Left	0	1 (2%)	0	4 (9%)	5 (3%)
Sum	46	46	46	46	184

ROUND 2

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	29 (63%)	35 (76%)	34 (74%)	24 (52%)	122 (66%)
Overline	9 (20%)	10 (22%)	3 (7%)	15 (33%)	37 (20%)
Shortline	8 (17%)	1 (2%)	1 (2%)	4 (9%)	14 (8%)
Doubtful Right	0	0	7 (15%)	1 (2%)	8 (4%)
Doubtful Left	0	0	1 (2%)	2 (4%)	3 (2%)
Sum	46	46	46	46	184

ROUNDS 1 and 2

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	53 (58%)	64 (70%)	67 (73%)	43 (47%)	227 (62%)
Overline	15 (16%)	24 (26%)	7 (8%)	27 (29%)	73 (20%)
Shortline	23 (25%)	3 (3%)	6 (7%)	13 (14%)	45 (12%)
Doubtful Right	1 (1%)	0	11 (12%)	3 (3%)	15 (4%)
Doubtful Left	0	1 (1%)	1 (1%)	6 (7%)	8 (2%)
Sum	92	92	92	92	368

TABLE 13

NUMBER AND PERCENTAGE OF HITS AND TYPES OF MISSES FOR EACH MAIN GUN TARGET ON TABLES VIII A-DAY AND VIII B-NIGHT COMBINED

(Some percentages differ slightly from percentages reported earlier because they are based on 46 tank crews rather than just 42 tank crews which could be used in the earlier inferential statistical analyses).

ROUND 1

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	38 (41%)	48 (52%)	69 (75%)	55 (60%)	210 (57%)
Overline	13 (14%)	27 (29%)	7 (8%)	18 (20%)	65 (18%)
Shortline	39 (42%)	16 (17%)	10 (11%)	13 (14%)	78 (21%)
Doubtful Right	2 (2%)	0	5 (5%)	2 (2%)	9 (2%)
Doubtful Left	0	1 (1%)	1 (1%)	4 (4%)	6 (7%)
Sum	92	92	92	92	368

ROUND 2

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	52 (57%)	57 (62%)	65 (71%)	62 (67%)	236 (64%)
Overline	13 (14%)	20 (22%)	5 (5%)	21 (23%)	59 (16%)
Shortline	27 (29%)	14 (15%)	7 (8%)	6 (7%)	54 (15%)
Doubtful Right	0	1 (1%)	12 (13%)	1 (1%)	14 (4%)
Doubtful Left	0	0	3 (3%)	2 (2%)	5 (1%)
Sum	92	92	92	92	368

ROUNDS 1 and 2

	Target #2	Target #3	Target #4	Target #7	Total
Target Hit	90 (49%)	105 (57%)	134 (73%)	117 (64%)	446 (61%)
Overline	26 (14%)	47 (26%)	12 (7%)	39 (21%)	124 (17%)
Shortline	66 (36%)	30 (16%)	17 (9%)	19 (10%)	132 (18%)
Doubtful Right	2 (1%)	1 (1%)	17 (9%)	3 (2%)	23 (3%)
Doubtful Left	0	1 (1%)	4 (2%)	6 (3%)	11 (1%)
Sum	184	184	184	184	736

errors in keying ammunition type into the ballistic computer. It was not possible in this study to determine which of the above factors contributed to the ranging errors in this study, but it would seem that this problem is one which should be the object of close study in the future.

It might be noted at this point that a factor contributing to the above results might possibly have been that the gunnery examiners were possibly biased toward using only one dimension in describing misses when in reality misses might have frequently involved two dimensions (e.g., a miss that was "overline" and "left" might have simply been called "overline" by the examiners). This possibility is supported by the fact that no misses were described in more than one dimension on the gunnery score sheets used in this study.

The tank gunnery performance of this battalion can be summarized by saying that their total gunnery scores and the total number of crews who qualified were quite impressive. However, the fact that the crews tended to perform better at night than during the day and the observation that most main gun misses were attributable to ranging error rather than lateral error are events which merit further investigation and analysis in future studies. It also appears that first round firing times were not as short as recent publications suggest that they ideally should be. In this regard, a question arises as to whether crews which get rounds off in a short period of time have a better or worse hit rate than slower crews. In order to answer this question a correlational analysis was

carried out between first round firing times and first round hits for all four target arrays. No significant correlations were found for any of the target arrays under either day or night conditions, thus indicating that rapidity of firing was not associated with the probability of hitting a target. Crews which fired rapidly had about as good a chance of hitting the target as crews which fired more slowly.

In concluding this section on tank gunnery it would seem useful to compare the performance of this National Guard battalion with the performance of an Army battalion. For this purpose, average main gun hit rates on Table VIII were obtained from a battalion in the 1st Cavalry Division that traversed Tank Table VIII in its annual gunnery cycle about three months before the present National Guard battalion did. A brief summary of the results are shown in Table 14. It can be seen that the National Guard battalion measured up quite well to the Army battalion in that overall hit rates averaged across rounds 1 and 2 were the same for both battalions. The two groups differed, however, with respect to their day and night hit rates, with the Army doing better than the National Garud during the night but worse during the day. For both battalions average performance tended to be better at night than during the day, but this effect was far more pronounced for the Army than for the National Guard.

VARIABLES ASSOCIATED WITH GOOD GUNNERY PERFORMANCE

In an attempt to identify variables which were associated with high performance in tank gunnery most of those variables which were earlier

TABLE 14

MAIN GUN HIT RATE (%) ON TANK TABLE VIII FOR 1-263 ARMOR, SCANG (NG), AND A COMPARABLE ARMY BATTALION (A)

	Round 1		Round 2		Rounds 1 and 2 Combined	
	NG	A	NG	A	NG	A
Day	57%	44%	62%	51%	60%	48%
Night	57%	72%	66%	76%	62%	74%
Overall	57%	58%	64%	64%	61%	61%

used to describe tank crew personnel were included in a correlational analysis with gunnery scores. Variables on which crewmen showed little variability were excluded from the analysis. The result of this analysis was that very few of the variables included in this study were significantly correlated with gunnery scores, and those correlations which were significant were not very high.

It was not expected that high correlations would be found for the laoders and drivers because their roles in gunnery activities on Tank Table VIII are very small compared to those of the gunner and tank commander. The driver has to maintain a steady rate of movement on target arrays 1, 6, and 9 so that the tank commander and gunner have a stable platform from which to fire the machineguns, and the loader must be able to load the Cal. 30 machinegun, distinguish between HEP and HEAT ammunition, and rapidly load the main gun. These duties, although important, are not as complex, extensive, or as crucial to Tank Table VIII gunnery as are the duties of the tank commander, which include, for example, ranging on the target, laying the main gun, giving fire commands, sensing rounds, and firing the Cal. 50 machinegun, or of the gunner, which include sighting on the target with the appropriate reticle, tracking a moving target, and employing fire adjustment procedures. In short, performance on Tank Table VIII is much more a function of gunner and tank commander skills than of loader and driver skills.

From this perspective, then, it seems reasonable to focus upon the correlations for tank commanders (Appendix XI) and gunners (Appendix XII).

[It should be kept in mind when scanning Appendices XI and XII that a relatively high correlation coefficient may not be statistically significant if the sample size from which it is derived is rather small; such was the case with several of the coefficients listed in these Appendices]. For tank commanders only three variables were significantly correlated with tank gunnery. The amount of time spent in the National Guard was positively correlated with night gunnery score ($r = + 0.38$, $p < 0.05$) and General Maintenance aptitude score was positively correlated with day gunnery score ($r = + 0.49$, $p < 0.05$). Of more interest, perhaps, is the fact that age of the tank commander was positively correlated with both total and night gunnery score ($r = + 0.38$ in each case, $p < 0.05$), thus indicating that tank crews with older tank commanders tended to perform better in tank gunnery than crews with younger tank commanders. This could be attributed to several causes, such as; 1) older tank commanders have more experience in handling tank crews and are better able to supervise and motivate the men to maximum proficiency, and/or 2) older tank commanders have had more practice on the manual skills that they personally need for good tank gunnery. Both of these variables should be investigated in future studies. Results of such an investingation would indicate whether selection of good tank commanders should be based on their leadership skills, their technical skills associated with tank gunnery, or both.

With respect to gunners, it is interesting to note that grade was significantly correlated with total gunnery score ($r = + 0.34$) such that

crews with gunners of higher grade tended to perform better than crews with gunners of lower grade. This is rather interesting in light of the evidence presented earlier that this battalion was using some very low ranking individuals as gunners. The above correlation indicates that this might not be a good idea, although the situation certainly warrants further investigation.

Special mention should be made of the relationship between how long tank commanders and gunners had served together as a crew and their day, night, and total gunnery scores. Correlation coefficients were calculated and were found to be very low (-0.01, -0.23, and -0.17, respectively) with none of them being statistically significant ($p < 0.05$). This indicates that the length of time that tank commanders and gunners had served together as a crew had very little to do with how well they performed on Tank Table VIII.

