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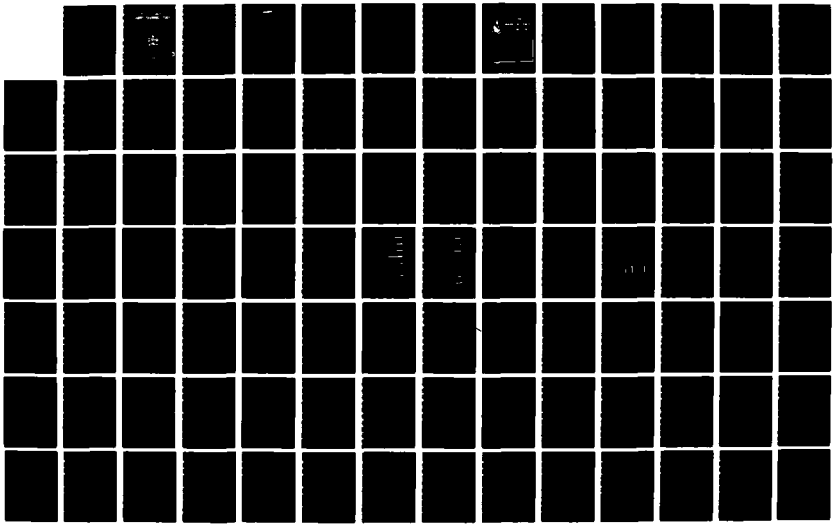

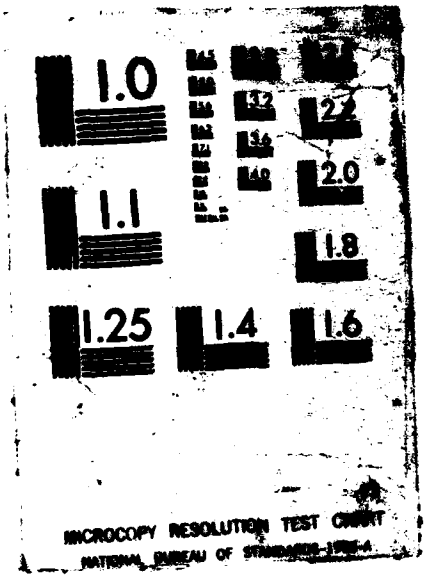
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ARMY TRAINING STUDY

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TRAINING EFFECTIVENESS ANALYSIS (TEA) 1978 TEST REPORTS

VOLUME IV

~~FOR OFFICIAL USE ONLY~~

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The Army Training Study (ARTS Study) conducted a comprehensive overview of Army training. The research probed across a wide range of training issues as the study group sought a broad perspective of army training. The study group conducted a field surveys at numerous continental US Army posts and schools. The data obtained was analyzed using the Training Effectiveness Analysis (TEA).

The Training Effectiveness Analysis (TEA) summary volumes explain the analysis of the data gathered on both institutional training and unit training across a range of combat, combat support and combat service support systems and skills, supplemented by research into such completed tests as CAMMS, REALTRAIN and Chaparral. It provided some of the data necessary for the formulation of the Battalion Training Model and provided insight into the general state of training in the army.

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TRAINING EFFECTIVENESS

ANALYSIS (TEA)

ORDNANCE, SIGNAL, AND COMPUTER ASSISTED MAP MANEUVER SYSTEM

TEST REPORTS

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The reports contained in this volume were prepared by the responsible System Work Team (SWT) for the Army Training Study. All results are subject to revision by further analysis, comparison with other data, and further testing. The views, opinions, and/or findings contained herein are not to be construed as an official Department of the Army or the US Army Training and Doctrine Command (TRADOC) position, policy, or decision unless so designated by other official documentation.

~~Exempt under Exemption 5 of the Freedom of Information Act, 5 USC552(b)~~

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TABLE OF CONTENTS

PART I - Combat Service Support, MOS63C and 63H Proficiency Development Profiles Report.

PART II - A Comparative Study Relating MOS 05C Training Resources to Combat Readiness.

PART III - The Computer Assisted Map Maneuver System in Support of Army Training Study Objectives Training Effectiveness Analysis '78.

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PART I

Combat Service Support
MOS 63C and 63H
Proficiency Development Profiles

PART I, TABLE OF CONTENTS

Page

Initial Report, Proficiency Development Profiles 1

Abstract
Introduction
Test Design
Findings
Discussion
Conclusions
Appendixes
A - Tasks Selected for Testing
B - 63C/H Examinee's Questionnaire
C - 63C/H Supervisors' Questionnaire
D - Instructions for Computing Criterion and Predictor Variables
E - Tabulated Data for Figures

Supplement Number 1, Proficiency Development Profiles, National Guard S1-1

Abstract
Introduction
Test Design
Findings
Discussion
Conclusions
Appendix A - Data Tabulation by Figures

Supplement Number 2, Cost Effectiveness of Institutional and Unit Training; Distribution of Tasks Between Institutional and Unit Training; Training Selected Personnel for Mobilization S2-1

Abstract
Tests and Results
Appendix A - Institutional Training Cost Data

U.S. ARMY

ORDNANCE AND CHEMICAL

CENTER AND SCHOOL

ARMY TRAINING STUDY (ARTS)

COMBAT SERVICE SUPPORT

MOS 63C AND 63H

INITIAL REPORT

1 JULY 1978

PROFICIENCY DEVELOPMENT PROFILES

ABERDEEN PROVING GROUND, MARYLAND 21005

PREFACE

This report summarizes results of the 63C, Track Vehicle Mechanic and 63H, Automotive Repairman, portions of the Army Training Study (ARTS) Training Effectiveness Analysis 1978. The primary objectives of this effort were to provide insights into the effectiveness of institutional and unit training to develop a methodology for evaluating training effectiveness, and to provide an empirical basis for defending training expenditures.

This portion of the ARTS effort is reported as an initial report and two supplements. The initial report contains information pertaining to proficiency profiles for Active Army personnel. Supplement Number 1 contains similar information for one National Guard unit. Supplement 2 contains cost effectiveness data for institutional training and identifies an available manpower pool for mobilization purposes.

PROFICIENCY DEVELOPMENT PROFILES

SECTION I - ABSTRACT

A. Problem: The purpose of this test was to determine proficiency development profiles for 63C, Track Vehicle Mechanic, and 63H, Tank Automotive Repairman, for various levels of experience, training, and skill levels, and for various types of Advanced Individual Training (AIT) programs.

B. Test Design:

1. The test design provided for the testing of AIT graduates, individuals assigned to CONUS and USAREUR based active Army divisions, and one National Guard division. Individuals tested were in all grades from E1-E7 in both MOS.

2. Data collection instruments consisted of performance examinations and questionnaires. Tasks were selected to measure a broad spectrum of maintenance capabilities in the areas of remove and replace, align and adjust, and troubleshoot. In this connection, the test results do not necessarily indicate how well an individual performs his assigned duties. 63H personnel in grades E6-E7 were tested on troubleshooting tasks only.

C. Findings:

1. AIT is an effective method of training individuals to perform a wide variety of maintenance tasks. However, this proficiency decays rapidly if not reinforced soon after arrival on the job. The magnitude and duration of the decline depends upon the degree to which relevant and timely on-the-job training and experiences are provided. This decline is approximately the same regardless of the mode of instruction during

AIT, i.e., conventional or self-paced.

2. Proficiency improves with experience and supervision but the average proficiency under the most favorable conditions leaves much room for improvement. Performance on troubleshooting is in general lower than performance on other task types.

3. Individuals of varying ability levels can learn to perform the type of tasks tested in this study but the performance of the low ability group is below that of the high ability group as measured by AFQT and mechanical maintenance (MM) scores. Performance of the low ability group declines to a lower level and remains at that level for a longer period under the current conditions that exist on the job.

4. Although experience correlates favorably with performance, there is considerable overlap in the proficiency level of less experienced (E1-E3) personnel and the more experienced (E4-E6) group. Many of the more experienced individuals do not appear to possess the necessary skills and knowledge to provide essential technical leadership to the less experienced group.

5. Increasing the proficiency level of AIT graduates does not improve retention when accomplished in a mass practice approach. It appears that learning requires distributive reinforcement during AIT as well as on the job.

6. Estimates of equipment availability based upon average proficiency levels determined from this test indicate that availability could dip to an unacceptably low level during conditions of rapidly changing support requirements or disruptions in technical supply.

D. Conclusions:

1. AIT is effective in producing a broad spectrum maintenance capability within a relatively short period of time for both high ability and low ability individuals.

2. Skills learned in AIT are rather fragile and they decay rapidly if not reinforced by on-the-job experience and training. The decay is greatest for lower aptitude individuals.

3. The decay seems to be independent of the type of training received, i.e., conventional or self-paced instruction.

4. On-the-job training and experience must be relevant and timely to the type of proficiencies to be developed. Just putting in hours in the maintenance shop does not accomplish this objective. In addition, performing a task only occasionally does not seem to produce the capability to perform without assistance.

5. The concept of training and developing maintenance personnel on a broad spectrum MOS basis as opposed to specific job or duty position requirements needs reevaluation.

6. Individuals of all aptitude levels included in this study seem to have the ability to learn the desired skills. However, the lack of planned reinforcement on the job has a greater depressing effect on the low aptitude individual. Their initial learning decays to a lower level and stays at that level for a longer period of time.

7. The overall on-the-job performance of 63C and 63H personnel leaves much room for improvement. This is true for both the E1-E3 group and the E4-E7 group. Performance is especially low in the troubleshooting area.

8. No systematic on-the-job training program for maintenance personnel was observed within the units visited.

9. Many individuals in grades E4-E7 do not appear to be any more proficient than lesser experienced individuals in grades E1-E3.

10. A high degree of specialization exists on the job. This results both from the support requirements and the manner in which the personnel are utilized.

11. The concept of multilevel training as currently defined for the 63H MOS appears to be a valid concept for both MOS.

12. Training to a higher standard during AIT is not likely to improve performance significantly unless the training is reinforced over a period of time. One shot training to any level seems similar to "cramming" for an exam and the learning will decay rapidly if not reinforced.

13. The current proficiency of maintenance personnel does not appear sufficient to maintain an acceptable level of equipment availability under conditions of changing support requirements or supply disruptions. Unless the commander is able to utilize extraordinary management practices, such as over specialization of personnel and heavy reliance on replacement rather than repair, the potential exists for equipment availability to fall to fifty percent or less for such critical items as the main battle tank.

SECTION II - INTRODUCTION

Objectives: The purpose of this test was to determine proficiency development profiles for 63C, Track Vehicle Mechanics, and 63H, Tank Automotive Repairmen, personnel. Specific objectives of the test were to:

A. Identify proficiency levels of 63C and 63H personnel at the conclusion of resident training and after various periods of on-the-job experience for individuals of varying experience levels, AFQT levels, and mechanical maintenance aptitude levels.

B. Determine the troubleshooting ability 63H personnel in grades E6 and E7.

C. Compare learning and retention of 63C personnel graduating from lock-step and self-paced resident courses.

D. Determine the retention level of 63H personnel trained to a higher level of proficiency during initial resident training.

SECTION III - TEST DESIGN

A. Experimental Design.

1. A cross-sectional approach was used to determine proficiency development profiles for 63C and 63H personnel. Figure 1 illustrates this design. Test subjects consisted of graduates of 63C and 63H resident courses at the time of graduation and 63H and 63C personnel assigned to CONUS and USAREUR based active Army divisions. Data was collected by administering performance examinations and questionnaires, searching personnel records, and obtaining supervisor's rating of examinees.

At Graduation	Months in MOS					
	0-3	4-12	13-18	19-30	31-48	>48
X						
	X					
		X				
			X			
				X		
					X	
						X

Figure 1. Test design for proficiency development profiles.

2. The same methodology was used to determine the troubleshooting ability of 63H personnel grades E6-E7. Test subjects consisted of 63H personnel in grades E6-E7 assigned to CONUS and USAREUR based active Army divisions and to the US Army Ordnance and Chemical Center and School (USAOCCS). Data was collected by administering performance examinations and questionnaires.

3. The effectiveness of 63C conventional lock-step instruction versus self-paced instruction was determined by administering performance examinations and questionnaires to graduates of the 63C resident course conducted in each mode. Examinees were retested after approximately three months on the job. This longitudinal design is illustrated at Figure 2.

Type of Instruction	Time in MOS	
	At Graduation	2-4 Months on the Job
Lock-Step	X	*X
Self-Paced	X	X

Figure 2. Test design for comparing lock-step to self-paced instruction.

*On-the-job test subjects were not the same as those tested at graduation.

4. The retention level of 63H personnel trained to a higher level was determined by a longitudinal study. Graduates of the 63H self-paced course were trained on two tasks to a higher proficiency than required by the resident course. These graduates were retested after approximately four months on-the-job. Figure 3 illustrates this design.

Type of Instruction	Time in MOS	
	At Graduation	After 4 months on the job
Increased Proficiency	X	X

Figure 3. Test design for determining the effectiveness of increased proficiency training.

B. Subjects. Subjects for this test consisted of 63C and H personnel assigned to CONUS and USAREUR based active Army units, one National Guard unit, recent graduates of resident instruction at the US Army Armor School (USAARMS) and the USAOCCS, and personnel assigned to the USAOCCS. In all, 666 individuals were tested. Specific numbers of personnel tested by location are shown in Table 1.

Location	63C		63H		
	Recent Grads	E1-E6	Recent Grads	E1-E5	E6-E7
CONUS & USAREUR Divisions		178		162	22
USAARMS	88				
USAOCCS			81		24
National Guard		62		41	8

Table 1. Number of subjects tested by location and MOS.

C. Procedures.

1. Data Collection.

a. Performance Tests:

(1) Performance tests were developed to evaluate the capability of track vehicle mechanics (MOS 63C) and tank automotive repairmen (MOS 63H) to perform critical MOS tasks. Three tests were developed. One test was used to evaluate 63C personnel in grades E1-E6. This test consisted of eight tasks selected to evaluate the capabilities of 63C personnel to perform across the spectrum of MOS responsibilities. Tasks were selected from the areas of remove/replace, inspection, align/adjust, and troubleshooting. Tasks were selected according to the sampling scheme shown in Table 2.

TABLE 2

63C PERFORMANCE TEST PLAN

TASK TYPE	NUMBER OF TASKS
Remove/replace	1
Align/adjust	
Mechanical	1
Electrical	1
Troubleshooting	
Mechanical	2
Electrical	3

(2) A second test of eight tasks was developed to evaluate the maintenance capabilities of 63H personnel in grades E1-E5. These tasks were selected according to the plan shown in Table 3.

TABLE 3

63H (GRADES E1-E5) PERFORMANCE TEST PLAN

TASK/TYPE	NUMBER OF TASKS
Remove/replace	1
Align/adjust	
Mechanical	2
Electrical	2
Electrical Troubleshooting	2
Inspection	1

(3) The following criteria were used to select tasks for the 63C test.

(a) Must be a critical task.

(b) Selected for skill level one resident training.

(c) Require no more than 45 minutes to perform.

(d) Could be performed by one individual.

(4) Tasks for the 63H (grades E1-E5) test were selected on the same criteria with one major exception. That exception pertains to the troubleshooting tasks which are not skill level one tasks for 63H personnel and are not taught in the 63H10 resident course. The reason for including these two tasks was to obtain information regarding the degree to which this critical skill is learned in the 63H maintenance environment. In making comparisons between 63C and 63H data, it is important to keep in mind that all eight tasks are critical for the 63C and they are included in the resident training program. Only six of the 63H tasks are included in resident training for skill level one.

(5) The third test consisted of four troubleshooting tasks for 63H personnel in grades E6-E7. Individuals in these grades are expected to inspect and troubleshoot equipment at the support maintenance level. This test consisted of three electrical troubleshooting and one mechanical troubleshooting task.

(6) Specific tasks included in each test are identified at Appendix A.

(7) No attempt was made to select these tasks based on what individuals actually do in specific maintenance units. In this connection, the test results may not be indicative of how well an individual performs his day-to-day assigned duties. The tests are designed to indicate an individual's capability to perform a variety of critical maintenance tasks on rather common military vehicles.

(8) All test items were validated prior to actual use in the data collection phase. Validation consisted of review by subject matter experts, tryouts to confirm administrative instructions and detect errors, and tryouts to determine scoring consistency.

b. Questionnaires:

(1) Questionnaires were developed to obtain information from the individuals tested and supervisors. The examinee's questionnaire was designed to obtain information pertaining to education, experience, and training of each individual tested. A copy of this questionnaire is at Appendix B.

(2) The supervisor's questionnaire was designed to obtain information pertaining to shop operations and on-the-job training activities. A copy of this questionnaire is at Appendix C. This questionnaire was administered to approximately 40 individuals at each test location.

(3) All questionnaires were validated by repeated review and tryouts to confirm administrative procedures and to detect errors or ambiguous wording.

c. Aptitude Data: Individual aptitude area scores and general ability information were obtained from MILPERCEN. Information of particular interest is the Armed Forces Qualification Test (AFQT), Mechanical Maintenance (MM), and General Technical (GT) scores. All scores were not available for each individual but a high percentage of scores were available in each area of interest.

2. Data Analysis.

a. Computerized Data Base: The need for ADP support was recognized early in the ARTS effort and efforts were initiated to develop a computer program to store and manipulate the data. As each field test was completed, the data was coded and placed in the computerized data base.

b. Data Reduction Procedure:

(1) Summary Reports. As data was added to the data base, summary reports were analyzed for possible errors. When errors or apparent inconsistencies were spotted, actions were initiated to correct the errors or insure that the inconsistencies were apparent rather than real.

(2) Correlations:

(a) Criterion Measure. Intercorrelations between individual performance on each task and with total performance for each test were computed to identify the presence or absence of clusters indicating differential performance within elements of each test. The objective of this computation was to identify the criterion measure that would be used in the subsequent data analysis. Clearly identified clusters would indicate a need to analyze the data in terms of more than one criterion variable. A generally uniform correlation, either high or low, would indicate that the one criterion measure of total score on all tasks in each test could be used. The correlations were generally uniform and quite low. Consequently, the remaining data analysis was performed using total test score for each individual as the criterion measure of performance. In this case, the criterion measure is the total number of "go's" received on the tasks for the test. Maximum score on the 63C and 63H (grades E1-E5) tests is eight and maximum score on the 63H (grades E6-E7) is four.

(b) Predictor Variables:

1 Information from examinee questionnaires and aptitude scores were correlated with the criterion measure to identify those factors impacting upon performance. Seventeen predictor variables were examined initially. These are:

a Average supervisor's rating on all tasks in the test.

b Number of tasks that individual has performed previously.

c Total number of on-the-job training modes that examinee has experienced for each task.

d Total types of civilian and military training and experience in maintenance.

e Estimated benefit of civilian and military maintenance training and experience.

f Total months experience in the MOS.

g Grade.

h Education level.

i Total hours per week working in maintenance.

j Total number of maintenance areas worked.

k Total of civilian training and experience.

l Sum of military training and experience.

m Individual's attitude toward maintenance and the Army.

n Sum of items e, k, l, and m.

o Armed Forces Qualification Test (AFQT) score.

p Mechanical Maintenance (MM) aptitude score.

q General Technical (GT) aptitude score.

2 Appendix D explains how each variable was computed. Those items having a meaningful correlation with the criterion measure were then selected for further analysis. This further analysis consists of computing intercorrelations, multiple correlations, and mean criterion measures using significant predictor variables as selectors. Results were then plotted to illustrate the relationship between the criterion measure and predictor variables.

c. Levels of Supervision:

(1) An item of frequent concern regarding the performance of mainte-

nance personnel is the type and amount of supervision. However, this matter has not previously been addressed in a quantitative fashion. For this study, supervision is defined as the amount of prompting required by an individual in completing a task. Prompting is defined as hints and other verbal cues short of actually telling the individual how to perform a task or portions of a task. Test administrators were allowed to provide these hints or prompts and were instructed to record the number of prompts that were provided. When an individual performs a task correctly without any prompts, this equates to the 0 prompt or no supervision condition. Tasks completed with no more than two prompts fall into the 0-2 prompt or moderate supervision condition and more than two prompts constitutes the maximum supervision condition.

(2) The 0-2 prompt condition was selected as a realistic level of supervision since it seems reasonable to expect that an individual might expect to receive some assistance one or two times during the performance of a task requiring approximately 30 minutes to perform. The condition of maximum supervision appears to be an unreasonable requirement because in many instances seven or eight and even more prompts were required. To provide this level of assistance would require almost one-on-one supervision. In order to provide insights into how supervision impacts on performance, much of the data has been analyzed for three levels of prompting, i.e., 0 prompts, 0-2 prompts, and all prompts.

SECTION IV - FINDINGS

A. Proficiency Development Profiles.

1. Figures *4 and *5 show the proficiency curves for 63C personnel in grades E1-E6 and for 63H personnel in grades E1-E5 at different levels of supervision, i.e., prompting. These curves show the mean performance capability at 0-3, 4-12, 13-18, 19-30, 31-48, and greater than 48 months experience in the MOS. Points are plotted at the actual average for each interval. There was only one individual in the 0-3 month interval for 63H and this was not plotted. Significant aspects of these curves are:

a. There is a significant decline in the ability to perform a wide variety of maintenance tasks shortly after the completion of Advanced Individual Training (AIT). This decline appears to occur in a relatively short time span as indicated by the Figure 4.

b. The curves for both MOS decline to about the same level for the zero prompting condition. Performance begins to improve significantly after about 15 months on the job for 63C personnel. Afterwards, there is generally a steady improvement for both groups.

c. The 63C personnel are better able to benefit from prompts as indicated by the significant improvement in performance between the curve for zero prompts and 0-2 prompts.

*Tabulated data for all curves is included at Appendix E.

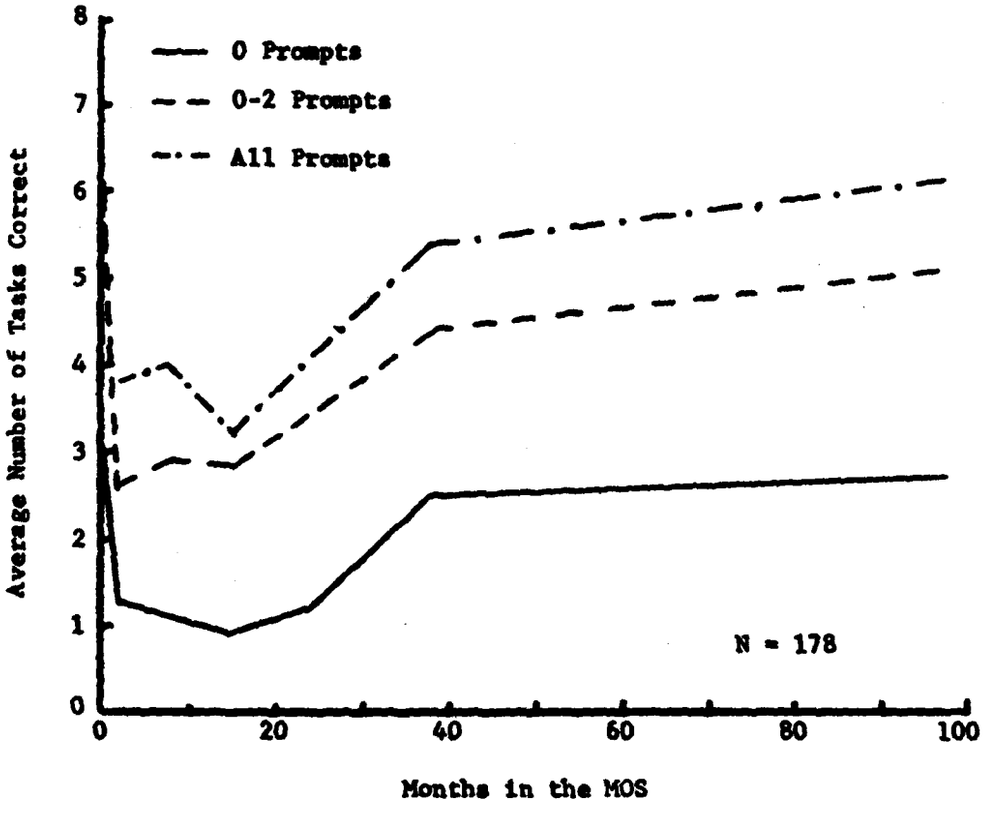

Figure 4. Proficiency Profiles for 63C personnel in grades E1-E6.

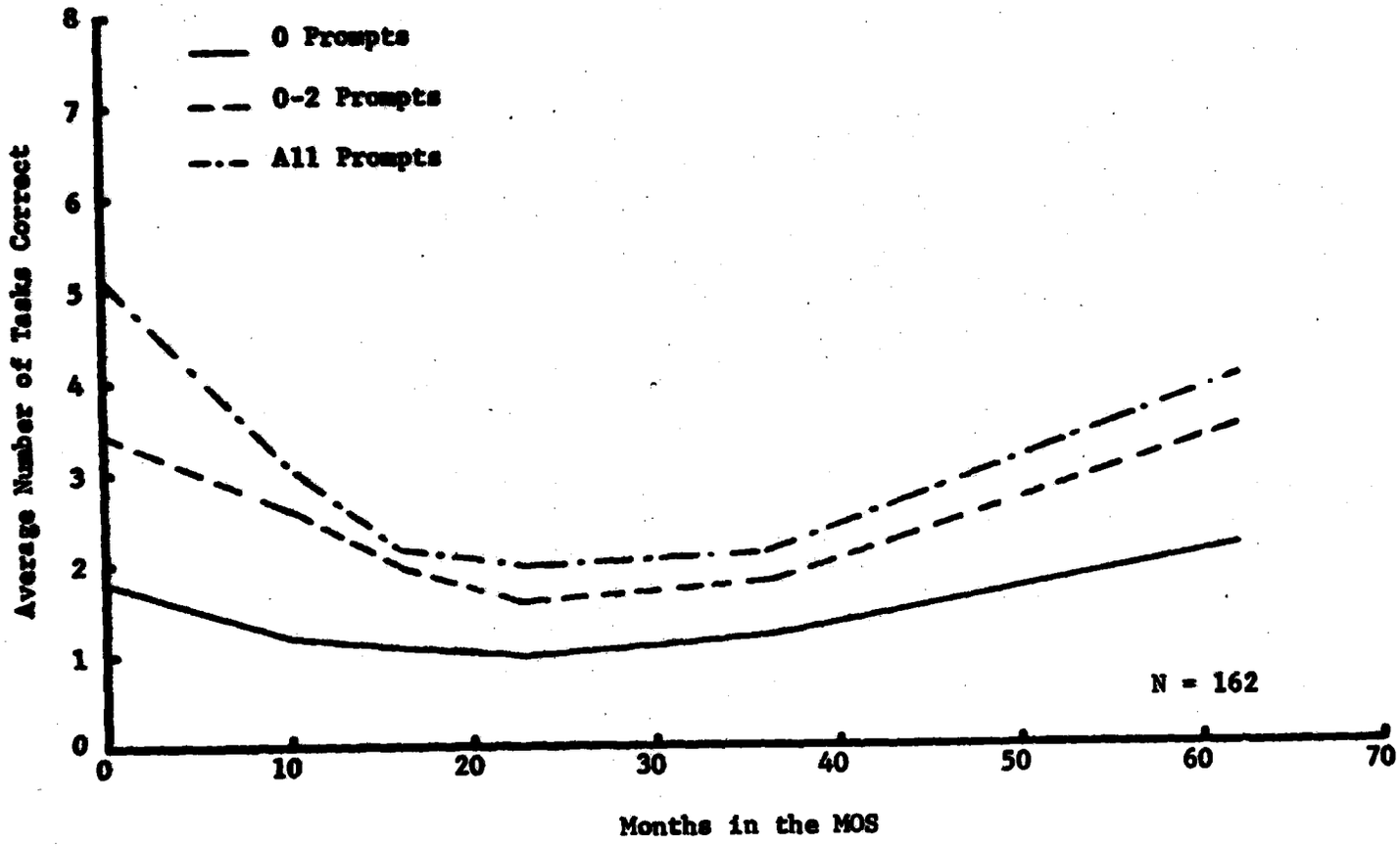

Figure 5. Proficiency curves for 63H personnel in grades E1-E5.

d. There is considerable room for improvement in the ability of 63C and 63H personnel to perform a wide variety of maintenance tasks.

e. One significant variable in maintenance proficiency appears to be months experience in the MOS.

2. Figures 6, 7, and 8 show the proficiency curves for 63C personnel by high and low mechanical maintenance (MM) aptitude groupings for the three levels of prompting. These curves indicate that high aptitude individuals tend to forget tasks learned in AIT in a manner similar to the low aptitude group. However, the high aptitude group outperforms the low aptitude group at all experience levels. The curve for the low aptitude group could not be plotted beyond the 19-30 month interval due to the absence of data. This may indicate that lower aptitude individuals tend to leave the service or leave the MOS.

3. Figures 9, 10, and 11 show the corresponding proficiency curves for low and high MM groups of 63H personnel. These curves indicate that the high aptitude group outperforms the low aptitude group by a significant amount at all experience levels except the 4-12 month interval. Although the high aptitude group experiences a decay in learning after AIT, they outperform the low aptitude group at all levels and the recovery from the decline is more rapid once it begins.

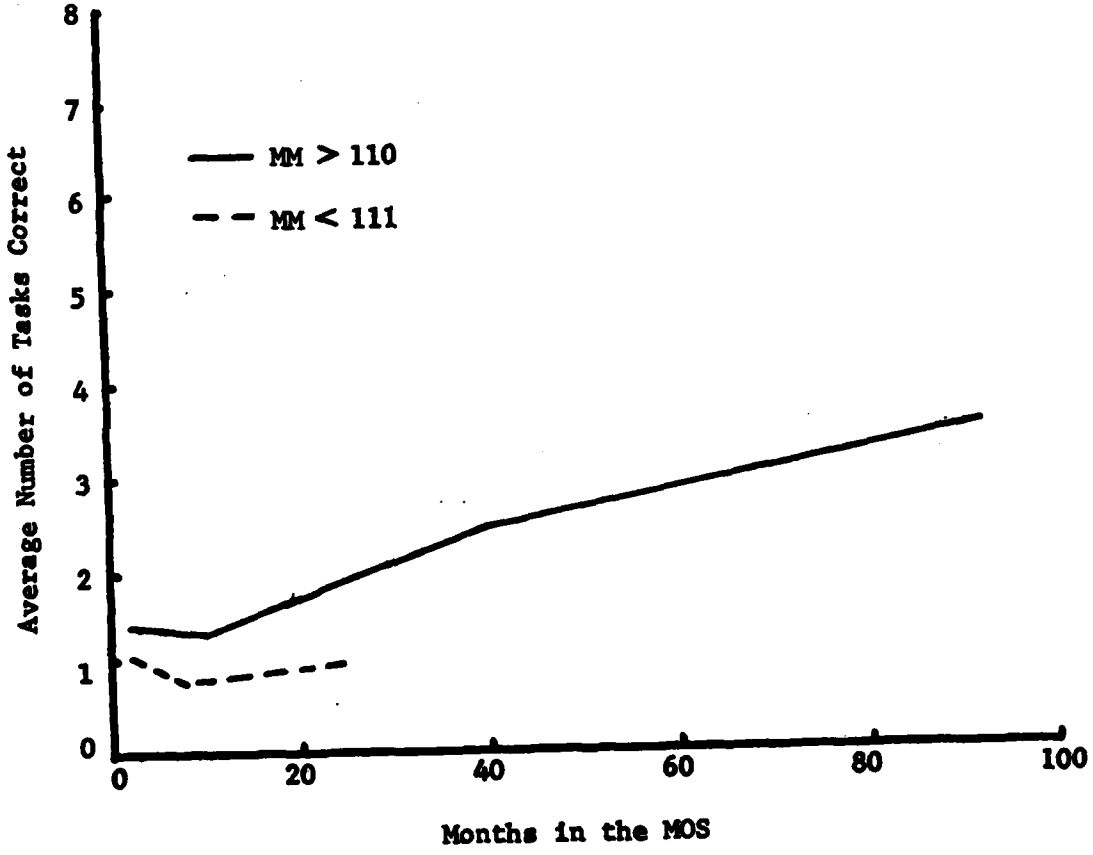

Figure 6. 63C proficiency curves for high and low MM groups with zero prompts.

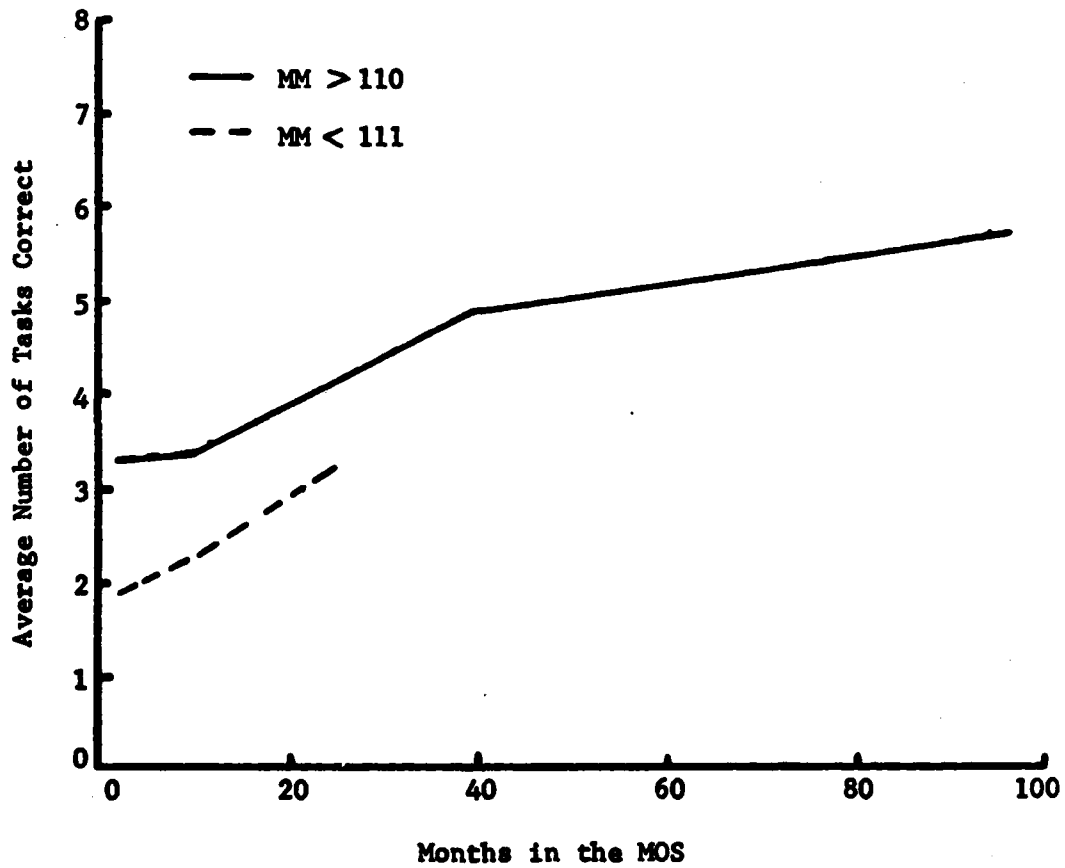

Figure 7. 63C proficiency curves for high and low MM groups with 0-2 prompts.