CONCLUSIONS

The following conclusions can be made from this analysis.

Tank Crews. The individuals in this National Guard battalion grew up in and continued to reside in rural areas or small towns of South Carolina. Most of them were white, married, and had graduated from high school but had not gone on to college. More than half of them attended Armor AIT and felt that it provided adequate training for gunners, loaders, and drivers. They had been in the National Guard for a fairly long period of time (over 14 years on the average for tank commanders), and often remained with the same crew for several years, though it should be noted that this was not a long time as far as actual training time was involved. Tank commanders estimated that they had a different gunner and loader once every two years and a different driver once every three years. Many crewmen were in a crew position which was not commensurate with their grade, a situation which was especially characteristic of gunners and suggested that crewmen were selected for positions on the basis of criteria other than just grade. Very few crewmen had any combat experience. They felt that their job was important, that they were adequately trained for it, and they were relatively satisfied with the conditions in which they had to work. There was a substantial number of individuals in the unit who had remained in the Guard beyond their minimum period of enlistment. They held their commanders in rather high regard and a majority of them indicated that they considered at least one other member of their crew to be a close friend. Seldom did they have disciplinary problems

requiring a court martial. Their aptitude test scores for military jobs lay close to the norm and they were in a high state of medical fitness.

Training Program. The emphasis of the 1974-75 training year was on tank gunnery. One hundred twenty-five duty hours were scheduled for training and 77 percent of these were spent on tank gunnery and related subjects. The gunnery subjects which took up most of the time were Tank Crew Qualification Course, Tank Tables I, II, and III, Prepare to Fire Procedures, and Preliminary Gunnery Exam. The Annual Training period at Fort Hood involved one week on Tank Tables IV, V, and VI, two days on Tank Table VII, and culminated with the gunnery test on Tank Table VIII. The amount of ammunition fired on the Tank Tables was comparable to that listed for tank crew qualfiication in FM 17-12.

Gunnery Performance. Gunnery performance of the battalion after its year of tank gunnery training was quite impressive, with only three (7 percent) of the 47 crews failing to qualify on Tank Table VIII. Sixty-one percent of the crews were rated Qualified and the remaining 33 percent achieved the rating of Qualified Distinguished. The average gunnery score was 1,863 out of a possible total of 2,400. The overall hit rate with the main gun was 57 percent of the first round, 64 percent for the second round, and 61 percent for the first and second rounds combined.

Interestingly, night scores tended to be better than day scores and it was suggested that this could have been due to one or several factors, including a possible sharper target-background contrast with the search-lights at night, difficulty in detecting hits and misses by the examiners

at night, and a learning effect due to the fact that the night run always followed the day run. The situation was further complicated by the fact the day and night scores were not correlated with each other. This implies that different skills were involved in day and night gunnery and/or that scoring on the day and/or night portions of the test was unreliable. These are problems which should be addressed in future studies.

Average first round firing times fell within the limits set in FM 17-12 and, as expected, were shortest for the target array which required use of the battlesight technique. Unexpectedly, hit rate tended to be highest for the moving target requiring the precision technique. This latter finding was possibly a result of experience with traversing Tank Table VIII since the moving target was always the third target in the test, or it might have been due to the characteristics of the target itself in that the target was a large white rectangular panel.

Interestingly, most main gun misses were due to ranging error with only a few misses being attributable to lateral error, a situation which implies that the subject of ranging should receive considerable attention during gunnery training. This is an area in which it would appear that future research would prove quite productive and valuable.

Finally, it was found that there was no association between how fast a crew fired the first round at a target and its probability of hitting the target. It would be interesting to know whether forcing a crew to fire sooner than it was used to would affect its performance.

Variables Associated with Good Tank Gunnery. There were very few

variables in this study which were significantly correlated with gunnery performance. Those variables which showed a significant positive association with gunnery scores included age of the tank commander and the grade of the gunner. This latter variable should be closely examined in future studies since the grade range of gunners in this battalion was quite large. Of special interest is the finding that there was no relationship between how long a tank commander and gunner had served together as a crew, and their performance in tank gunnery.

It should be noted that by using a stepwise multiple regression technique it would be possible to determine whether or not selected variables could be combined in order to predict gunnery score. This technique requires complete sets of data across all individuals for all of the variables being included in the analysis. This requirement could be met for only a very small sample of individuals in the present study and so the technique was not employed here on the grounds that the results might not be valid for the group as a whole. It is suggested, however, that the technique be considered for use in future studies where a larger sample size is available.

In conclusion it is recommended that this type of investigation be expanded to other National Guard and Army Reserve units so that comparisons between this battalion and other battalions can be made with respect to training programs, crew characteristics, and gunnery performance. Such comparisons could perhaps help identify training programs and crew related variables which lead to superior gunnery performance.

In addition, similar comparisons could be made with Army Armor units in order to determine to what extent training procedures in the Army are appropriate for training in the Reserves.

REFERENCES

Headquarters, Department of the Army, Tank Gunnery (FM 17-12), 1972.

Headquarters, Department of the Army, Tank and M551 Gunnery Training (Army Subject Schedule 17-12), 1971.

Headquarters, Department of the Army, Operators Manual: M73, M73A1, and M219 Machineguns (TM 9-1005-233-10), 1974.

Headquarters, Department of the Army, Operators Manual for Tank, Combat, Full Tracked: 105mm Gun, M60A1 W/E and M60 W/E (TM 9-2350-215-10), 1969.

U.S. Army Armor School, Training Tank and Sheridan Crews to Shoot (TC 17-12-2), 1974.

U.S. Army Armor School, Tank Gunnery Training (TC 17-12-5), 1975.

APPENDIX I

CRITTENBERGER RANGE

Tank #_____
Date_____
Total Score_____

TANK TABLE VIII A (DAY)

Tank Commander_____
Gunner_____
Loader_____
Driver_____

TARGET ARRAY	# OF ROUNDS	ITEM & POSSIBLE POINTS	SCORE
#1 Troops (10 "E" Type)	100 rds Coax (Tank Moving)	Opened fire within 15 seconds-----20 Completed within 75 seconds------- 5 Fire commands, crew duties and techniques of fire (maximum)------15 Target effect (maximum 5/5 area)--50 Total Possible---------90	_____ _____ _____ _____ Total_____
#2 Tank (1600 meters)	2 rds HEAT-T (Tank Stationary)	1st round fired within 15 seconds-30 Fire commands and crew duties-----35 Completed within 45 seconds-------10 Target hit 1st round----------65 Target hit 2nd round----------45 Total Possible--------185	_____ _____ _____ _____ _____ Total_____
#3 Antitank (Hull Plate) (950 meters)	2 rds HEP-T (Telescope) (Tank Stationary)	1st fired within 15 seconds-------30 Fire commands and crew duties-----35 Completed within 45 seconds-------10 Target hit 1st round----------65 Target hit 2nd round----------45 Total Possible--------185	_____ _____ _____ _____ _____ Total_____
#4 Moving White 8' x 10' panel (1025 meters) (right to left)	2 rds HEAT-TPT (Tank Stationary)	1st round fired within 15 seconds-30 Fire commands and crew duties-----35 Completed within 45 seconds-------10 Target hit 1st round----------65 Target hit 2nd round----------45 Total Possible--------185	_____ _____ _____ _____ _____ Total_____
#5 Moving Truck (Panel)	100 rds Coax (Tank Stationary)	Opened fire within 15 seconds-----20 Completed within 75 seconds------- 5 Fire commands, crew duties, and techniques of fire (maximum)------15 Each hit on target 10 pts (maximum of 5 hits)----------50 Total Possible---------90	_____ _____ _____ _____ Total_____

TARGET ARRAY	# OF ROUNDS	ITEM & POSSIBLE POINTS	SCORE
#6 Troops (10 "E" Type)	50 rds Cal. 50 (Tank Moving)	Opened fire within 20 seconds-----20	_____
		Completed within 60 seconds------- 5	_____
		Procedure & Technique of fire (maximum)----------15	_____
		Target effect (maximum 5/5)-------50	_____
		Total Possible---------90	Total_____
#7 Tank Battlesight 1400 meters	2 rds HEAT-T (Tank Stationary)	1st round fired within 5 seconds--30	_____
		Fire commands and crew duties-----35	_____
		Target hit 1st round----------20	_____
		Target hit 2nd round (Refer to scale)----------	_____
		(Note: If 1st round hit in 1 to 35 seconds 20 pts is all that is awarded. For 2nd round hit, use the scale).	
		Total Possible--------185	Total_____
#8 (Truck)	50 rds Cal .50 (Tank Stationary)	Opened fire in 20 seconds---------20	_____
		Completed within 60 seconds------- 5	_____
		Procedure & technique of fire-----15	_____
		Hits on the target----------60	_____
		Total Possible--------100	Total_____
#9 Troops (10 "E" Type)	100 rds Coax (Tank Moving)	Opened fire within 15 seconds-----20	_____
		Completed within 75 seconds------- 5	_____
		Fire commands, crew duties, and technique of fire (maximum)-------15	_____
		Target effect (maximum 5/5)-------50	_____
		Total Possible---------90	Total_____
		Maximum Possible Score-------1200	Total Score_____