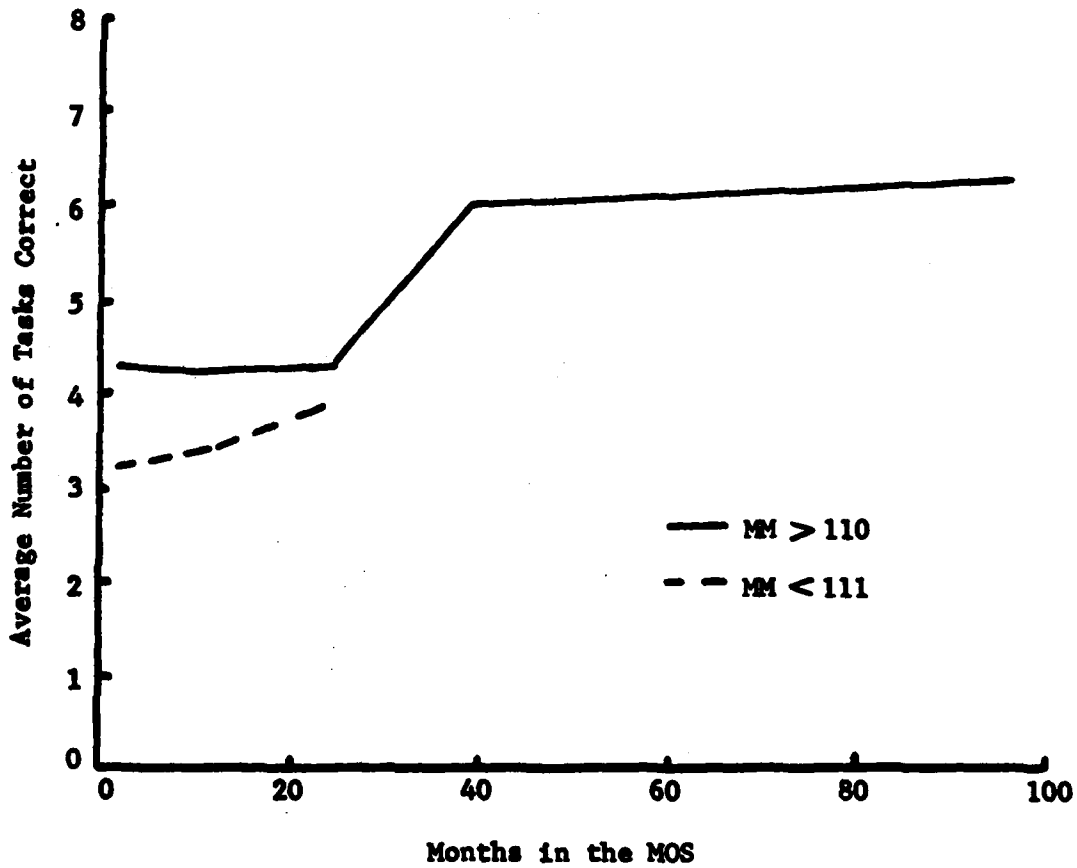

Figure 8. 63C proficiency curves for high and low MM groups with all prompts.

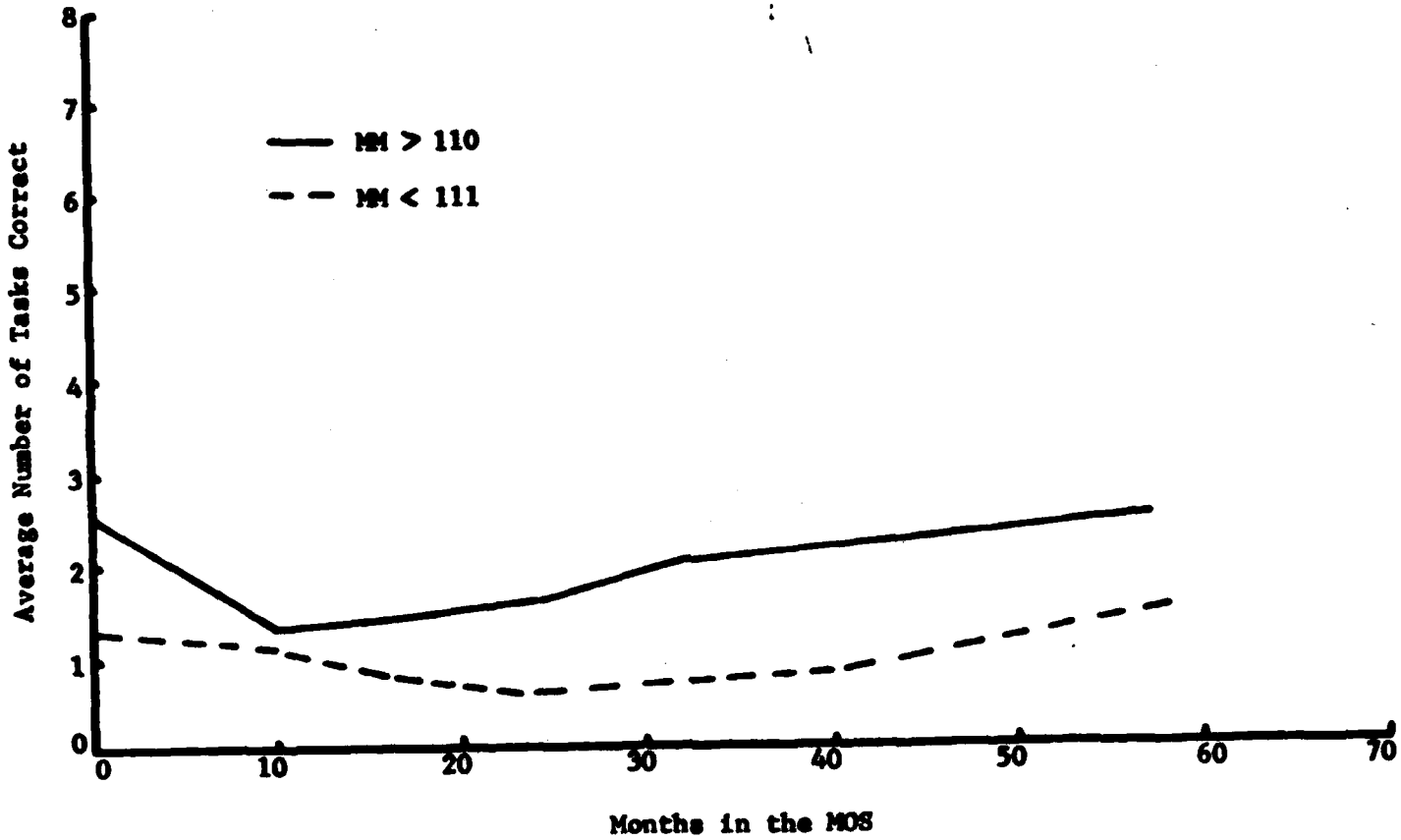

Figure 9. 63H proficiency curves for MM > 110 and < 111 with zero prompts.

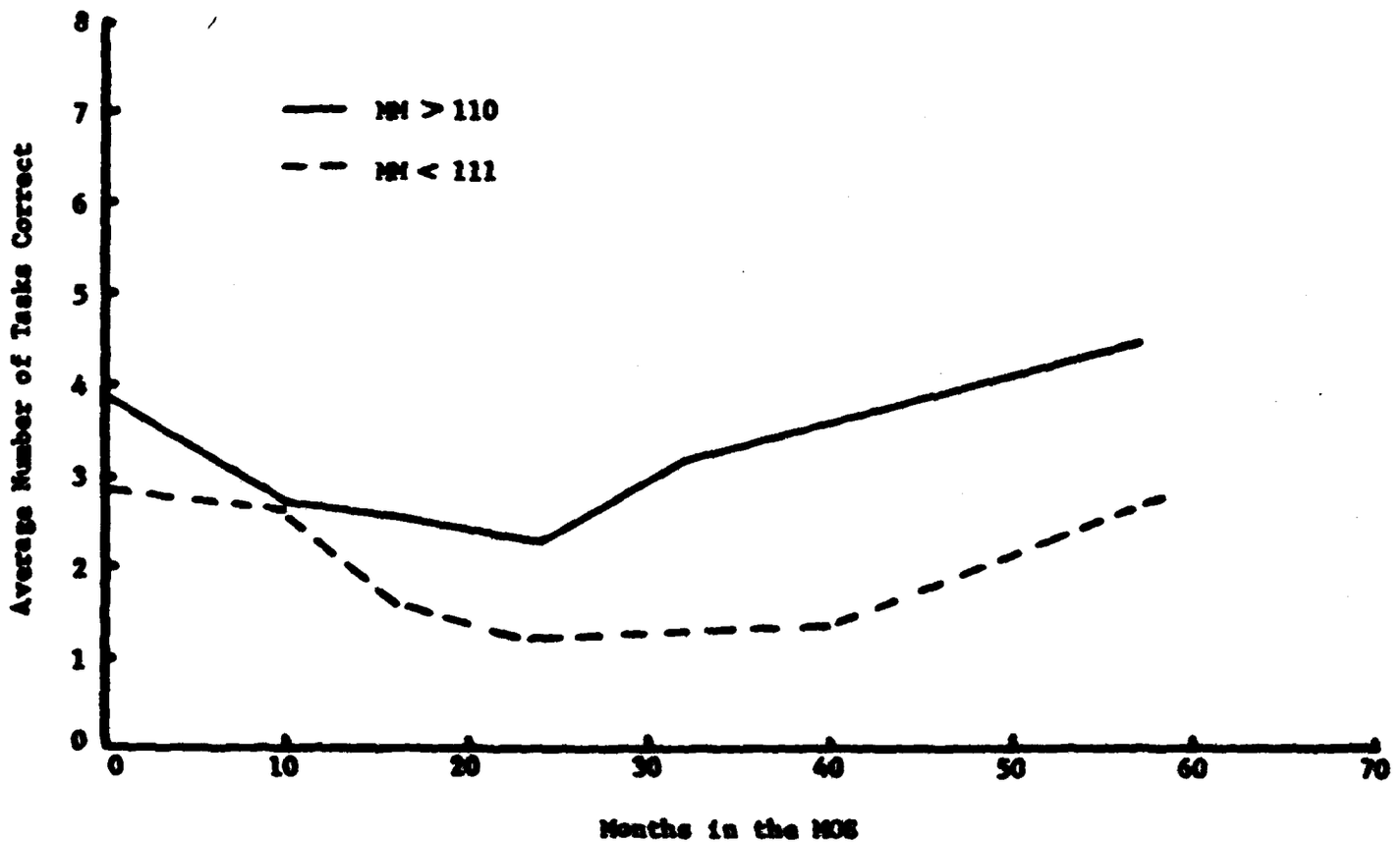

Figure 10. 63M proficiency curves for MM > 110 and < 111 with 0-2 prompts.

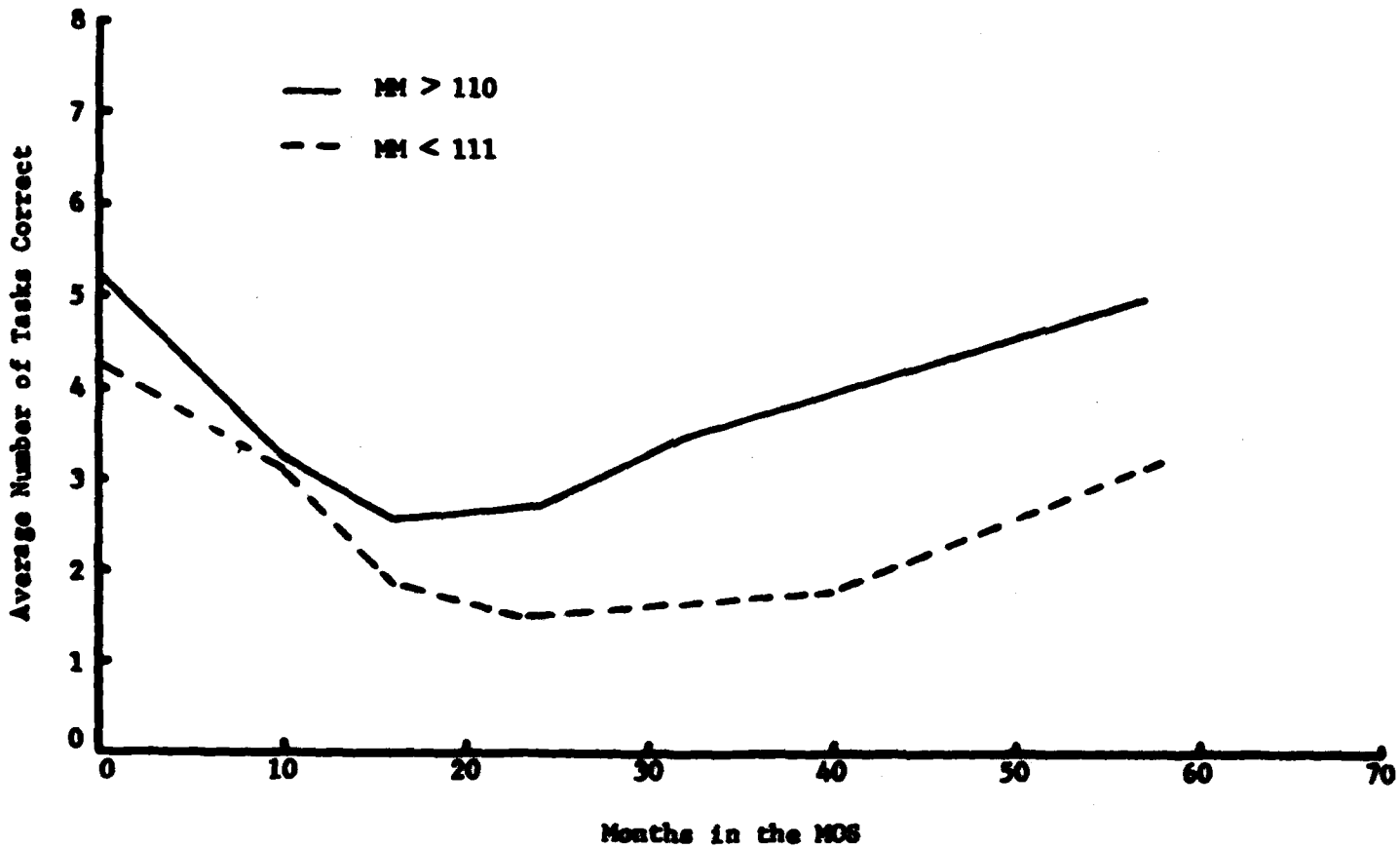

Figure 11. 63H proficiency curves for MM > 110 and < 111 with all prompts

4. Figures 12, 13, 14, 15, 16, and 17 show the proficiency profiles for high and low AFQT groups by MOS. These curves are similar to those of the high and low MM groups. From Figures 6 through 17, it is apparent that ability as measured by MM and AFQT scores is a significant contributor to maintenance capability of 63C and 63H personnel.

5. Table 4 indicates the correlations of the seventeen predictor variables and the criterion variable of total score on the eight tasks. For a sample size of 178, any correlation coefficient of .15 or greater is statistically significant at the .025 level. These data confirm the conclusion from the previously discussed proficiency profiles. The strongest correlations are related to months experience in the MOS; grade which has a strong relationship to months experience; military training and experience, and MM and GT scores. From these data it is clear that proficiency results primarily from experience, training, and ability.

6. Table 5 indicates that 63C personnel had previously performed on the average 5.4 of the 8 tasks and had received OJT on 4.9 of the 8 tasks. These data appear to explain why correlations for variables 2 and 3 of Table 4 are not as high as expected. Since most individuals in the sample have performed many of the tasks previously and had received some form of OJT on the tasks, the range of variability is not very large on these variables. In this connection, having performed the tasks previously does not have a chance to show its contribution. Likewise, not having performed a task does not significantly impact on overall performance.

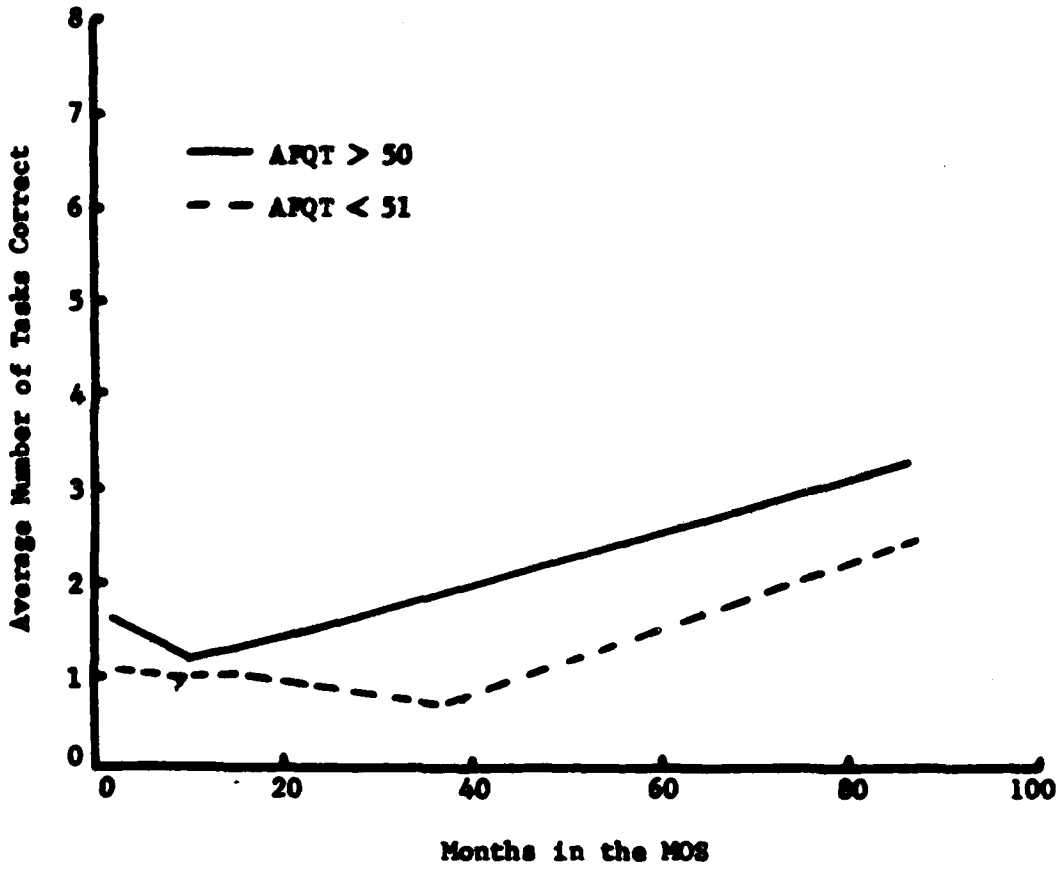

Figure 12. 63C proficiency curves for high and low AFQT groups with zero prompts.

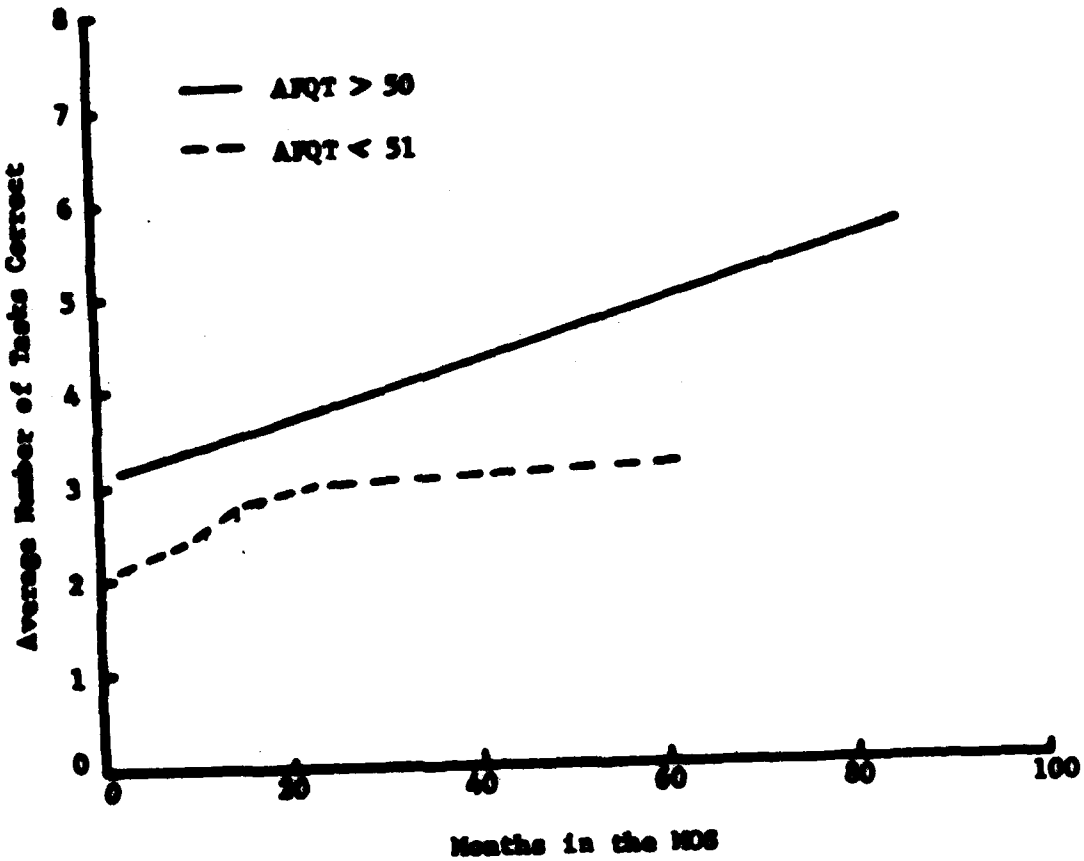

Figure 13. 63C proficiency curves for high and low AFQT groups with 0-2 prompts.

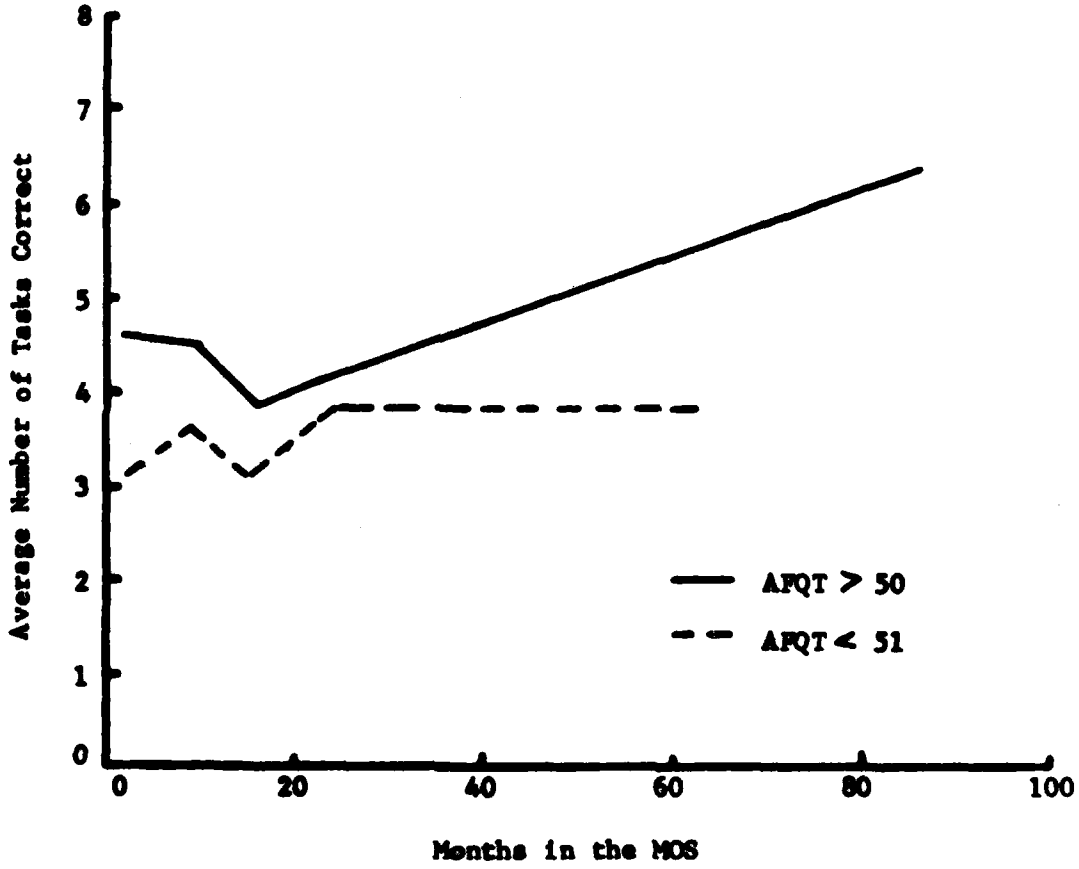

Figure 14. 63C proficiency curves for high and low AFQT groups with all prompts.

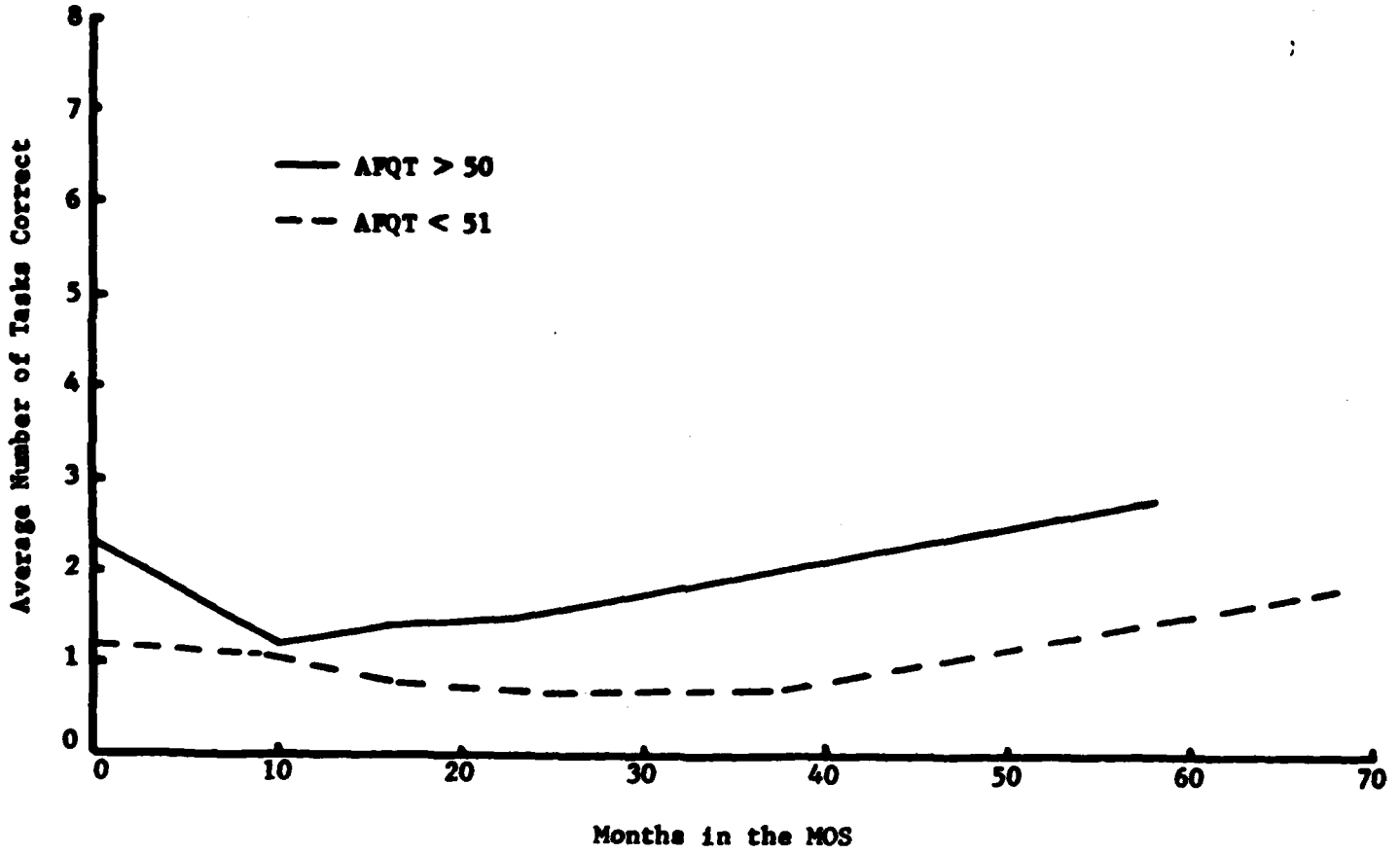

Figure 15. 63H proficiency curves for high and low AFQT groups with zero prompts.

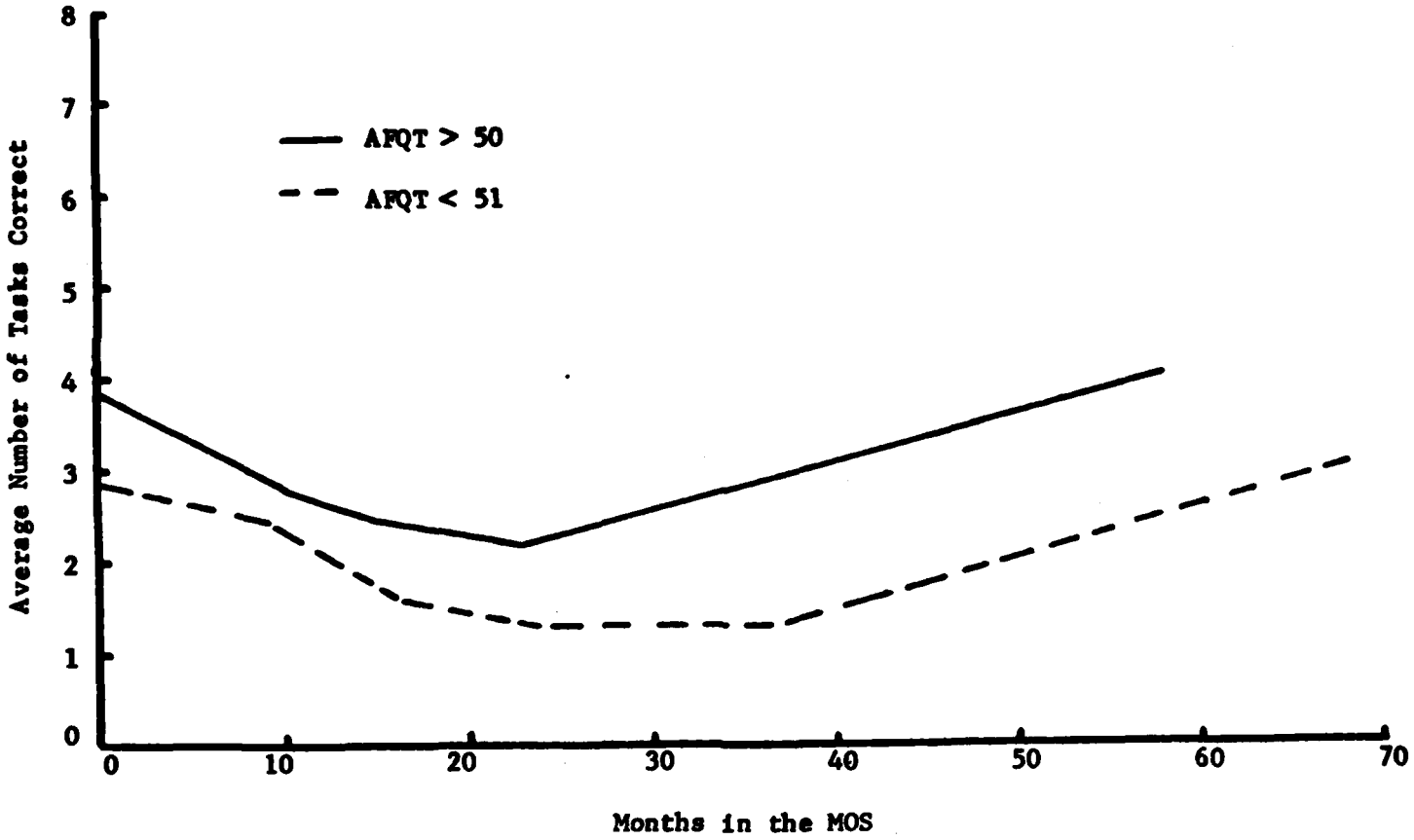

Figure 16. 63H proficiency curves for high and low AFQT groups with 0-2 prompts.

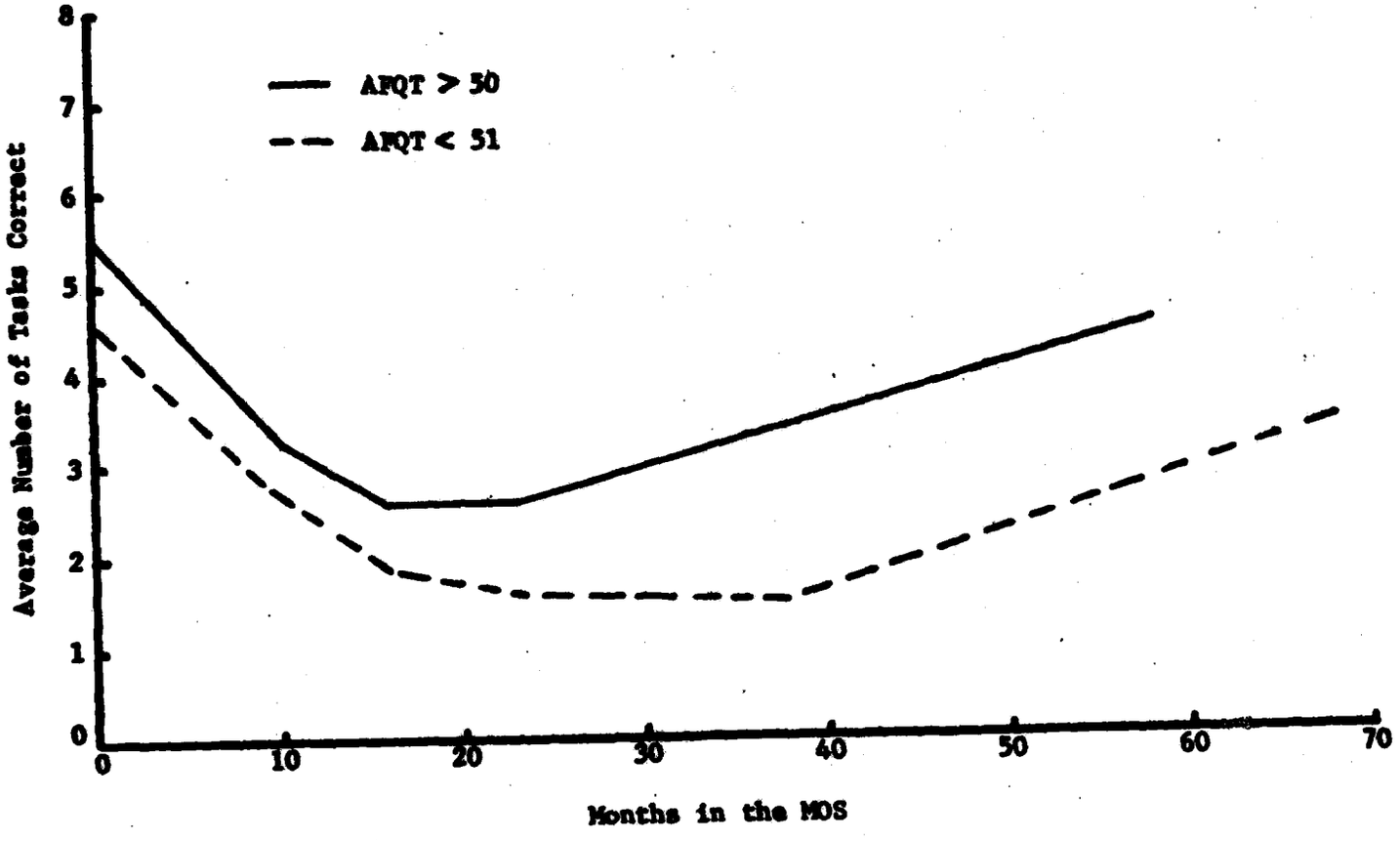

Figure 17. 63H proficiency curves for high and low AFQT groups with all prompts

TABLE 4

Correlations of Predictor Variables with Total Performance for 63C Personnel (E1-E6)

Variables	Prompts 0	Prompts 0-2	All
1. Supervisor's Rating	.04	.23	.12
2. Performed task before	.03	.09	.07
3. OJT received on the task	-.11	-.07	-.09
4. Types of background and experience	.24	.25	.19
5. Months experience in the MOS	.42	.42	.40
6. Grade	.35	.50	.40
7. Education	.14	.17	.16
8. Benefits of types of training	.29	.33	.26
9. Types of civilian experience	.26	.22	.17
10. Military training and experience	.42	.44	.40
11. Attitude toward maintenance and job	.21	.18	.17
12. Variables 10 and 11 combined	.44	.46	.39
13. AFQT score	.12	.26	.17
14. MM score	.33	.37	.32
15. GT score	.26	.34	.28
16. Hours per week working in maintenance	.11	.11	.09
17. Number of work areas	.23	.18	.14

TABLE 5

Mean Values of Predictor Variables

Variables	63C	63H
1. Supervisor's Rating	3.14	3.0
2. Performed task before	5.4	2.2
3. OJT received on the task	4.9	2.4
4. Types of background and experience	4.1	4.0
5. Months experience in the MOS	22.8	21.1
6. Grade	3.3	3.6
7. Education	11.7	11.8
8. Benefits of types of training	5.7	5.4
9. Types of civilian experience	1.8	1.7
10. Military training and experience	8.0	6.2
11. Attitude toward maintenance and job	2.6	2.1
12. Variables 10 and 11 combined	18.2	15.5
13. AFQT score	51.6	47.5
14. MM score	112.6	108.8
15. GT score	103.6	99.1
16. Hours per week working in maintenance	35.2	38.3
17. Number of work areas	7.8	5.5

7. Table 6 indicates the correlations for MOS 63H. These data indicate generally strong correlations for variables 2, 3, 11, and 14. In this instance, the influence of variables 2 and 3 becomes evident because 63H personnel had performed on the average approximately two of the eight tasks and had received OJT on about the same number, Table 5. With subjects having prior experience on so few tasks, the presence of this experience displays itself in improved performance. Again the importance of experience, training, and ability appear as the significant variables.