Sliding scale for second round on target #7:

SECONDS	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
POINTS	100	96	92	88	84	80	76	72	68	64	60	56	52	48	44	40	36	32	28	24	20

CRITTENBERGER RANGE

Tank #_____
Date_____
Total Score_____

TANK TABLE VIII B (NIGHT)

Tank Commander_____
Gunner_____
Loader_____
Driver_____

TARGET ARRAY	# OF ROUNDS	ITEM & POSSIBLE POINTS	SCORE
#1 Troops (10 "E" Type) White Light wide beam	100 rds Coax (Tank Moving)	Opened fire within 25 seconds----20 Completed within 1 min & 30 seconds---------- 5 Fire commands, crew duties and technique of fire (maximum)------15 Target effect (maximum 5/5 area)-50 Total Possible--------90	_____ _____ _____ _____ Total_____
#2 Tank (1600 meters) White Light Focus	2 rds HEAT-T (Tank Stationary)	1st round fired within 25 seconds-30 Fire commands and crew duties-----35 Completed within 1 minute---------10 Target hit 1st round----------65 Target hit 2nd round----------45 Total Possible--------185	_____ _____ _____ _____ _____ Total_____
#3 Antitank (Hull Plate) White Light Focus (950 meters)	2 rds HEP-T (Telescope) (Tank Stationary)	1st round fired within 25 seconds-30 Fire commands and crew duties-----35 Completed within 1 minute---------10 Target hit 1st round----------65 Target hit 2nd round----------45 Total Possible--------185	_____ _____ _____ _____ _____ Total_____
#4 Moving White 8' x 10' panel, White Light (1025 meters) (right to left)	2 rds HEAT-TPT (Tank Stationary)	1st round fired within 25 seconds-30 Fire commands and crew duties-----35 Completed within 1 minute---------10 Target hit 1st round----------65 Target hit 2nd round----------45 Total Possible--------185	_____ _____ _____ _____ _____ Total_____
#5 Moving Truck (Panel) White Light	100 rds Coax (Tank Stationary)	Opened Fire within 25 seconds-----20 Completed within 1 min 20 seconds- 5 Fire commands, crew duties, and techniques of fire (maximum)------15 Each hit on target 10 pts (maximum of 5 hits)----------50 Total Possible---------90	_____ _____ _____ _____ Total_____

TARGET ARRAY	# OF ROUNDS	ITEM & POSSIBLE POINTS	SCORE
#6 Troops (10 "E" Type) White Light wide beam	50 rds Cal .50 (Tank Stationary)	Opened fire within 30 seconds-----20 Completed within 75 seconds------- 5 Procedure and technique of fire (maximum)----------15 Target effect (maximum 5/5)--------50 Total Possible---------90	_____ _____ _____ _____ Total_____
#7 Tank Battlesight 1400 meters	2 rds HEAT-T (Tank Stationary)	1st round fired within 10 seconds-30 Fire commands and crew duties-----35 Target hit 1st round----------20 Target hit 2nd round (Refer to scale)----------	_____ _____ _____ _____
Mortar Illumination			

Sliding scale for second round on target #7:

SECONDS	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
POINTS	100	96	92	88	84	80	76	72	68	64	60	56	52	48	44	40	36	32	28	24	20

(Note: If 1st round hit in 1 to 10 seconds, 20 pts is awarded. For 2nd round hit, use the scale).

Total Possible--------185 Total_____

#8 (Truck) White Light Focus	50 rds Cal .50 (Tank Stationary)	Opened fire in 30 seconds---------20 Completed within 75 seconds------- 5 Procedure and technique of fire---15 Hits on the target----------60 Total Possible--------100	_____ _____ _____ _____ Total_____
#9 Troops (10 "E" Type) White Light wide beam	100 rds Coax (Tank Moving)	Opened fire within 25 seconds-----20 Completed within 1 minute 30 seconds---------- 5 Fire commands, crew duties, and techniques of fire (maximum)------15 Target effect (maximum 5/5)--------50 Total Possible---------90	_____ _____ _____ _____ Total_____

Maximum Possible Score_____1200 Total Score_____

APPENDIX II

SURVEY OF TANK CREWS

IN THE ARMY NATIONAL GUARD

August 1975

TANK CREW MEMBER QUESTIONNAIRE

The Department of the Army is conducting a study to improve tank crew training. As part of this study a survey of tank crew members is being conducted. You can be of great assistance to the project by answering the attached questions as accurately as possible.

Do not hesitate to give your honest opinions where appropriate. Your answers will only be used in combination with hundreds of others in the effort to improve training. Information about you as an individual will not be used or released to others for use.

Read all questions and instructions carefully. Each group of questions requires a different type of answer. If you do not understand any instructions, questions, or answer choices, ask the questionnaire administrator for assistance.

Thank you for your cooperation.

NAME_____ SSN_____

RANK_____ TIME IN GRADE_____(months)

PLATOON_____ COMPANY_____ BATTALION_____

NAMES OF OTHER MEMBERS OF YOUR CREW_____

_____

_____

JOB TITLE OF YOUR CIVILIAN OCCUPATION_____

PRIMARY MOS_____ DUTY MOS_____

HEIGHT_____ WEIGHT_____ AGE_____(years)

11E-MOS BACKGROUND

1. Did you take the Advanced Individual Training (AIT) course for tank crewmen, MOS 11E?

a. YES _____

b. NO _____

1a. If yes, indicate the date when you graduated from the course.

Month_____ Year_____

2. What other 11E=MOS training schools, or courses, have you taken and completed? Give course names and dates of completion.

NAME OF COURSE	DATE COMPLETED Month	Year
_____	_____	
_____	_____	
_____	_____	

PRESENT TANKCREW ASSIGNMENT

3. When were you assigned to your permanent crew?

Month_____ Year_____

4. Do you regularly train with your permanent crew?

a. _____Yes

b. _____No, have Special Duty assignment

c. _____No, assigned to another crew

d. _____Other (Specify)_____

5. What is your presently assigned crew position?

a. _____Tank Commander

b. _____Gunner

c. _____Driver

d. _____Loader

e. _____Not assigned to a particular crew position. I fill in where needed.

f. _____Other (Describe)_____

6. Since joining your present permanent crew, indicate what crew positions you have been assigned to by entering the date assigned to the crew position (beginning date) and the date re-assigned to a different crew position or different crew (ending date). (Enter a zero for crew positions not assigned to.)

	Month & Year Assigned	Month and Year Reassigned
TC	_____	_____
G	_____	_____
D	_____	_____
L	_____	_____

7. Since assignment to your present crew position, how many different people have been assigned to the other three crew positions in your crew? (Enter a 1 on the line for your position).

a. _____have been assigned as TC.

b. _____have been assigned as Gunner.

c. _____have been assigned as Driver.

d. _____have been assigned as Loader.

8. Since you were originally assigned to this crew, how many different people have been assigned to each crew position? (Include all assignments and re-assignments that have occurred for each position including your own).

a. _____have been assigned as TC.

b. _____have been assigned as Gunner.

c. _____have been assigned as Driver.

d. _____have been assigned as Loader.

9. How long (months) have you served in each tank crew position since you have been in the Army? Respond for each position and enter 0 for position(s) not served in.

a. Tank Commander _____(months).

b. Driver _____(months).

c. Gunner _____(months).

d. Loader _____(months).

10. What crew position did you fill when firing Table VIII?

a. _____Tank Commander.

b. _____Gunner.

c. _____Driver.

d. _____Loader

11. Did you serve in combat in Vietnam?

a. _____Yes

b. _____No

12. Did you serve in Vietnam in a Tanker's MOS (11E)?

a. _____Yes

b. _____No

BACKGROUND

13. How much schooling have you completed? (Circle one)

Grade School								High School				College or Vocational				Graduate School		
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

(Circle letter indicating which attended: C (College)
V (Vocational)

Degrees Attained (Mark those appropriate):

a. _____High School Diploma

b. _____GED Diploma

c. _____Trade School Diploma

d. _____AA (Community College) Degree

e. _____BA - BS Degree

f. _____MA - MS Degree

g. _____PhD

14. While you were growing up - say until you were seventeen - what kind of place did you live in most of the time?

a. _____Rural area (not considered a farm)

b. _____Farm

c. _____Town of less than 10,000

d. _____City of 10,000 - 50,000

e. _____City of 50,000 - 100,000

f. _____City of over 100,000

15. What is your current marital status?

a. _____Single

b. _____Married

c. _____Legally separated

d. _____Divorced

e. _____Widowed

f. _____Engaged

16. Where do you live? (Name of town or city)_____

17. How long have you been in the National Guard?

_____years _____months.

18. How long, if ever, were you on active duty in the Army?

_____years _____months

19. I entered military service as a:

a. _____Volunteer in the Regular Army (RA).

b. _____Draftee (US).

c. _____Volunteer in the National Guard.

d. _____Other (Specify)_____

20. Have you been reduced in rank for reasons other than reenlistment or loss of battlefield commissions?

a. _____Never

b. _____Once

c. _____Twice

d. _____Three or more times

21. How many months do you have left to serve on your current enlistment?

_____months

22. Do you plan to reenlist?

a. _____Yes, definitely

b. _____Probably

c. _____Undecided

d. _____Probably not

e. _____No

23. In which of these ethnic groups do you generally place yourself?

a. _____American Indian

b. _____Asian American or Oriental

c. _____Black or Afro American

d. _____Cuban American

e. _____Filipino American

f. _____Mexican American

g. _____Puerto Rican

h. _____White or Caucasian

i. _____Other (Please Specify):

_____

OPINIONS CONCERNING WORKING CONDITIONS

We would like to know some of your feelings about the crew position to which you are currently assigned. Using the answers listed below, marked A, B, C, D, and E, answer questions 24 thru 48 by circling one of the five letters below or beside each question.