8. Figure 18 shows the troubleshooting proficiency profiles for 63H personnel in grades E6-E7 for the three levels of prompting. This figure indicates a generally low level of troubleshooting ability for the group tested. Troubleshooting ability appears to reach its peak during the 3-5 year experience interval and remains fairly constant beyond that period.

B. Performance by Task Type.

1. Figures 19 and 20 indicate the overall performance for 63C and 63H personnel for the three prompting levels. The average number of tasks completed successfully for 63C personnel is 1.4, 3.2, and 4.2 respectively for the three prompting levels. Average performance for the 63H personnel is 1.2, 2.1, and 2.5 respectively. Figures 21 and 22 show the percent performing each task correctly under the various prompting conditions. These data indicate that all individuals experience considerable difficulty with troubleshooting tasks. However, there is room for improvement in all areas.

TABLE 6

Correlations of Predictor Variables with Total Performance for 63H Personnel (E1-E5)
N=162

Variables	Prompts 0	0-2	All
1. Supervisor's Rating	.15	.12	.16
2. Performed task before	.16	.31	.38
3. OJT received on the task	.23	.36	.43
4. Types of background and experience	.15	.20	.22
5. Months experience in the MOS	.18	.08	.08
6. Grade	-.02	-.01	-.01
7. Education	.07	.01	.03
8. Benefits of types of training	.21	.28	.28
9. Types of civilian experience	.12	.25	.27
10. Military training and experience	.17	.12	.15
11. Attitude toward maintenance and job	.34	.31	.34
12. Variables 10 and 11 combined	.28	.33	.36
13. AFQT score	.28	.26	.21
14. MM score	.41	.40	.37
15. GT score	.33	.34	.29
16. Hours per week working in maintenance	-.05	-.14	-.14
17. Number of work areas	.13	-.05	.03

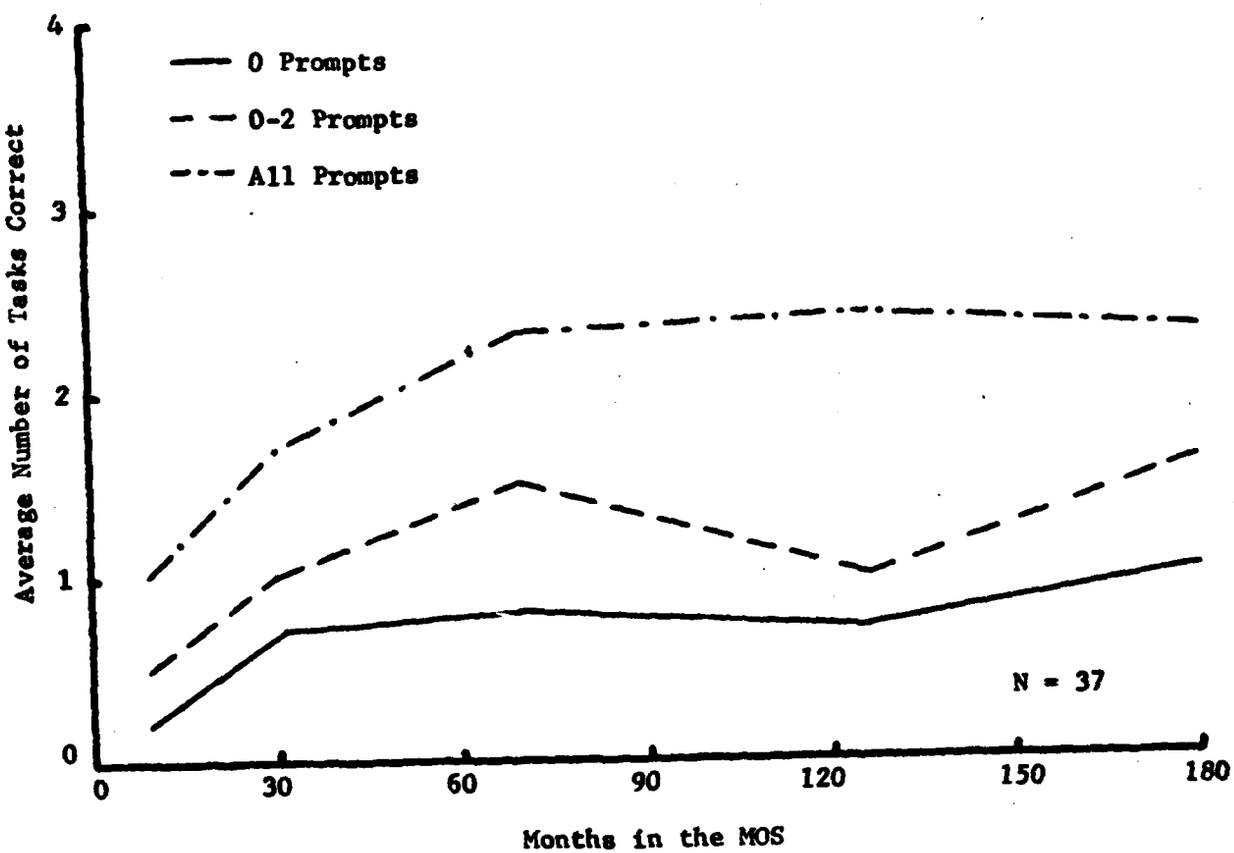

Figure 18. Troubleshooting proficiency profile for 63H personnel in grades E6-E7.

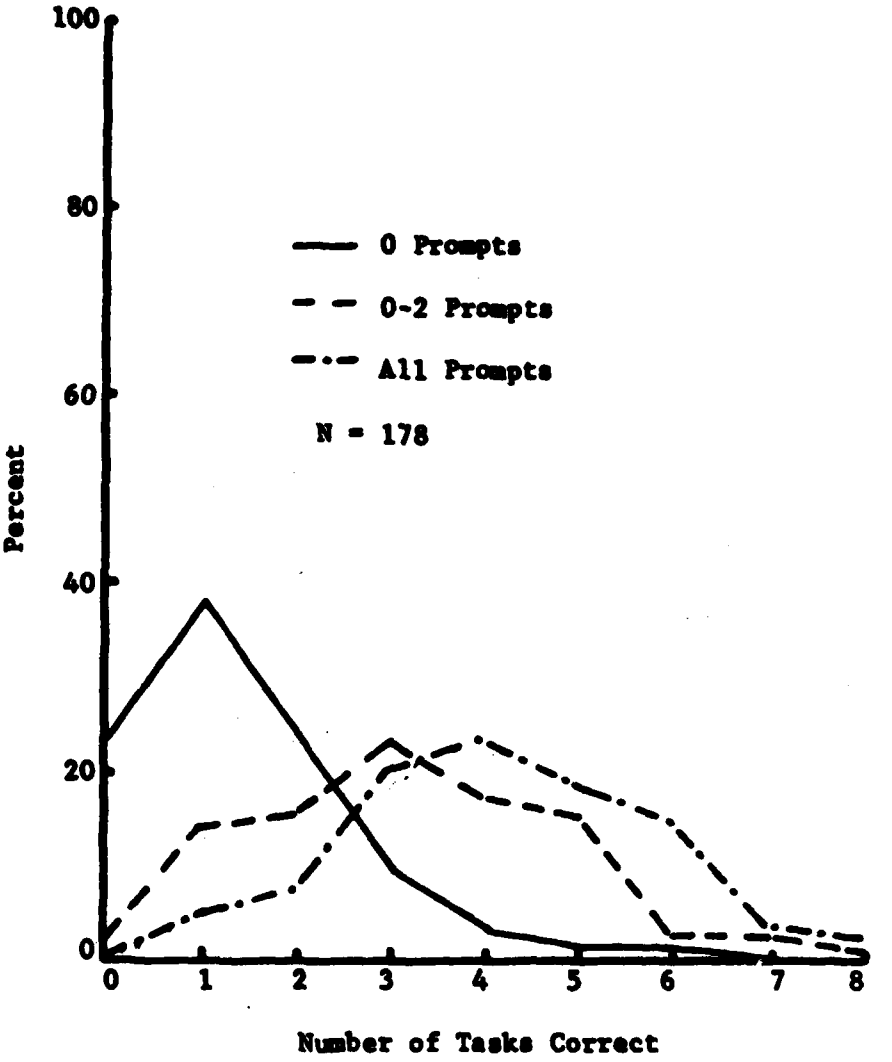

Figure 19. Percent of 63C personnel receiving various total scores on the eight task performance test for the three levels of supervision.

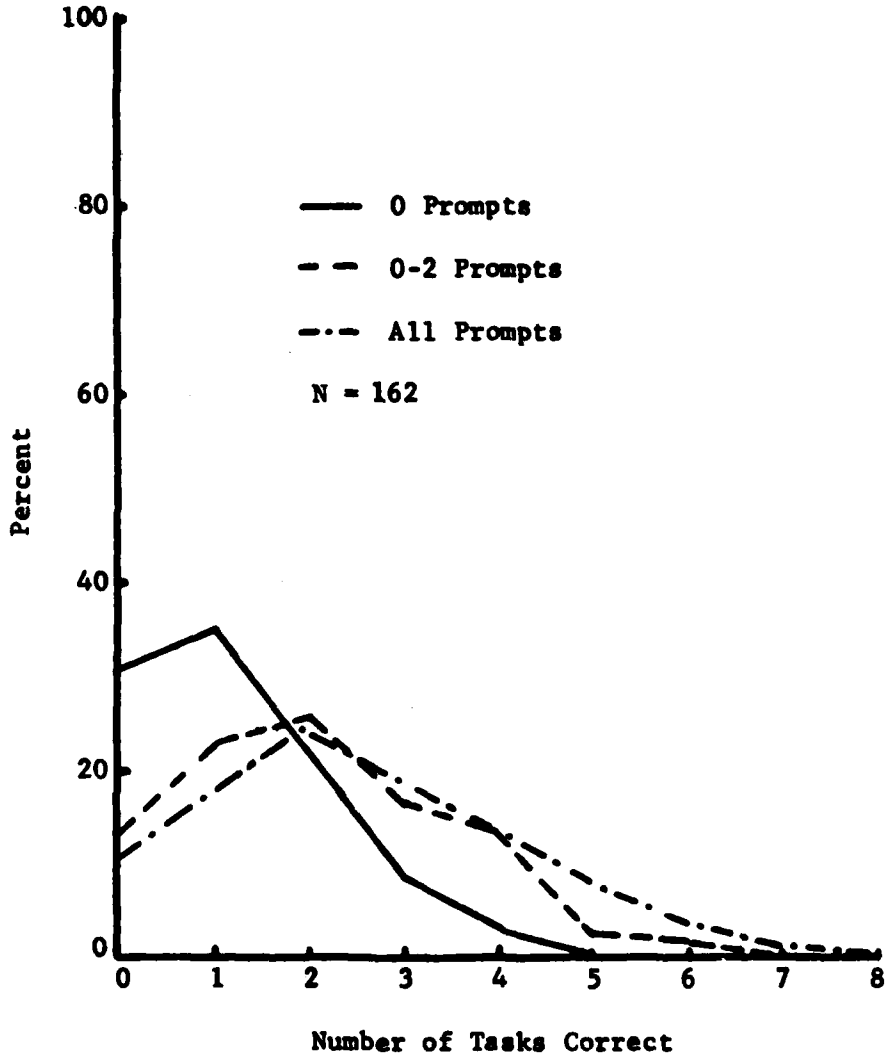

Figure 20. Percent of 63H (grades E1-E5) personnel receiving various total scores on the eight task performance test for the three levels of supervision.

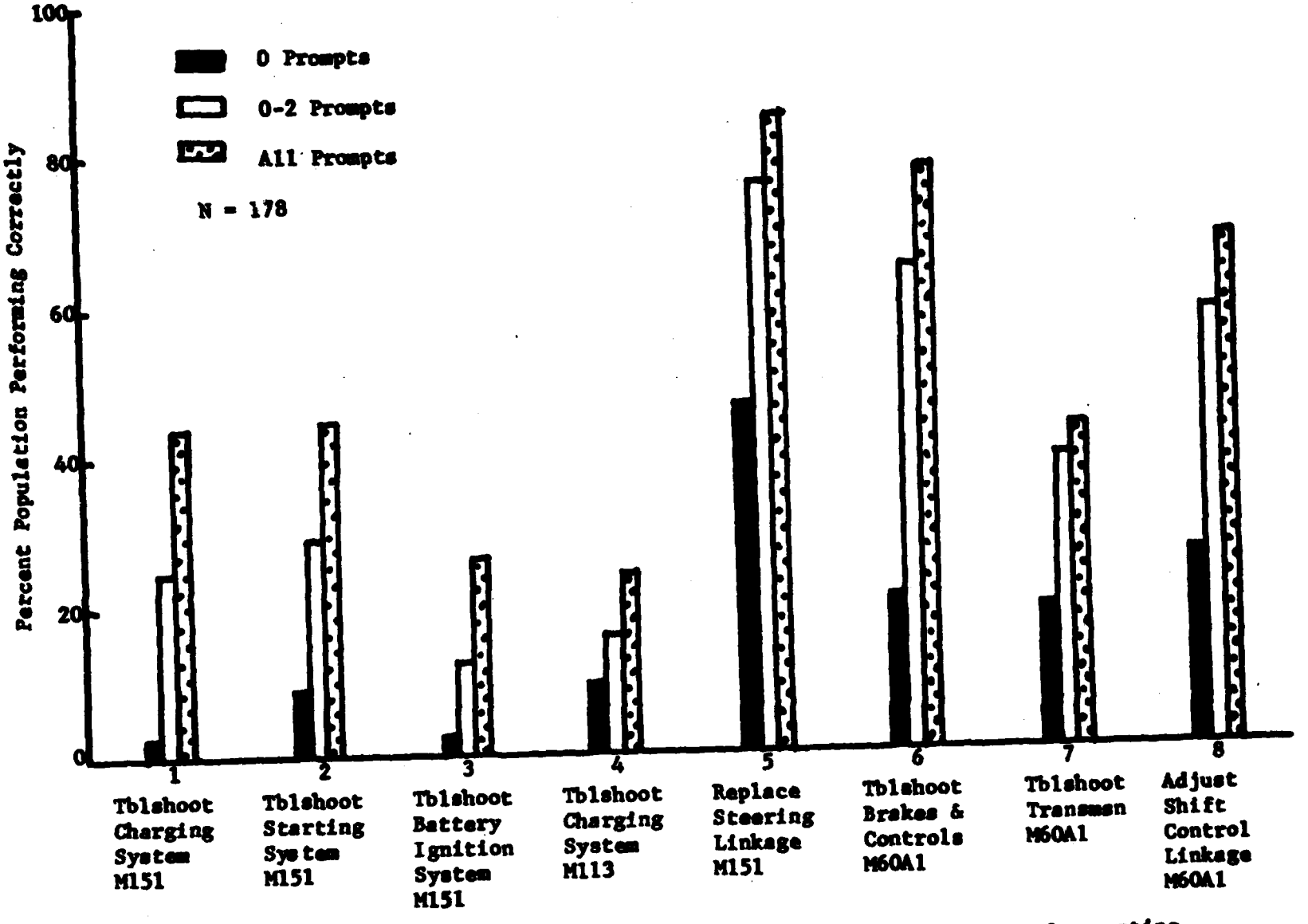

Figure 21. Performance of 63C personnel on each task for the three levels of prompting