ANSWER CHOICES

A. Very great
B. Great
C. Some
D. Little
E. Very little

24. To what extent do you enjoy performing the duties of your crew position?

A B C D E

25. To what extent do the working conditions in your unit help you to perform your duties and make you want to work hard? (Consider such working conditions as (1) The kind of instruction and help you get from your boss; (2) The kind of help you get from your teammates; (3) How well jobs are planned and organized by supervisors; (4) How well your supervisors give necessary support, such as providing technical guidance, the right tools, spare parts, test equipment, and material; and (5) Favorable recognition for doing good work and disapproval for bad work).

A B C D E

26. To what extent do you gain a sense of accomplishment from doing the day-to-day tasks that make up your crew duties?

A B C D E

27. To what extent has the training you have received in your unit improved your ability to perform your crew duties?

A B C D E

28. To what extent are the people you work with a team that works together?

A B C D E

29. To what extent does your MOS match your interests, knowledge and skills?

29a. Interests A B C D E

29b. Knowledge A B C D E

29c. Skills A B C D E

ANSWER CHOICES

A. Very great
B. Great
C. Some
D. Little
E. Very little

30. To what extent are the tasks you perform in this unit important?

A B C D E

31. To what extent are the tasks you perform in this unit challenging?

A B C D E

32. If you could be awarded any MOS that you could qualify for, to what extent would you like to change from your present MOS?

A B C D E

33. To what extent do you think the tank commander's performance is important to the accomplishment of your crew's mission?

A B C D E

34. To what extent do you think the driver's performance is important?

A B C D E

35. To what extent do you think the gunner's performance is important?

A B C D E

36. To what extent do you think the loader's performance is important?

A B C D E

Questions 37 thru 47 ask about your opinions of your immediate supervisor: the person who is directly above you in command. If you are a crewman your immediate supervisor is the TC. For the purposes of this questionnaire, the immediate supervisor of a TC is the platoon leader.

37. To what extent does your immediate supervisor care about your personal problems?

A B C D E

38. To what extent does your immediate supervisor solve problems before they get out of hand?

A B C D E

ANSWER CHOICES

A. Very great
B. Great
C. Some
D. Little
E. Very little

39. To what extent does your immediate supervisor encourage his men to work together as a team?

A B C D E

40. To what extent does your immediate supervisor keep himself informed about the progress his men are making in their work?

A B C D E

41. To what extent does your immediate supervisor work right along with his men?

A B C D E

42. To what extent does your immediate supervisor provide for the everyday needs of his men?

A B C D E

43. To what extent does your immediate supervisor explain why a particular action is important?

A B C D E

44. To what extent is your immediate supervisor willing to accept responsibility for mistakes made by his men?

A B C D E

45. To what extent does your immediate supervisor take an interest in you as a person as well as in how well you do your job?

A B C D E

46. To what extent is your immediate supervisor interested in getting your ideas and suggestions?

A B C D E

ANSWER CHOICES

A. Very great
B. Great
C. Some
D. Little
E. Very little

47. To what extent are you allowed to take part in the decisions about how your unit goes about performing its tasks?

A B C D E

48. To what extent does your supervisor tell you how well you are performing your duties?

A B C D E

49. Circle the positions below (Excluding your own) of the men in your crew you consider as close friends. (For example, guys in the crew you hang around with after duty hours.)

a. Driver

b. Tank Commander

c. Gunner

d. Loader

e. None

50. Circle the letter which best describes how you would rank your tank crew relative to other tank crews in your company.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q

(Best tank crew) (Average tank crew) (Worst tank crew)

50 a. Using the 9 point scale below, circle the letter which best describes how you would rank the overall performance of your company commander relative to other company commanders you are familiar with.

1	2	3	4	5	6	7	8	9
a	b	c	d	e	f	g	h	i

(Best I ever saw — (Average) — (Worst I ever saw

50 b. Using the 9 point scale below, circle the letter which best describes how you would rank the overall performance of your battalion commander relative to other company commanders you are familiar with.

1	2	3	4	5	6	7	8	9
a	b	c	d	e	f	g	h	i

(Best I ever saw — (Average) — (Worst I ever saw

QUALITY OF TRAINING IN YOUR CREW

Using the answers below, indicate the status of your crew in each of the following areas (Items 51 thru 62):

ANSWER CHOICES

A. Over-trained
B. Fully trained
C. Adequately trained
D. Under-trained
E. Untrained
F. Don't understand training subject

51. _____Vehicle Maintenance
52. _____Radio maintenance
53. _____Radio procedures
54. _____Tank tactics
55. _____Vehicle recovery
56. _____Night operations
57. _____Nuclear-Bio-Chem Warfare
58. _____Raft shipment/crossing
59. _____Deepwater fording
60. _____Physical training
61. _____Gunnery
62. _____Individual weapons

63. What is the minimum time a crew should serve and train together to be well trained?

a. Platoon missions_____months.

b. Company missions_____months (include platoon training time entered in 63a.)

c. Battalion missions_____months (include company training time entered in 63b.)

64. How many National Guard duty hours do you normally have in a month?

_____hours.

65. How many of these hours are normally devoted to training?

a. In the field? _____hours

b. At the armory? _____hours

66. Approximately how many hours of this training time is spent in MOS-related training each month?

a. In the field? _____hours

b. At the armory? _____hours

67. How important is the job you are doing in the Army National Guard?

a. _____Not important at all.

b. _____Somewhat important

c. _____Fairly important.

d. _____Moderately important.

e. _____Very important.

CONTINUED ON NEXT PAGE

YOUR OPINION OF AIT TRAINING

When a new trainee has completed the Advanced Individual Training Course (AIT) for the 11E MOS at Fort Knox and reports to his first tactical unit, how well prepared is he to perform all the duties for each crew position?

Use a fully trained and experienced tank crewman as the standard for comparison. Select the choices listed below to indicate how well prepared the trainee would be for performing the skills and duties for each tank crew position described. (If you did not attend AIT for 11E MOS, place a check here ☐ and go ahead and answer the questions, basing your answers on your experience with AIT graduates.)

ANSWER CHOICES

A. Fully Trained - Completely proficient in understanding and executing the task. Needs no supervision.

B. Adequately Trained - Is proficient in the fundamental skills and doctrine, but needs guidance and experience to master the advanced skills and techniques.

C. Under Trained - Below average capability in fundamental skills and doctrine, and needs additional training, practice, and close supervision.

D. Inadequately Trained - Is not proficient in fundamental skills and doctrine, needs retraining in the basic subjects.

E. Untrained - Cannot perform any of the basic skills.

GUNNER DUTIES

68. Perform prepare-to-fire checks.

A B C D E

69. Use all fire control systems.

A B C D E

70. Identify/acquire targets.

A B C D E

ANSWER CHOICES

A. Fully Trained.
B. Adequately Trained.
C. Under Trained.
D. Inadequately Trained.
E. Untrained.

71. Identify a proper sight picture and use all sight reticles.
A B C D E

72. Sense rounds. A B C D E

73. Engage targets.
A B C D E

74. Use the correct fire adjustment procedures.
A B C D E

75. Track targets smoothly.
A B C D E

76. Fire missile (M551 and M60A2 only).
A B C D E

77. Use passive/IR sighting system.
A B C D E

78. Operate laser rangefinder, if so equipped, from gunner's position.
A B C D E

79. Apply range estimation.
A B C D E

80. Employ misfire procedures.
A B C D E

81. Prepare and use range card.
A B C D E

82. Use intercom. A B C D E

83. Knowledge of tactics, including fire discipline techniques used in multiple-target fire fights, ambushes, and coordinated platoon fire.
A B C D E