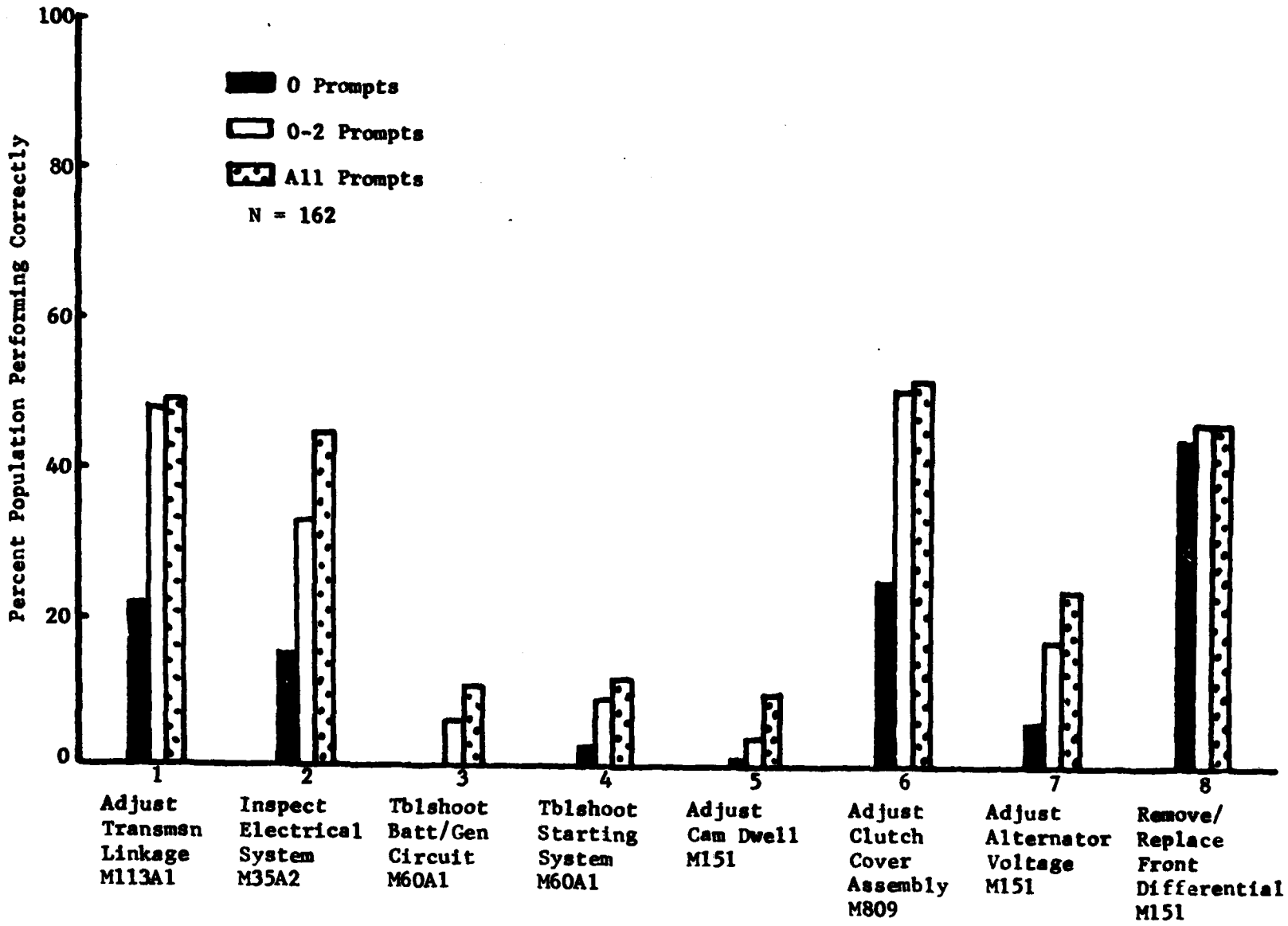

Figure 22. Performance of 63H personnel on each task for the three levels of prompting.

2. Figure 23 shows the overall performance of 63H (E6-E7) personnel on the four task troubleshooting test. Average performance equals 0.6, 1.1, and 1.9 tasks correct for the three prompting levels respectively. Figure 24 shows the percent performing each of the four tasks correctly.

C. Comparison of Less Experienced and More Experienced Personnel.

1. Figures 25, 26, and 27 show a comparison of the performance by less experienced personnel, E1-E3 and more experienced personnel, E4-E6, for 63C under the three conditions of prompting. On the average, performance of the more experienced group is superior to the less experienced. However, there is considerable overlap between the two groups indicating that many individuals in the E4-E6 group do not perform any better than individuals in the E1-E3 group.

2. Figures 28, 29, and 30 show similar information for the MOS 63H. Again, there is considerable overlap between the curves for the two groups. These curves for the 63C and 63H groups suggest that many individuals that would be expected to provide on-the-job training and assistance do not themselves possess the necessary technical skills and knowledges to provide this assistance.

D. Comparison of Conventional Group-Paced Instruction and Self-Paced Instruction.

1. Graduates of the group-paced 63C course at the USAARMS were tested at the completion of training as well as graduates of the newly instituted self-paced version of the course. Graduates of the self-paced course were then retested approximately two months later. Figure 31 contains the

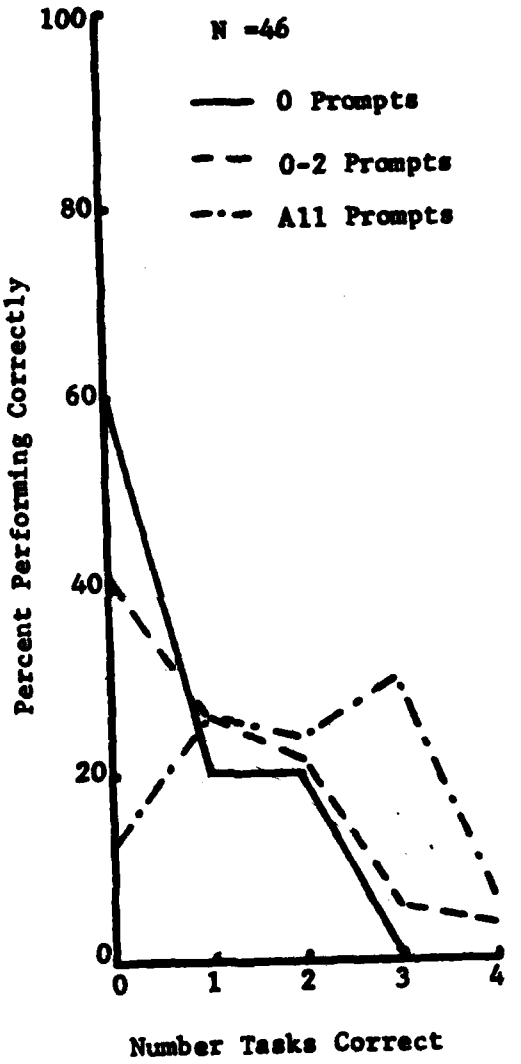

Figure 23. Percent of 63H (E6-E7) personnel receiving various total scores on the troubleshooting test.

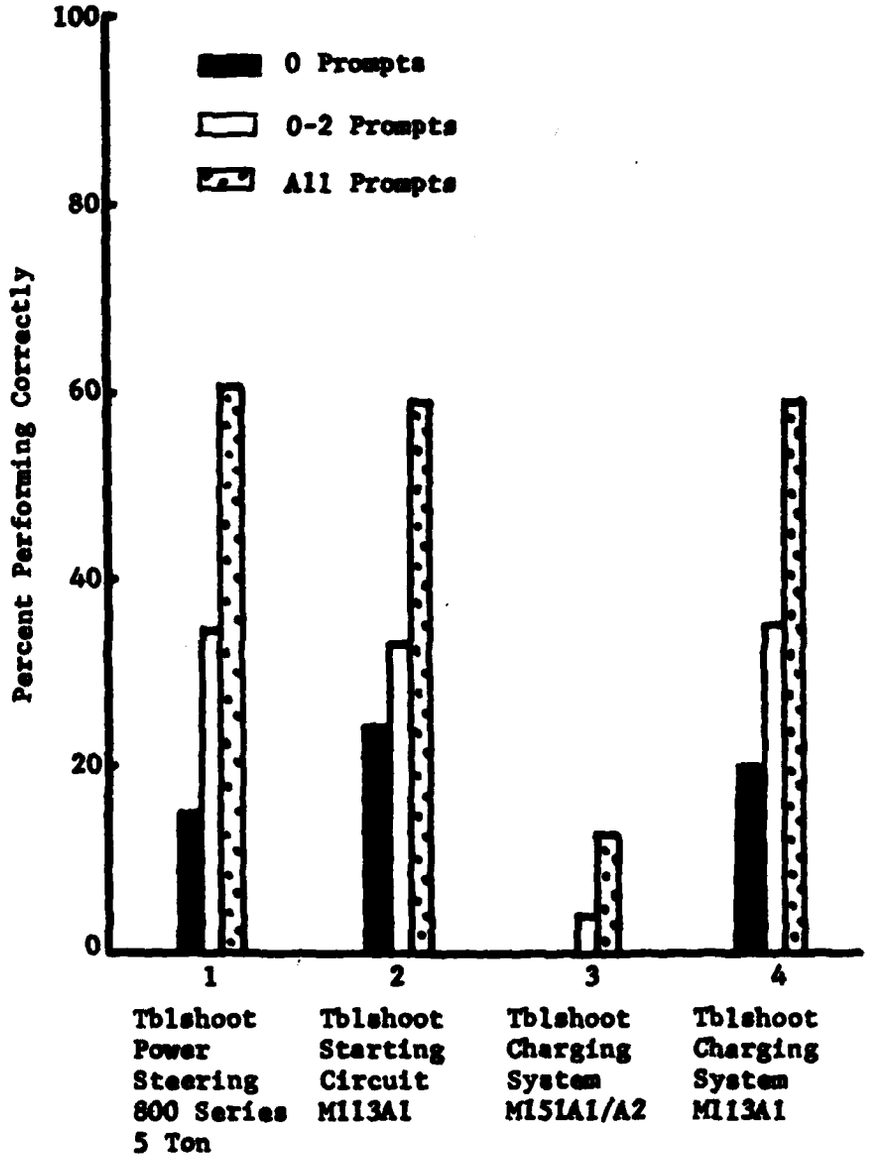

Figure 24. Performance on each troubleshooting test by 63H (E6-E7) personnel.

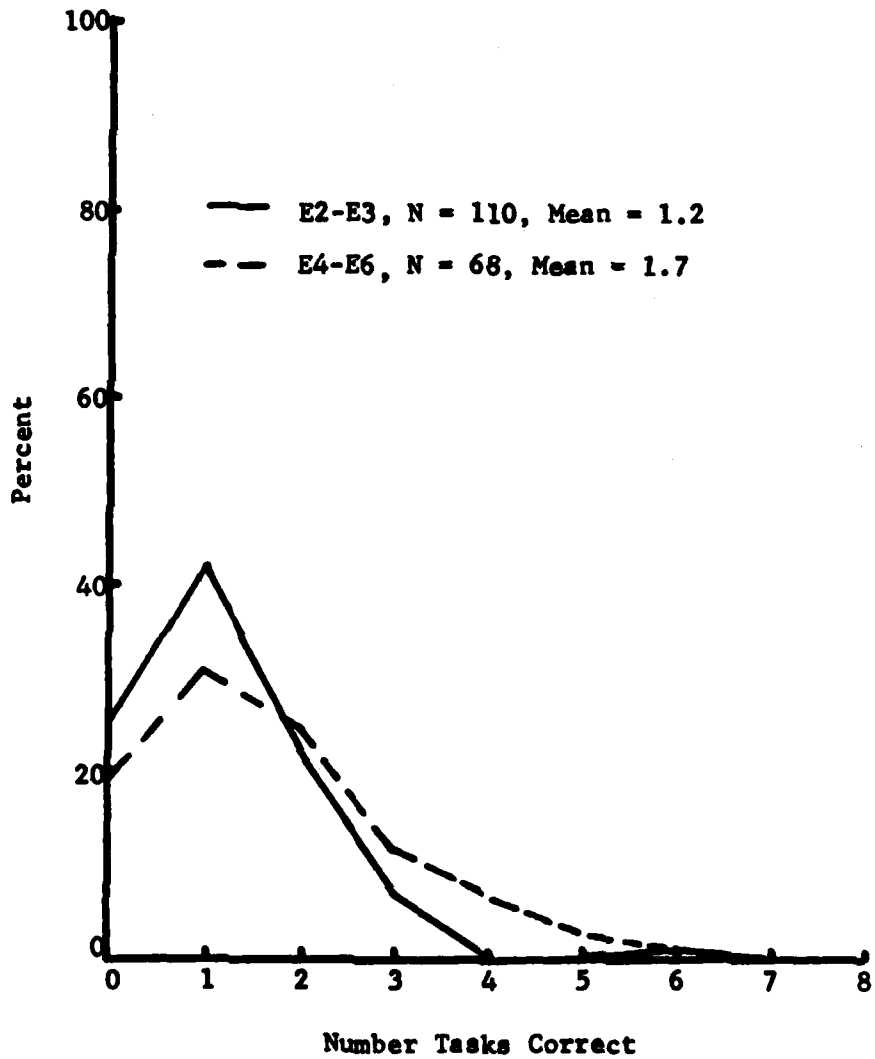

Figure 25. Comparison of 63C E2-E3 and E4-E6 performance for the 0 prompting condition (no supervision).

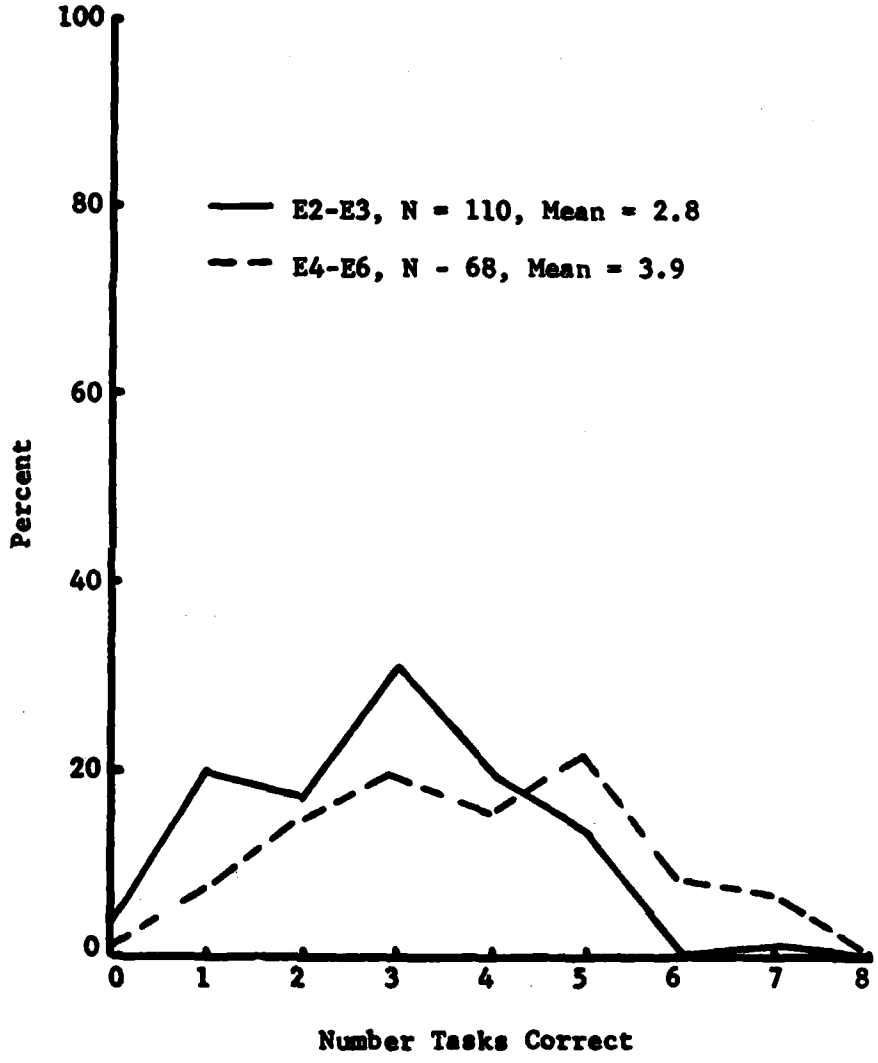

Figure 26. Comparison of 63C E2-E3 and E4-E6 performance for the 0-2 prompting condition (moderate supervision).

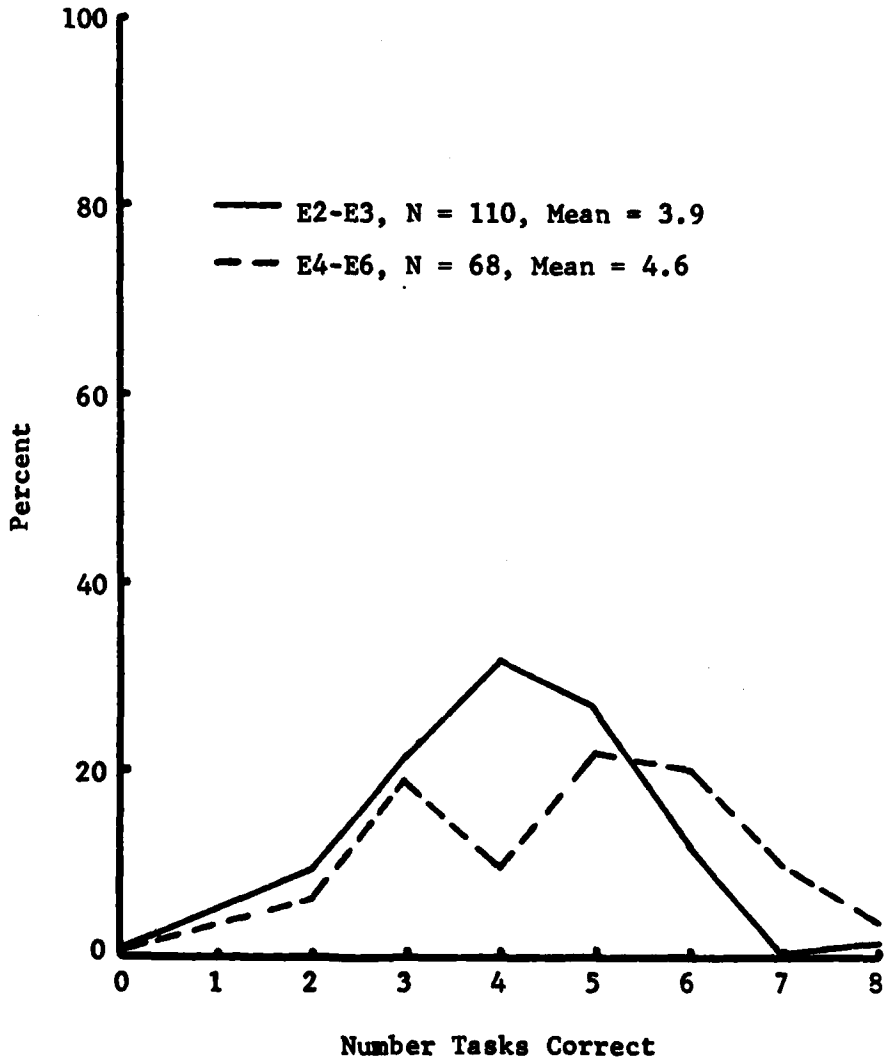

Figure 27. Comparison of 63C E2-E3 and E4-E6 performance for the all prompts condition (maximum supervision).