84. Knowledge and ability of gunner's duties in operator/crew level maintenarce.
A B C D E

ANSWER CHOICES

A. Fully Trained.
B. Adequately Trained.
C. Under Trained.
D. Inadequately Trained.
E. Untrained.

85. Knowledge and ability of gunner's duties in battalion level maintenance.
A B C D E

DRIVER DUTIES

86. Perform before-, during-, and after-operation checks.
A B C D E

87. Accelerate and decelerate smoothly.
A B C D E

88. Maintain correct speeds.
A B C D E

89. Judgment of ground conditions that will either support or not support the weight of the tank.
A B C D E

90. Select a route providing a stable platform.
A B C D E

91. Select a firing position.
A B C D E

92. Perform evasive maneuvers.
A B C D E

93. Use night vision equipment.
A B C D E

94. Identify/acquire targets.
A B C D E

95. Sense rounds. A B C D E

96. Use intercom. A B C D E

97. Select route providing cover and concealment .
A B C D E

98. Select firing positions providing hull-down protection.
A B C D E

ANSWER CHOICES

A. Fully trained
B. Adequately trained
C. Under trained
D. Inadequately trained
E. Untrained

99. Select alternate firing positions in advance.

A B C D E

100. Knowledge of tactics, including understanding of tactical formations and proper position in formations.

A B C D E

101. Knowledge and ability of driver's duties in operator/crew level maintenance.

A B C D E

102. Knowledge and ability of driver's duties in battalion level maintenance.

A B C D E

LOADER DUTIES

103. Store all types of ammo quickly and correctly.

A B C D E

104. Identify main gun ammunition.

A B C D E

105. Load the main gun with conventional ammo quickly and correctly.

A B C D E

106. Load the gun/launcher with missile (M551) and M60A2 only).

A B C D E

107. Apply misfire procedures.

A B C D E

108. Load the coax machinegun.

A B C D E

ANSWER CHOICES

A. Fully trained
B. Adequately trained
C. Under trained
D. Inadequately trained
E. Untrained

109. Correct stoppages.

A B C D E

110. Perform prepare-to-fire checks, including communication.

A B C D E

111. Identify/acquire targets.

A B C D E

112. Disassemble and assemble the coax machinegun.

A B C D E

113. Boresight and zero the searchlight.

A B C D E

114. Use intercom.

A B C D E

115. Knowledge and ability of loader's duties in operator/crew level maintenance.

A B C D E

116. Knowledge and ability of loader's duties in battalion level maintenance.

A B C D E

APPENDIX III

PERSONNEL PROFILE
FORM PP (JULY 1975)

1. NAME (1-22) [ ]

TANK NUMBER (23-25) [ ]

2. SSAN (26-34) [ ]

3. PMOS (35-41) [ ] PMOS Score (42-44) [ ]

SMOS (45-51) [ ] SMOS Score (52-54) [ ]

6. TIPMOS (55-57) [ ] TISMOS (58-60) [ ]

5. COMBAT EXPERIENCE WITH TANK OR CAVALRY UNIT

(61) [ ] 1=YES 2=NO MONTHS IN COMBAT (62-63) [ ]

35. DMOS IN COMBAT (64-68) [ ]

5. OVERSEAS COMBAT AREA (69-74) [ ] (80) [ ]

(DUP 1-34)

35. UNIT IN WHICH COMBAT PERFORMED (35-44) [ ]

8. APTITUDE AREA SCORES:

(45-74) AE EL GM MM CL GT RC COA COB

[ ]

(79-80) [ ] DUP(1-34)

11. CIVILIAN EDUCATION AND MILITARY SCHOOLS.

SCHOOL TRAINED PMOS (55) [ ] 1=YES 2=NO

SMOS (56) [ ] 1=YES 2=NO

NCO ACADEMY GRAD (57) [ ] 1=YES 2=NO

CIVILIAN EDUCATION (58-59) [ ] YEARS (60-63) [ ] DEG

11. MILITARY EDUCATION

	COURSE/SCHOOL	COMPLETED 1=YES 2=NO	YEAR
(64-75)		(76)	(77-78)

(80) B (DUP 1-34)

(35-46)		(47)	(48-49)
(50-61)		(62)	(63-64)
(65-76)		(77)	(78-79)

(80) C (DUP 1-34)

18. GRADE (35-36)

DOR (YRMODAY) (37-42)

20. TIME IN SERVICE YEARS (43-44)

MO (45-46)

21. PAST COURTS MARTIALS (47) 1=YES 2=NO

FLAGGING ACTIONS (48) 1=YES 2=NO

23. STATE OF BIRTH (49-52)

26. CIVIL OCCUPATION (53-72)

(80) D (DUP 1-34)

DOT CODE (35-43)

NO MO EMPLOYED (43-45)

35. TIME IN PRESENT UNIT (46-47) MOs

PRESENT CREW POSITION (48-54)

TIME IN PRESENT POSITION (55-56) MOs

33. DATE DA FORM 2-1 REVIEWED (REF DA FORM 2) (57-62)

12. SERVICE COMPONENT (63-66)

59. MARITAL STATUS (A-D) (67) [ ] REF SF 88 (80) [E]

(DUP 1-34) _____

6. DATE OF EXAMINATION (YRMODAY) (34-40) [ ][ ][ ][ ][ ][ ]

7. SEX (41) [ ] 8. RACE (A-G) (42) [ ] AGE (43-44) [ ][ ]

51. HEIGHT (45-46) [ ][ ] IN 52. WEIGHT (47-49) [ ][ ][ ] LBS

55. BUILD (A-D) (50) [ ]

64. COLOR VISION (51) [ ] 1=PASS 2=FAIL

WEARS GLASSES (52) [ ] 1=YES 2=NO

65. DEPTH PERCEPTION (53) [ ] 1=PASS 2=FAIL

70. HEARING RIGHT EAR (54) [ ] 1=PASS 2=FAIL

70. HEARING LEFT EAR (55) [ ] 1=PASS 2=FAIL

76. PHYSICAL PROFILE PULHES (56-61) [ ][ ][ ][ ][ ][ ]

(62-64) (LEAVE BLANK) [ ][ ][ ]

ASSIGNMENT CONSIDERATIONS (A-F) (65-70) [ ][ ][ ][ ][ ][ ]

VISUAL ACUITY (71-76) [ ][ ][ ][ ][ ][ ]

(80) [F] (DUP 1-34) _____

MOS & TITLE (CODE A-L) - DATE
(35-62) [ ]

(80) [G] (DUP 1-34) _____

MOS TITLE (CODE A-L) - DATE (CONT)
(35-62) [ ]

(80) [H] (DUP 1-34) _____

SIGNIFICANT MEDICAL NOTE

(35-64) [ ]

(80) [I] (DUP 1-34) _____

PHYSICAL RELATED LIMITATIONS - IF YES, EXPLAIN

(35) [ ] 1=YES 2=NO

(36-65) [ ]

(80) [J] (DUP 1-34) _____

74. MEDICAL DEFECT SUMMARY

(35-64) [ ]

(80) [K]

APPENDIX IV

Tank commanders' opinion of armor AIT (see Appendix II, questions 68-116). Only tank commanders who attended AIT are included. Total number of respondents (n) and percent of respondents who checked each category are shown, as well as means and standard deviations (S.D.) of responses. Calculation of means and standard deviations was performed by letting A (Fully Trained) equal 1, B (Adequately Trained) equal 2, C (Under Trained) equal 3, D (Inadequately Trained) equal 4, and E (Untrained) equal 5.

GUNNER DUTIES

		n	A	B	C	D	E	Mean	S.D.
68.	Perform prepare-to-fire checks.	17	24%	53%	18%	6%		2.1	0.83
69.	Use all fire control systems.	17	18%	53%	24%	6%		2.2	0.81
70.	Identify/acquire targets.	17	18%	47%	29%	6%		2.2	0.83
71.	Identify a proper sight picture and use all sight reticles.	17	29%	41%	29%			2.0	0.79
72.	Sense rounds.	17	24%	47%	24%	6%		2.1	0.86
73.	Engage targets.	17	24%	35%	35%	6%		2.2	0.90
74.	Use the correct fire adjustment procedures.	17	18%	41%	35%		6%	2.4	1.00
75.	Track targets smoothly.	17	29%	59%	12%			1.8	0.64
76.	Fire missile (M551 and M60A2 only).	15	13%	13%	13%	7%	53%	3.7	1.60
77.	Use passive/IR sighting system.	17	12%	29%	35%	12%	12%	2.8	1.20
78.	Operate laser rangefinder, if so equipped, from gunner's position	16	13%	13%	19%	6%	50%	3.7	1.50
79.	Apply range estimation.	17	12%	41%	29%	18%		2.5	0.94
80.	Employ misfire procedures.	17	24%	59%	18%			1.9	0.66
81.	Prepare and use range card.	17	24%	53%	24%			2.0	0.71

		n	A	B	C	D	E	Mean	S.D.
82.	Use intercom.	17	41%	47%	12%			1.7	0.69
83.	Knowledge of tactics, including fire discipline techniques used in multiple-target fire fights, ambushes, and coordinated platoon fire.	17	12%	12%	65%	6%	6%	2.8	0.95
84.	Knowledge and ability of gunner's duties in operator/crew level maintenance.	17	12%	47%	35%	6%		2.4	0.79
85.	Knowledge and ability of gunner's duties in battalion level maintenance.	17	6%	35%	41%	12%	6%	2.8	0.97
DRIVER DUTIES									
86.	Perform before-, during-, and after-operation checks.	17	24%	71%	6%			1.8	0.53
87.	Accelerate and decelerate smoothly.	17	35%	47%	18%			1.8	0.73
88.	Maintain correct speeds.	17	35%	47%	12%	6%		1.9	0.86
89.	Judgment of ground conditions that will either support or not support the weight of the tank.	17	24%	53%	18%	6%		2.1	0.83
90.	Select a route providing a stable platform.	17	12%	65%	18%	6%		2.2	0.73
91.	Select a firing position.	17	18%	53%	24%	6%		2.2	0.81
92.	Perform evasive maneuvers.	17	18%	29%	41%	12%		2.5	0.94
93.	Use night vision equipment.	16	13%	44%	44%			2.3	0.70
94.	Identify/acquire targets.	17	18%	53%	24%	6%		2.2	0.81
95.	Sense rounds.	17	24%	53%	18%	6%		2.1	0.83
96.	Use intercom.	16	38%	50%	6%		6%	1.9	1.02

	n	A	B	C	D	E	Mean	S.D.
97. Select route providing cover and concealment.	17	18%	47%	29%	6%		2.2	0.83
98. Select firing positions providing hull-down protection.	17	29%	53%	12%	6%		1.9	0.83
99. Select alternate firing positions in advance.	17	18%	47%	29%	6%		2.2	0.83
100. Knowledge of tactics, including understanding of tactical formations and proper position in formations.	17	12%	53%	24%	12%		2.4	0.86
101. Knowledge and ability of driver's duties in operator/crew level maintenance.	17	18%	65%	18%			2.0	0.61
102. Knowledge and ability of driver's duties in battalion level maintenance.	17	12%	47%	35%	6%		2.4	0.79
LOADER DUTIES								
103. Store all types of ammo quickly and correctly.	17	29%	47%	18%	6%		2.0	0.87
104. Identify main gun ammunition.	17	41%	47%	12%			1.7	0.69
105. Load the main gun with conventional ammo quickly and correctly.	17	41%	41%	18%			1.8	0.75
106. Load the gun/launcher with missile (M551 and M60A2 only).	15	20%	13%	7%	13%	47%	3.5	1.68
107. Apply misfire procedures.	17	29%	47%	24%			1.9	0.75
108. Load the coax machinegun.	17	35%	47%	18%			1.8	0.73
109. Correct stoppages.	17	29%	59%	12%			1.8	0.64
110. Perform prepare-to-fire checks, including communication.	17	29%	53%	12%	6%		1.9	0.83
111. Identify/acquire targets.	17	24%	47%	18%	6%	6%	2.2	1.09

		n	A	B	C	D	E	Mean	S.D.
112.	Disassemble and assemble the coax machinegun.	17	53%	35%	12%			1.6	0.71
113.	Boresight and zero the searchlight.	17	12%	24%	35%	12%	18%	3.0	1.27
114.	Use intercom.	17	47%	41%	12%			1.6	0.70
115.	Knowledge and ability of loader's duties in operator/crew level maintenance.	17	18%	71%	12%			1.9	0.56
116.	Knowledge and ability of loader's duties in battalion level maintenance.	17	12%	59%	24%	6%		2.2	0.75

APPENDIX V

Tank commanders' opinion of armor AIT (see Appendix II, questions 68-116). Only tank commanders who did not attend AIT are included. Total number of respondents (n) and percent of respondents who checked each category are shown, as well as means and standard deviations (S.D.) of responses. Calculation of means and standard deviations was performed by letting A (Fully Trained) equal 1, B (Adequately Trained) equal 2, C (Under Trained) equal 3, D (Inadequately Trained) equal 4, and E (Untrained) equal 5.

GUNNER DUTIES

		n	A	B	C	D	E	Mean	S.D.
68.	Perform prepare-to-fire checks.	14	14%	71%	7%		7%	2.1	0.94
69.	Use all fire control systems.	14	14%	71%	7%		7%	2.1	0.94
70.	Identify/acquire targets.	14	21%	64%	7%		7%	2.1	1.00
71.	Identify a proper sight picture and use all sight reticles.	14	29%	57%	7%		7%	2.0	1.00
72.	Sense rounds.	14	7%	86%			7%	2.1	0.86
73.	Engage targets.	14	14%	71%	7%		7%	2.1	0.95
74.	Use the correct fire adjustment procedures.	14	21%	50%	29%			2.1	0.73
75.	Track targets smoothly.	14	7%	79%	14%			2.1	0.47
76.	Fire missile (M551 and M60A2 only).	11		27%	36%	9%	27%	3.4	1.20
77.	Use passive/IR sighting system.	14		43%	36%	14%	7%	2.9	0.95
78.	Operate laser rangefinder, if so equipped, from gunner's position	10		20%	30%	10%	40%	3.7	1.30
79.	Apply range estimation.	13		54%	23%	23%		2.7	0.85
80.	Employ misfire procedures.	14	14%	57%	21%	7%		2.2	0.80
81.	Prepare and use range card.	14	14%	64%	21%			2.1	0.62

		n	A	B	C	D	E	Mean	S.D.
82.	Use intercom.	14	21%	71%	7%			1.9	0.53
83.	Knowledge of tactics, including fire discipline techniques used in multiple-target fire fights, ambushes, and coordinated platoon fire.	13	8%	31%	54%	8%		2.6	0.77
84.	Knowledge and ability of gunner's duties in operator/crew level maintenance.	14	7%	64%	29%			2.2	0.58
85.	Knowledge and ability of gunner's duties in battalion level maintenance.	14		50%	36%	14%		2.6	0.74
DRIVER DUTIES									
86.	Perform before-, during-, and after-operation checks.	14	29%	64%	7%			1.8	0.58
87.	Accelerate and decelerate smoothly.	14	21%	57%	21%			2.0	0.68
88.	Maintain correct speeds.	14	14%	79%	7%			1.9	0.47
89.	Judgment of ground conditions that will either support or not support the weight of the tank.	14		79%	21%			2.2	0.43
90.	Select a route providing a stable platform.	14		86%	14%			2.1	0.36
91.	Select a firing position.	14		86%	14%			2.1	0.36
92.	Perform evasive maneuvers.	14	7%	57%	29%	7%		2.4	0.74
93.	Use night vision equipment.	14	7%	36%	43%	14%		2.6	0.84
94.	Identify/acquire targets.	14	7%	64%	21%	7%		2.3	0.73
95.	Sense rounds.	13		62%	38%			2.4	0.51
96.	Use intercom.	14	21%	71%	7%			1.9	0.53

	n	A	B	C	D	E	Mean	S.D.
97. Select route providing cover and concealment.	14	14%	79%	7%			1.9	0.47
98. Select firing positions providing hull-down portection.	14	14%	71%	14%			2.0	0.55
99. Select alternate firing positions in advance.	14		50%	43%	7%		2.6	0.65
100. Knowledge of tactics, including understanding of tactical formations and proper position in formations.	14	7%	50%	36%	7%		2.4	0.76
101. Knowledge and ability of driver's duties in operator/crew level maintenance.	14	29%	57%	14%			1.9	0.66
102. Knowledge and ability of driver's duties in battalion level maintenance.	14	7%	50%	43%			2.4	0.63
LOADER DUTIES								
103. Store all types of ammo quickly and correctly.	14	21%	64%	14%			1.9	0.62
104. Identify main gun ammunition.	14	21%	64%	14%			1.9	0.62
105. Load the main gun with conventional ammo quickly and correctly.	14	36%	64%				1.6	0.50
106. Load the gun/launcher with missile (M551 and M60A2 only).	9		67%	11%		22%	2.8	1.30
107. Apply misfire procedures.	14	7%	86%	7%			2.0	0.39
108. Load the coax machinegun.	14	14%	79%	7%			1.9	0.47
109. Correct stoppages.	14	14%	71%	14%			2.0	0.55
110. Perform prepare-to-fire checks, including communication.	14	7%	71%	21%			2.1	0.53
111. Identify/acquire targets.	14		71%	29%			2.3	0.47

		n	A	B	C	D	E	Mean	S.D.
112.	Disassemble and assemble the coax machinegun.	14	14%	79%	7%			1.9	0.47
113.	Boresight and zero the searchlight.	14		29%	50%	21%		2.9	0.73
114.	Use intercom.	14	29%	64%	7%			1.8	0.58
115.	Knowledge and ability of loader's duties in operator/crew level maintenance.	14	14%	79%	7%			1.9	0.47
116.	Knowledge and ability of loader's duties in battalion level maintenance.	14	7%	43%	50%			2.4	0.65

APPENDIX VI

Gunners' opinion of armor AIT (see Appendix II, questions 68-85). Only gunners who attended AIT are included. Total number of respondents (n) and percent of respondents who checked each category are shown, as well as means and standard deviations (S.D.) of responses. Calculation of means and standard deviations was performed by letting A (Fully Trained) equal 1, B (Adequately Trained) equal 2, C (Under Trained) equal 3, D (Inadequately Trained) equal 4, and E (Untrained equal 5.