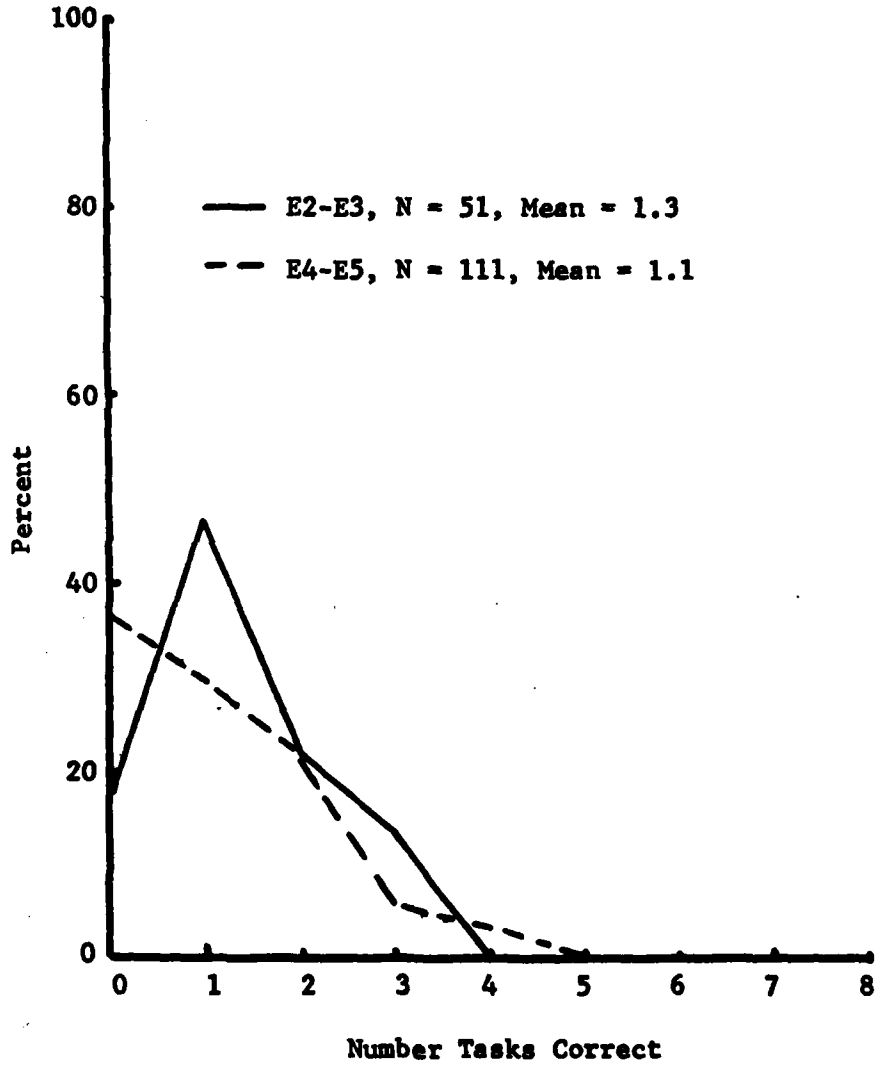

Figure 28. Comparison of 63H E2-E3 and E4-E5 performance for the 0 prompting condition (no supervision).

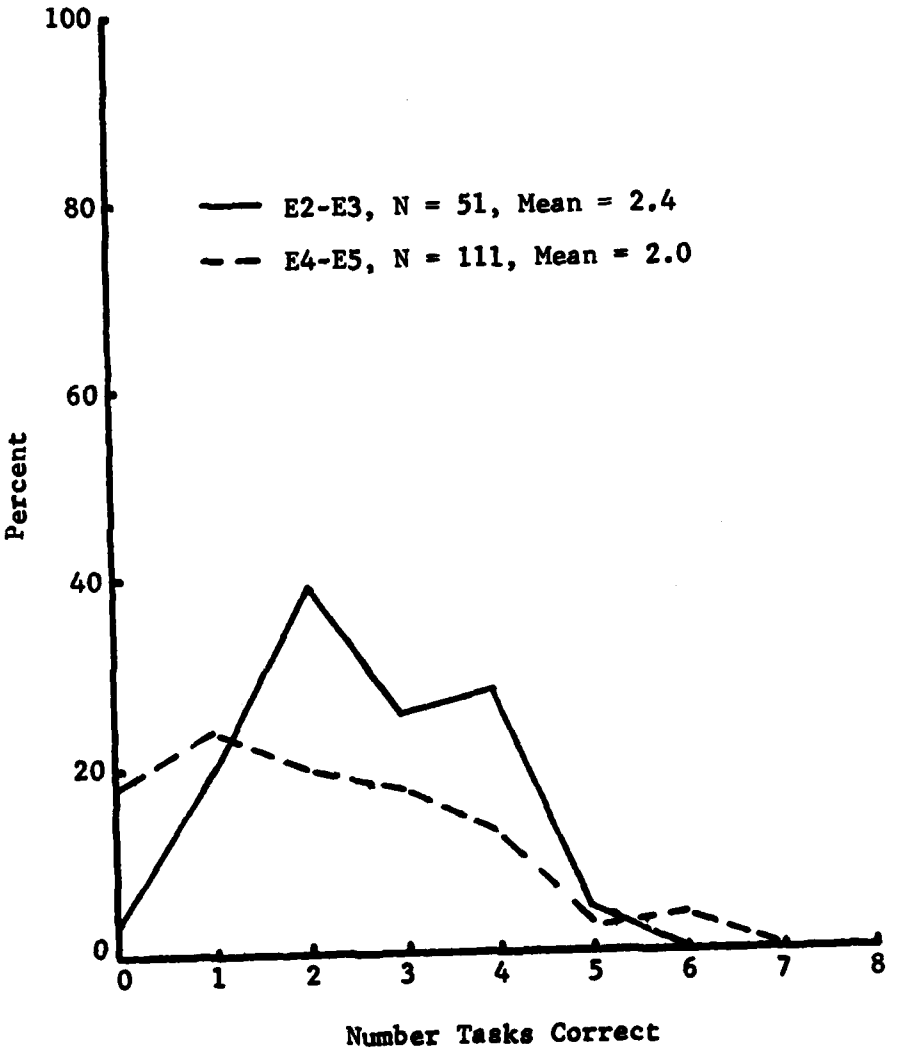

Figure 29. Comparison of 63H E2-E3 and E4-E5 performance for the 0-2 prompting condition (moderate supervision).

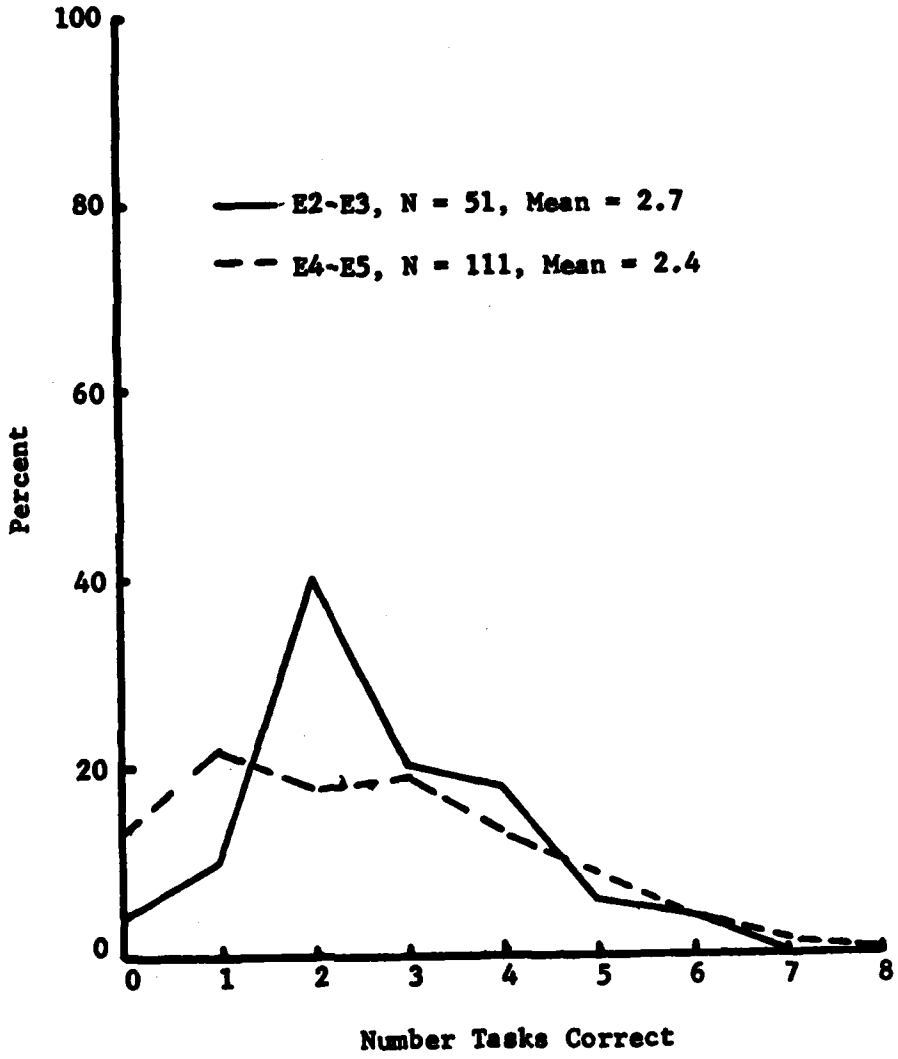

Figure 30. Comparison of 63H E2-E3 and E4-E5 performance for the all prompts condition (maximum supervision).

results of this testing. The means for the conventional group after two months on the job are not the same individuals as were tested at graduation but they appear to be a representative sample. Sample size for each group is indicated in each cell.

Type Instruction	Prompts	Mean Performance Level: At Graduation	Mean Performance Level: Two Months After Graduation
Conventional Group-paced	0	3.2 N = 30	1.3 N = 19
	0-2	*	*
	All	*	*
Self-paced	0	3.5 N = 58	1.3 N = 21
	0-2	6.2	2.9
	All	6.3	3.6

*Information not collected for these prompting levels.

Figure 31. Performance levels for graduates of 63C course in group-paced and self-paced modes.

2. These data are in agreement with the information presented earlier under the discussion of proficiency profiles. Both groups experienced a severe decline in proficiency shortly after graduation and the resulting proficiency level is almost identical for each group. A similar decline in proficiency for the 63H self-paced course was also documented. Figure 32 contains this information. Since the 63H graduates were not trained on the two troubleshooting tasks, their maximum score is 6.0.

Prompts	Mean Performance Level: At Graduation	Mean Performance Level: Two Months After Graduation
0	1.8 N = 81	1.2 N = 20
0-2	3.4	2.2
All	5.1	3.0

Figure 32. Performance levels for graduates of the 63H self-paced course.

3. Retention of AIT learning appears to be influenced more by on-the-job conditions than by the mode of instruction during AIT. The learning that occurs during AIT is quite fragile regardless of the instructional mode. It seems that the main advantage of self-paced instruction is in such things as reduced average training time, improved morale, and reduced attrition rather than in improving the quality of graduates under the current on-the-job conditions experienced by 63C and 63H personnel.

E. Effectiveness of Increased Proficiency Training During AIT.

1. The purpose of this portion of the test was to determine the effectiveness of training to a higher standard during AIT. This was accomplished by selecting two tasks from the 63H test and providing additional training on these tasks to graduates of the 63H10 course. The graduates were first tested on all eight tasks to determine their overall proficiency level. Then additional training was provided on tasks number five and eight. Proficiency was measured in terms of time to accomplish the task and accuracy of performance. As a result of this additional training, all subjects were able to successfully complete these tasks with zero prompts and most were able to accomplish the task in approximately one-half the normal time allocation.

2. Twenty of these individuals were retested after three to five months on the job. Figure 33 displays the results of this initial and follow-on testing.

		Mean Performance Level		
		0 Prompts	0-2 Prompts	All Prompts
Performance on All 8 tasks	At Graduation	1.8	3.4	5.1
	After 3-5 months on-the-job	1.2	2.2	3.0
	Percent change	-33	-35	-41
Performance on tasks 5 and 8	At Graduation*	0.3	0.4	0.6
	After 3-5 months on-the-job	0.2	0.3	0.4
	Percent change	-33	-25	-33

*Before additional training was provided

Figure 33. Comparison of overall performance on the 63H test and performance on tasks 5 and 8 after additional training.

3. These data indicate that performance on tasks 5 and 8 after additional training was not noticeably different from performance on the overall test after three to five months on the job. In both instances, the decline in performance was in the general area of 30 to 40 percent.

F. Impact of Maintenance Proficiency on Equipment Availability.

1. The proficiency level of maintenance personnel is meaningless unless it relates to the availability of supported equipment or results in economies of such items as personnel and repair parts. The model

$$OA = \frac{MTBF}{MTBF + A + R\ (1 + I_D + I_R) + D\ (1 + I_D)}$$

provides a means of estimating this relationship. In the model, MTBF = mean time between failure, A = evacuation time plus any administrative delays, R = repair time to include waiting for parts, D = diagnostic time, I_D = the average number of incorrect diagnosis, and I_R = the average number of incorrect repairs. $I_D = 1-P_d/P_d$ where P_d is the probability of a correct diagnosis and $I_R = 1-P_r/P_r$ where P_r is the probability of a correct repair.

2. Information on the 63C test can be used to estimate the probability of a correct diagnosis and a correct repair for 63C personnel. Information from the two 63H tests can be used to determine similar estimates for 63H personnel. These estimates are shown in Table 7.

	Estimated Probabilities		
	63C	63H	Average
Correct Diagnosis	11-33%	20-32%	15-33%
Correct Repair	36-67%	30-48%	33-58%

Table 7. Estimated probabilities of correct diagnosis and correct repair.

3. Typical time estimates that have been used in previous studies performed by the US Army Ordnance and Chemical Center and School (USAOCCS) will be used in this example. These estimates are for the main battle tank under wartime conditions in Europe and represent a weighted average between organizational and support maintenance. Specific times follow:

Average diagnosis time	3.0 hours
Average final inspection time	4.7 hours
Average evacuation time	8.0 hours
MTBF	84.0 hours
Average repair time	10.0 hours

Using this information plus the estimates from Table 7 and allowing parts wait time to vary from 0-100 hours,it is possible to compute an estimated equipment availability as shown in Figure 34.

4. It is recognized that Figure 34 does not represent the availability that exists today. A much higher availability can be maintained through such management practices as over specialization of personnel and heavy reliance on replacement rather than repair.

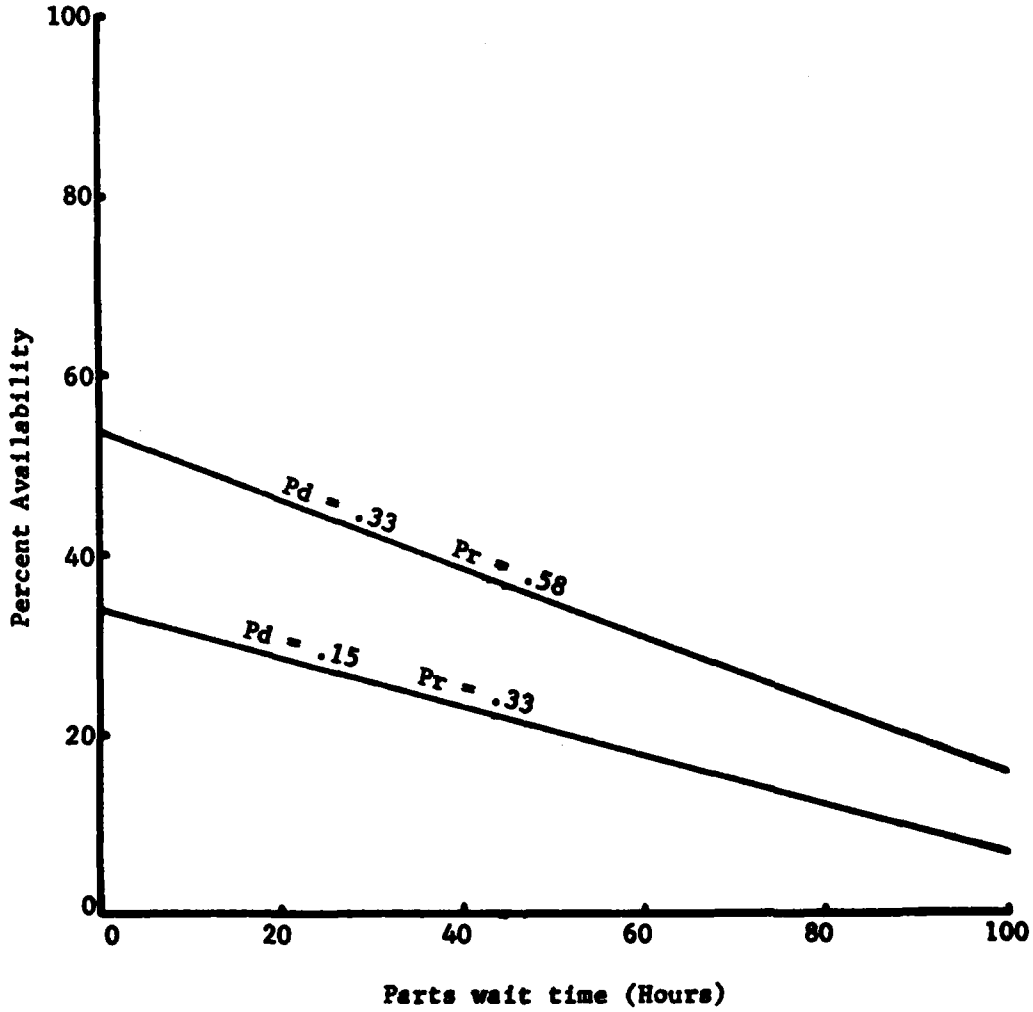

Figure 34. Equipment availability as a function of diagnostic capability, repair capability, and spare parts availability.