GUNNER DUTIES

		n	A	B	C	D	E	Mean	S.D.
68.	Perform prepare-to-fire checks.	30	20%	73%	7%			1.9	0.51
69.	Use all fire control systems.	30	23%	67%	10%			1.9	0.57
70.	Identify/acquire targets.	30	23%	67%	3%	3%	3%	2.0	0.85
71.	Identify a proper sight picture and use all sight reticles.	30	20%	63%	13%	3%		2.0	0.69
72.	Sense rounds.	30	20%	70%	11%	3%		1.9	0.64
73.	Engage targets.	30	13%	73%	10%	3%		2.0	0.61
74.	Use the correct fire adjustment procedures.	30	13%	80%	3%	3%		2.0	0.56
75.	Track targets smoothly.	30	23%	67%	10%			1.9	0.57
76.	Fire Missile (M551 and M60A2 only).	28	11%	25%	11%	4%	50%	3.6	1.57
77.	Use passive/IR sighting system.	30	10%	43%	23%	7%	17%	2.8	1.25
78.	Operate laser rangefinder, if so equipped, from gunner's position	29	7%	28%	24%	14%	28%	3.3	1.33
79.	Apply range estimation.	29	7%	62%	14%	3%	14%	2.6	1.15
80.	Employ misfire procedures.	30	17%	70%	13%			2.0	0.56
81.	Prepare and use range card.	30	17%	70%	10%	3%		2.0	0.64

		n	A	B	C	D	E	Mean	S.D.
82.	Use intercom.	30	30%	60%	7%	3%		1.8	0.70
83.	Knowledge of tactics, including fire discipline techniques used in multiple-target fire fights, ambushes, and coordinated platoon fire.	30	10%	50%	33%	3%	3%	2.4	0.86
84.	Knowledge and ability of gunner's duties in operator/crew level maintenance.	30	13%	73%	3%	7%	3%	2.1	0.86
85.	Knowledge and ability of gunner's duties in battalion level maintenance.	30	13%	53%	17%	10%	7%	2.4	1.07

APPENDIX VII

Loaders' opinion of armor AIT (see Appendix II, questions 103-116). Only loaders who attended AIT are included. Total number of respondents (n) and percent of respondents who checked each category are shown, as well as means and standard deviations (S.D.) of responses. Calculation of means and standard deviations was performed by letting A (Fully Trained equal 1, B (Adequately Trained) equal 2, C (Under Trained) equal 3, D (Inadequately Trained) equal 4, and E (Untrained) equal 5.

LOADER DUTIES

		n	A	B	C	D	E	Mean	S.D.
103.	Store all types of ammo quickly and correctly.	14	50%	50%				1.5	0.52
104.	Identify main gun ammunition.	14	50%	50%				1.5	0.52
105.	Load the main gun with conventional ammo quickly and correctly.	14	50%	50%				1.5	0.52
106.	Load the gun/launcher with missile (M551 and M60A2 only).	13	31%	31%			38%	2.8	1.82
107.	Apply misfire procedures.	14	50%	50%				1.5	0.52
108.	Load the coax machinegun.	14	50%	50%				1.5	0.52
109.	Correct stoppages.	14	43%	50%	7%			1.6	0.63
110.	Perform prepare-to-fire checks, including communication.	14	36%	57%	7%			1.7	0.61
111.	Identify/acquire targets.	14	36%	64%				1.6	0.50
112.	Disassemble and assemble the coax machinegun.	14	43%	57%				1.6	0.51
113.	Boresight and zero the searchlight.	14	21%	50%	7%	7%	14%	2.4	1.34
114.	Use intercom.	14	29%	64%	7%			1.8	0.58

		n	A	B	C	D	E	Mean	S.D.
115.	Knowledge and ability of loader's duties in operator/ crew level maintenance.	14	50%	50%				1.5	0.52
116.	Knowledge and ability of loader's duties in battalion level maintenance.	14	36%	50%	7%	7%		1.9	0.86

APPENDIX VIII

Drivers' opinion of armor AIT (see Appendix II, questions 86-102). Only drivers who attended AIT are included. Total number of respondents (n) and percent of respondents who checked each category are shown, as well as means and standard deviations (S.D.) of responses. Calculation of means and standard deviations was performed by letting A (Fully Trained equal 1, B (Adequately Trained) equal 2, C (Under Trained) equal 3, D (Inadequately Trained) equal 4, and E (Untrained) equal 5.

DRIVER DUTIES

		n	A	B	C	D	E	Mean	S.D.
86.	Perform before-, during-, and after-operation checks.	19	32%	58%	11%			1.8	0.63
87.	Accelerate and decelerate smoothly.	19	37%	53%	5%	5%		1.8	0.79
88.	Maintain correct speeds.	19	47%	47%	5%			1.6	0.61
89.	Judgment of ground conditions that will either support or not support the weight of the tank.	19	26%	63%		11%		1.9	0.85
90.	Select a route providing a stable platform.	19	26%	68%	5%			1.8	0.54
91.	Select a firing position.	19	26%	63%	11%			1.8	0.60
92.	Perform evasive maneuvers.	19	21%	58%	21%			2.0	0.67
93.	Use night vision equipment.	19	21%	53%	21%		5%	2.2	0.96
94.	Identify/acquire targets.	19	21%	63%	11%	5%		2.0	0.75
95.	Sense rounds.	19	21%	68%	5%		5%	2.0	0.88
96.	Use intercom.	19	37%	63%				1.6	0.50
97.	Select route providing cover and concealment.	19	32%	53%	16%			1.8	0.69

	n	A	B	C	D	E	Mean	S.D.
98. Select firing positions providing hull-down protection.	19	26%	58%	16%			1.9	0.66
99. Select alternate firing positions in advance.	19	21%	63%	16%			1.9	0.62
100. Knowledge of tactics, including understanding of tactical formations and proper position in formations.	19	26%	58%	16%			1.9	0.66
101. Knowledge and ability of driver's duties in operator/crew level maintenance.	19	37%	63%				1.6	0.50
102. Knowledge and ability of driver's duties in battalion level maintenance.	19	16%	68%	5%		11%	2.2	1.08

		n	A	B	C	D	E	Mean	S.D.
41.	To what extent does your immediate supervisor work right along with his men?	127	44%	27%	16%	5%	8%	2.0	1.24
42.	To what extent does your immediate supervisor provide for the everyday needs of his men?	127	31%	35%	25%	3%	5%	2.1	1.08
43.	To what extent does your immediate supervisor explain why a particular action is important?	127	33%	37%	19%	8%	3%	2.1	1.08
44.	To what extent is your immediate supervisor willing to accept responsibllity for mistakes made by his men?	127	32%	36%	19%	4%	9%	2.2	1.20
45.	To what extent does your immediate supervisor take an interest in you as a person as well as in how well you do your job?	127	35%	35%	20%	5%	6%	2.1	1.11
46.	To what extent is your immediate supervisor interested in getting your ideas and suggestions?	127	28%	41%	21%	4%	6%	2.1	1.08
47.	To what extent are you allowed to take part in the decisions about how your unit goes about performing its tasks?	128	12%	22%	25%	10%	30%	3.2	1.42
48.	To what extent does your supervisor tell you how well you are performing your duties?	128	21%	41%	27%	6%	5%	2.3	1.03

APPENDIX IX

Crewmembers' opinions of their working conditions (see Appendix II, questions 24-48). Total number of respondents (n) and percent of respondents who checked each category are shown, as well as means and standard deviations (S.D.) of responses. Calculation of means and standard deviations was performed by letting A (Very Great) equal 1, B (Great) equal 2, C (Some) equal 3, D (Little) equal 4, and E (Very Little) equal 5.

	n	A	B	C	D	E	Mean	S.D.
24. To what extent do you enjoy performing the duties of your crew position?	127	25%	38%	27%	4%	6%	2.2	1.05
25. To what extent do the working conditions in your unit help you to perform your duties and make you want to work hard?	127	16%	42%	24%	6%	12%	2.5	1.20
26. To what extent do you gain a sense of accomplishment from doing the day-to-day tasks that make up your crew duties?	126	16%	40%	33%	6%	6%	2.4	1.03
27. To what extent has the training you have received in your unit improved your ability to perform your crew duties?	126	22%	44%	26%	7%	1%	2.2	0.91
28. To what extent are the people you work with a team that works together?	126	42%	47%	8%	2%	1%	1.7	0.82
29a. To what extent does your MOS match your interests?	122	16%	45%	24%	6%	8%	2.4	1.10
29b. To what extent does your MOS match your knowledge?	118	12%	35%	34%	11%	8%	2.6	1.10
29c. To what extent does your MOS match your skills?	120	15%	33%	32%	8%	12%	2.6	1.19
30. To what extent are the tasks you perform in this unit important?	127	27%	44%	21%	5%	3%	2.1	0.99

		n	A	B	C	D	E	Mean	S.D.
31.	To what extent are the tasks you perform in this unit challenging?	126	24%	29%	35%	8%	4%	2.3	1.06
32.	If you could be awarded any MOS that you could qualify for, to what extent would you like to change from your present MOS?	125	21%	12%	24%	7%	36%	3.2	1.55
33.	To what extent do you think the tank commander's performance is important to the accomplishment of your crew's mission?	126	71%	21%	6%	1%		1.3	0.67
34.	To what extent do you think the driver's performance is important?	127	62%	28%	10%			1.4	0.73
35.	To what extent do you think the gunner's performance is important?	127	76%	20%	4%			1.2	0.58
36.	To what extent do you think the loader's performance is important?	127	69%	25%	6%			1.3	0.64
37.	To what extent does your immediate supervisor care about your personal problems?	127	27%	33%	29%	2%	9%	2.3	1.18
38.	To what extent does your immediate supervisor solve problems before they get out of hand?	126	31%	36%	21%	5%	8%	2.2	1.20
39.	To what extent does your immediate supervisor encourage his men to work together as a team?	127	44%	36%	16%	1%	3%	1.8	0.95
40.	To what extent does your immediate supervisor keep himself informed about the progress his men are making in their work?	127	38%	37%	17%	4%	4%	1.9	1.06

APPENDIX X

Crewmembers' opinions of the state of training in their crew (see Appendix II, questions 51-62). Total number of respondents (n) and percent of respondents who checked each category are shown.

	n	A	B	C	D	E	F
51. Vehicle maintenance	128	3%	21%	58%	17%		
52. Radio maintenance	128	2%	6%	48%	35%	8%	1%
53. Radio procedures	128	2%	23%	59%	16%	1%	
54. Tank tactics	128	2%	37%	45%	13%	2%	2%
55. Vehicle recovery	128	2%	26%	44%	23%	4%	2%
56. Night operations	127	6%	24%	47%	15%	5%	2%
57. Nuclear-Bio-Chem Warfare	126	2%	6%	30%	34%	25%	3%
58. Raft shipment/crossing	127	1%	1%	15%	28%	48%	8%
59. Deepwater fording	128	1%	6%	20%	28%	40%	6%
60. Physical training	128	8%	16%	50%	14%	12%	
61. Gunnery	128	10%	47%	35%	7%	2%	
62. Individual weapons	128	20%	34%	41%	4%	2%	

APPENDIX XI

Correlations between selected variables and gunnery scores for tank commanders. (Number of cases from which correlations were calculated is given in parentheses; starred [*] correlations are significant at the 0.05 level).

Variable	Total Gunnery Score	Day Gunnery Score	Night Gunnery Score
Military Training and Experience			
Primary MOS score	0.03 (33)	0.09 (33)	-0.04 (33)
Time in primary MOS	0.28 (33)	0.15 (33)	0.27 (33)
Did or did not attend Armor AIT	-0.02 (33)		
Grade	0.26 (33)	0.28 (33)	0.13 (33)
Time in National Guard	0.32 (33)	0.12 (33)	0.38* (33)
Time in present unit	0.22 (33)	0.09 (33)	0.24 (33)
Time in present position	0.22 (33)	0.04 (33)	0.30 (33)
Personal Background			
Married or not	0.08 (33)	0.02 (33)	0.22 (33)
Amount of civilian education	0.22 (33)	0.20 (33)	0.14 (33)

Variable	Total Gunnery Score	Day Gunnery Score	Night Gunnery Score
Miltiary Aptitude Area Scores			
IN (Infantry)	0.12 (9)	0.06 (9)	0.11 (9)
AE (Armor, Artillery, Engineer)	0.42 (15)	0.18 (15)	0.44 (15)
EL (Electronics repair)	0.20 (18)	0.08 (18)	0.22 (18)
GM (General Maintenance)	0.35 (19)	0.49* (19)	0.02 (19)
MM (Motor Maintenance)	0.36 (19)	0.07 (19)	0.45 (19)
CL (Clerical)	0.03 (19)	-0.07 (19)	0.11 (19)
GT (General technical)	0.12 (19)	0.04 (19)	0.14 (19)
RC (Radio Code)	-0.01 (12)	-0.27 (12)	0.32 (12)
Physical and Medical			
Age	0.38* (33)	0.13 (33)	0.46* (33)
Height	-0.10 (33)	-0.19 (33)	0.03 (33)
Weight	-0.12 (33)	-0.02 (33)	-0.16 (33)
Does or does not wear glasses	-0.03 (33)	0.08 (33)	-0.13 (33)
Opinion of Commander			
Rating of Company Commander	0.26 (34)		
Rating of Battalion Commander	0.18 (35)		

APPENDIX XI

Correlations between selected variables and gunnery scores for tank commanders. (Number of cases from which correlations were calculated is given in parentheses; starred [*] correlations are significant at the 0.05 level).

Variable	Total Gunnery Score	Day Gunnery Score	Night Gunnery Score
Military Training and Experience			
Primary MOS score	0.03 (33)	0.09 (33)	-0.04 (33)
Time in primary MOS	0.28 (33)	0.15 (33)	0.27 (33)
Did or did not attend Armor AIT	-0.02 (33)		
Grade	0.26 (33)	0.28 (33)	0.13 (33)
Time in National Guard	0.32 (33)	0.12 (33)	0.38* (33)
Time in present unit	0.22 (33)	0.09 (33)	0.24 (33)
Time in present position	0.22 (33)	0.04 (33)	0.30 (33)
Personal Background			
Married or not	0.08 (33)	0.02 (33)	0.22 (33)
Amount of civilian education	0.22 (33)	0.20 (33)	0.14 (33)

PRECEDING PAGE BLANK-NOT FILMED

Variable	Total Gunnery Score	Day Gunnery Score	Night Gunnery Score
Miltiary Aptitude Area Scores			
IN (Infantry)	0.12 (9)	0.06 (9)	0.11 (9)
AE (Armor, Artillery, Engineer)	0.42 (15)	0.18 (15)	0.44 (15)
EL (Electronics repair)	0.20 (18)	0.08 (18)	0.22 (18)
GM (General Maintenance)	0.35 (19)	0.49* (19)	0.02 (19)
MM (Motor Maintenance)	0.36 (19)	0.07 (19)	0.45 (19)
CL (Clerical)	0.03 (19)	-0.07 (19)	0.11 (19)
GT (General technical)	0.12 (19)	0.04 (19)	0.14 (19)
RC (Radio Code)	-0.01 (12)	-0.27 (12)	0.32 (12)
Physical and Medical			
Age	0.38* (33)	0.13 (33)	0.46* (33)
Height	-0.10 (33)	-0.19 (33)	0.03 (33)
Weight	-0.12 (33)	-0.02 (33)	-0.16 (33)
Does or does not wear glasses	-0.03 (33)	0.08 (33)	-0.13 (33)
Opinion of Commander			
Rating of Company Commander	0.26 (34)		
Rating of Battalion Commander	0.18 (35)		

APPENDIX XII

Correlations between selected variables and gunnery scores for gunners. (Number of cases from which correlations were calculated is given in parentheses; starred [*] correlations are significant at the 0.05 level).

Variable	Total Gunnery Score	Day Gunnery Score	Night Gunnery Score
Military Training and Experience			
Primary MOS score	0.00 (32)	0.06 (32)	-0.05 (32)
Time in primary MOS	0.00 (38)	0.04 (38)	-0.04 (38)
Did or did not attend Armor AIT	0.26 (39)		
Grade	0.34* (40)	0.21 (40)	0.30 (40)
Time in National Guard	0.18 (40)	0.05 (40)	0.23 (40)
Time in present unit	0.11 (40)	0.08 (40)	0.09 (40)
Time in present position	0.20 (40)	0.20 (40)	0.09 (40)
Personal Background			
Married or not	0.00 (40)	0.00 (40)	0.01 (40)
Amount of civilian education	-0.16 (40)	-0.01 (40)	-0.23 (40)

Variable	Total Gunnery Score	Day Gunnery Score	Night Gunnery Score
Military Aptitude Area Scores			
IN (Infantry)	-0.39 (13)	-0.04 (13)	-0.45 (13)
AE (Armor, Artillery, Engineer)	-0.19 (23)	-0.06 (23)	-0.22 (23)
EL (Electronics repair)	-0.24 (28)	-0.05 (28)	-0.32 (28)
GM (General Maintenance)	0.03 (28)	0.08 (28)	-0.03 (28)
MM (Motor Matinenance)	0.02 (28)	0.13 (28)	-0.10 (28)
CL (Clerical)	-0.23 (28)	0.08 (28)	-0.43* (28)
GT (General technical)	0.00 (28)	0.21 (28)	-0.21 (28)
RC (Radio Code)	-0.04 (23)	0.26 (23)	-0.33 (23)
Physical and Medical			
Age	0.06 (40)	-0.01 (40)	-0.31 (40)
Height	0.17 (40)	0.13 (40)	0.13 (40)
Weight	-0.15 (40)	-0.12 (40)	-0.04 (40)
Does or does not wear glasses	0.12 (40)	0.07 (40)	0.11 (40)
Opinion of Commander			
Rating of Company Commander	0.03 (39)		
Rating of Battalion Commander	-0.01 (39)		