5. The message to be gained from Figure 34 is that it represents a condition that could occur very rapidly with a significant change in support requirements, a loss of one or two key individuals, or supply shortages. All of these are likely to occur during wartime conditions.

6. An investment in proficiency development training that would shift the operating range upward could produce pay offs in increased equipment availability or a reduction in spare parts requirements or both.

SECTION V - DISCUSSION

A. The results from this test indicate that AIT can be highly effective in training individuals with a wide range of abilities to accomplish a wide variety of rather complicated tasks in a relatively short time frame, i.e., two to three months. However, this initial learning appears to be rather fragile and a large portion of the learning can be lost in as little as two months. The decay appears to be a natural phenomenon and not related to any particular type of training. For example, the proficiency curves at Figure 5 show a consistent pattern of decay during the period 0-30 months. Those individuals in the 19-30 month period graduated from 16-week 63H20 course which was discontinued July 1976. Individuals in the 13-18 period graduated from the 8-week 63H10 course conducted in a conventional group-paced mode. Most individuals in the 0-12 month interval graduated from the 8-week 63H10 course conducted in a self-paced mode.

B. As indicated by Figures 4 and 5, the capability to perform without prompting for 63C and 63H personnel declines to about the same level. During the period 0-10 months, both groups are able to perform at about the same level with 0-2 prompts. After about 10 months, the capability of 63C personnel to perform with moderate supervision begins to increase while the capability of the 63H group continues to decline. This appears to result from the differential availability of relevant on-the-job training and experiences. The 63C personnel were receiving some OJT and performing most of the tasks whereas the 63H personnel received very little training and job experiences related to the tasks on the test. Although 63C personnel perform most of the tasks, the frequency of performance is not sufficient

to produce a high level of individual capability to perform without supervision.

C. These data indicate that maintenance skills learned during AIT will be lost if not reinforced. The biggest loss appears to occur within the first two or three months after graduation. Reinforcement must be relevant to the tasks that individuals are expected to perform. For example, just putting in hours in the shop does not produce overall maintenance capability as indicated by the low correlations between performance on the test and hours worked in maintenance.

D. As it currently exists, the on-the-job environment does not produce highly proficient maintenance personnel as indicated by Figures 4, 5, and 18. This is true even for the most capable individuals as shown in Figures 6-17. The proficiency that is developed occurs over a rather long time period. As shown by Figure 34 without extraordinary measures such as excessive parts consumption and over specialization, there is a likelihood that equipment availability could sink to an abysmally low level. With the current individual maintenance capabilities, there is always the potential for this to occur.

E. The implications seem to be that AIT will be most effective for those tasks that can be reinforced by on-the-job training and experience soon after arrival on the job. The on-the-job supervisors then have the responsibility to insure that the appropriate training and experiences are provided. However, within the current environment this does not seem likely to occur. Systematic on-the-job training is not being accomplished at any locations visited. Seventy percent of the supervisors interviewed

indicated there was insufficient time for training. Other obstacles include people not available due to company duties and other commitments, equipment not available, insufficient command emphasis, instructional materials and publications not available, and qualified people to conduct the training not available.

F. The current concept for multilevel training for the 63H MOS appears to be valid and essential for both MOS. This training would occur at the time when individual proficiency is on the upswing. Since second level training is aimed primarily at developing troubleshooting capability, there is a strong need for assistance in this area as indicated by Figures 18, 21, and 22. The data indicates that troubleshooting ability is not developed to any significant degree in the current environment. In addition, the multilevel concept appears valid to insure that the more experienced personnel possess the necessary technical skills and knowledges to provide assistance to the less experienced personnel. The same constraints as indicated for AIT would seem to apply for second level training. This implies that training should be provided only on those tasks that can be reinforced by on-the-job training and experience.

G. It appears that training to a higher standard as accomplished in this test is not an effective method for improving performance. It might be compared to "cramming" for an exam. The individual can perform at a high level for a short period but the learning will soon decay if not reinforced. It seems that any efforts to train to a higher proficiency should include practice spaced over a period of time to insure that the learning is strengthened through reinforcement.

H. The information presented at Figure 34 represents an estimated operational availability that could occur for such items as the main battle tank if availability depended primarily on individual diagnostic and repair proficiency. This unacceptably low availability is a real possibility if maintenance requirements or supply conditions change drastically as could happen during wartime.

I. Increasing the proficiency of maintenance personnel would move the operating range upward, thus increasing the minimum operating level that could exist. This can only occur through some combination of training and on-the-job experiences. During the conduct of this study, no systematic efforts were found that were designed to accomplish this objective. Commanders and supervisors maintaining a high level of availability through extraordinary practices such as overdependence on the availability of spare parts and components and extensive specialization of personnel. Over the past 25-30 years, many examples have been documented where a high percentage of good components were replaced and returned for repair. The data presented in this study indicates that the environment still exists for that condition to continue.

SECTION VI - CONCLUSIONS

A. AIT is effective in producing a broad spectrum maintenance capability within a relatively short period of time for both high ability and low ability individuals.

B. Skills learned in AIT are rather fragile and they decay rapidly if not reinforced by on-the-job experience and training. The decay is greatest for lower aptitude individuals.

C. The decay seems to be independent of the type of training received, i.e., conventional or self-paced instruction.

D. On-the-job training and experience must be relevant and timely to the type of proficiencies to be developed. Just putting in hours in the maintenance shop does not accomplish this objective. In addition, performing a task only occasionally does not seem to produce the capability to perform without assistance.

E. The concept of training and developing maintenance personnel on a broad spectrum MOS basis as opposed to specific job or duty position requirements needs reevaluation.

F. Individuals of all aptitude levels included in this study seem to have the ability to learn the desired skills. However, the lack of planned reinforcement on the job has a greater depressing effect on the low aptitude individual. Their initial learning decays to a lower level and stays at that level for a longer period of time.

G. The overall on-the-job performance of 63C and 63H personnel leaves much room for improvement. This is true for both the E1-E3 group and the E4-E7 group. Performance is especially low in the troubleshooting area.

H. No systematic on-the-job training program for maintenance personnel was observed within the units visited.

I. Many individuals in grades E4-E7 do not appear to be any more proficient than lesser experienced individuals in grades E1-E3.

J. A high degree of specialization exists on the job. This results both from the support requirements and the manner in which the personnel are utilized.

K. The concept of multilevel training as currently defined for the 63H MOS appears to be a valid concept for both MOS.

L. Training to a higher standard during AIT is not likely to improve performance significantly unless the training is reinforced over a period of time. One shot training to any level seems similar to "cramming" for an exam and the learning will decay rapidly if not reinforced.

M. The current proficiency of maintenance personnel does not appear sufficient to maintain an acceptable level of equipment availability under conditions of changing support requirements or supply disruptions. Unless the commander is able to utilize extraordinary management practices, such as over specialization of personnel and heavy reliance on replacement rather than repair, the potential exists for equipment availability to fall to fifty percent or less for such critical items as the main battle tank.

APPENDIX A

TASKS SELECTED FOR TESTING

1. 63C - Track Vehicle Mechanic Test.

   a. Troubleshoot the M151A1/A2 25 ampere DC charging system.

   b. Troubleshoot the M151A1/A2 starting system.

   c. Troubleshoot the M151A1/A2 battery ignition system.

   d. Troubleshoot the M113A1 100 ampere charging system.

   e. Replace the M151A1/A2 steering linkage.

   f. Troubleshoot the M151A1/A2 brakes and controls.

   g. Troubleshoot the M60A1 transmission.

   h. Adjust M60A1 shift control linkage.

2. 63H (E1-E5) - Tank Automotive Repairman Test.

   a. Adjust the M113A1 transmission linkage.

   b. Inspect the M35A2 electrical system.

   c. Troubleshoot the M60A1 battery indicator circuit.

   d. Troubleshoot the M60A1 starting system.

   e. Adjust cam dwell on M151A1/A2.

   f. Adjust clutch cover on M809.

   g. Test and adjust the M151A1/A2 alternator voltage output.

   h. Remove and replace the M151A1/A2 front differential.

3. 63H (E6-E7) - Tank Automotive Repairman Test.

   a. Troubleshoot the power steering system of the 800 series 5-ton truck.

   b. Troubleshoot the M113A1 starting circuit.

   c. Troubleshoot the M151A1/A2 40/60 ampere charging system.

   d. Troubleshoot the M113A1 100 ampere charging system.

APPENDIX B

US ARMY ORDNANCE AND CHEMICAL CENTER AND SCHOOL

63C/H EXAMINEE'S QUESTIONNAIRE

Data Required by the Privacy Act of 1974 (5 U.S.C. 552a)

Title of Form: 63C/H Examinee's Questionnaire

Prescribing Directive: Ltr, CG TRADOC, 28 Oct 1977

1. Authority: Executive Order 9397

2. Principal Purpose(s): The data collected will allow for efficient and correct identification of the individual's response.

3. Routine Uses:

a. The data will be used in conjunction with collection of information required for the Army Training Study (ARTS).

b. The data and the other information collected will be stored and used by authorized personnel in making statements and written reports of an official nature.

c. The data will be used in grouping and retrieval of the collected information from computerized storage.

4. Disclosure is voluntary and nondisclosure will not result in any action agianst the individual.

EXAMINEE'S QUESTIONNAIRE

1. Name_____ Rank_____

2. SSN_____ Sex: M_____ F_____

3. Left Handed_____ Right Handed_____

4. Height ____Ft ____In Weight_____lbs

5. Educational level (Circle one) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

6. If you completed high school. Diploma_____ GED_____

7. Duty MOS_____ Primary MOS_____ Secondary MOS_____

8. Total experience in 63C or 63H____years _____months.

9. What is your present duty assignment? DS Maint Shop_____ Org Maint Shop_____

10. Time in current duty position in months_____.

11. What job are you actually doing?_____

_____

12. Do you like your present job? Yes____ No____

13. Do you plan to reenlist? Yes____ No____

14a. Do you want to remain in maintenance? Yes____ No____

b. If no, what kind of Army job would you like?_____

_____

15. How did you receive your primary MOS? (Circle appropriate letter)

a. Army school (AIT or ATC)

b. On-the-job training (OJT)

c. Command or unit-sponsored school

d. Promotion or reduction in grade

e. Reclassification

f. Civilian acquired skill

g. Contractor training

h. None of the above (explain briefly)

16. How did you receive your duty MOS? (Circle appropriate letter)

a. Army school (AIT)

b. On-the-job training (OJT)

c. Command or unit-sponsored school

d. Promotion or reduction in grade

e. Reclassification

f. Civilian acquired skill

g. Contractor training

h. None of the above (please explain briefly)

17. What is your job duty?

a. Mechanic/repairman

What do you do?_____

b. Wrecker operation

c. Driver

d. Record keeping/clerical

e. Other_____

18. How many times have you changed jobs in the past six months? (Circle appropriate answer)

a. None

b. One

c. Two

d. Three

e. More than three

19. Indicate, with a check in as many boxes as apply, where you are primarily working. If you do not normally work in an area do not check the box.

	TRACK	WHEEL
Suspension		
Power Train		
Electrical		
Brake		
Cooling		
Fuel		
Hydraulic		
Steering		

20. On the average, how many hours per week do you spend in each of the following activities? (Use the column for your rank)

	E2 - E4	E5
a. Inspecting equipment	_____	_____
b. Troubleshooting	_____	_____
c. Repair	_____	_____
d. Maintenance training	_____	_____
e. Company platoon duties, details and training	_____	_____
f. Other (List activities and times for each)		
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

21. How much civilian experience have you had in automotive mechanics? (Circle appropriate answer)

a. None

b. Some in H. S.

c. Vocational school (Civilian)

d. Other (Specify)

22. How much civilian experience have you had as an automotive mechanic? (Circle a or b or 1, 2, or 3)

a. None

b. Hobby

c. Worked full time

(1) Garage (auto repair)

(2) Service station

(3) Other

23. Mark each of the following activities with which you have had experience. For each of those activities with which you have had experience how much did each help you learn to work as a repairman/mechanic?

	Experience		Benefits of Experience			
	Yes	No	None	Some	Little	Much
(1) High school auto shop	___	___	___	___	___	___
(2) Vocational or trade school	___	___	___	___	___	___
(3) Hobby	___	___	___	___	___	___
(4) Work experience (civilian)	___	___	___	___	___	___
(5) Army school (AIT)	___	___	___	___	___	___
(6) Co-worker OJT	___	___	___	___	___	___
(7) Supervisor OJT	___	___	___	___	___	___
(8) Self-study and experience	___	___	___	___	___	___

24. Do you like working as a mechanic?

a. Yes

b. No

APPENDIX C

US ARMY ORDNANCE AND CHEMICAL CENTER AND SCHOOL

63C/H SUPERVISOR'S QUESTIONNAIRE

Data Required by the Privacy Act of 1974 (5 U.S.C. 522a)

Title of Form: 63C/H Supervisor's Questionnaire

Prescribing Directive: Ltr, CG TRADOC, 28 Oct 1977

1. Authority: Executive Order 9397

2. Principal Purpose(s): The data collected will allow for efficient and correct identification of the individual's response.

3. Routine Uses:

a. The data will be used in conjunction with collection of information required for the Army Training Study (ARTS).

b. The data and the other information collected will be stored and used by authorized personnel in making statements and written reports of an official nature.

c. The data will be used in grouping and retrieval of the collected information from computerized storage.

4. Disclosure is voluntary and nondisclosure will not result in any action against the individual.

SUPERVISOR QUESTIONNAIRE

1. Name_____Rank_____Sex: M_____ F_____
2. SSN_____ Left Handed____ Right Handed_____
3. Height_____ Ft_____ In Weight____Lbs
4. Education Level (Circle one) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
5. If you completed high school. Diploma_____ GED_____.
6. Duty MOS_____Primary MOS_____Secondary MOS_____
7. Source of primary MOS (Circle one) AIT OJT
8. Total months experience in 63C or 63H_____
9. What is your present duty assignment? DS Maint Shop_____ Org Maint Shop_____
10. Time in current duty position in months_____
11. What job are you actually doing?_____ _____
12. Do you like your present job? Yes_____ No_____
13. Do you plan to reenlist? Yes_____ No_____
14. Do you want to remain in maintenance? Yes_____ No_____
    b. If no, what kind of Army job would you like?_____

15. Check the following areas in which you feel technically qualified. (Please mark as many as apply.)

System:	Track	Wheel
Suspension		
Power Train		
Electrical		
Brake		
Cooling		
Fuel		
Hydraulic		
Steering		
General Mechanic/ Repairman		

16. How many hours per week do you normally spend doing your job?_____Hours.

Of the hours you normally spend doing your job, how many hours do you normally spend supervising or performing each of the following?

a. _____ Shop administration (paperwork activities)

b. _____ Inspection of equipment

c. _____ Troubleshooting

d. _____ Repair

e. _____ Coordinating with other sections

f. _____ Assigning work to others

g. _____ Maintenance training (yourself and subordinates)

h. _____ Company/platoon duties, details and training

i. Other (list activities and time for each)

_____ _____

_____ _____

17. How many mechanics/repairmen in your unit are working primarily in each of the following systems?

System:	Track	Wheel
Suspension		
Power Train		
Electrical		
Brake		
Cooling		
Fuel		
Hydraulic		
Steering		

18. How many hours per week does a mechanic or repairman in your unit normally spend in each of the following activities?

	E2-E4	E-5
a. Inspecting equipment	____	____
b. Troubleshooting	____	____
c. Repair	____	____
d. Maintenance training	____	____
e. Company platoon duties, details and training	____	____
f. Other (list activities and times for each)		
_____	____	____
_____	____	____
_____	____	____

MAINTENANCE TRAINING PROGRAM FOR SUBORDINATES

19. The primary objective of the normal maintenance training program for your subordinates is:

_____ a. Tasks performed in your shop

_____ b. Tasks in the Soldiers Manual, whether or not they are normally performed in your shop

20. Which of the following methods are used for maintenance training of your subordinates? (Mark all that you use)

_____ Scheduled group instruction

_____ Unscheduled group instruction

_____ Training Extension Course (TEC)

_____ Exportable lessons other than TEC

_____ Training team

_____ Work with experienced mechanic/repairman

_____ Technical assistance from supervisor or experienced person

_____ Other (Please list)

_____

_____

_____

_____

21. Do you consider yourself qualified to develop and conduct a maintenance training program for your subordinates?

Yes____ No____

22. What major difficulties do you have with conducting a planned maintenance training program in your unit? Circle the MOS you are addressing.

63C 63H

Select as many as apply for each rank by making a check in the appropriate column.

E2-E4	E5-E8	
____	____	a. Insufficient time to conduct training.
____	____	b. Equipment not available for training.
____	____	c. Publications not available.
____	____	d. Qualified people to conduct training not available.
____	____	e. Instructional materials not available. (Lesson plans, audio visual materials, etc.)
____	____	f. People not available for training due to other company commitments such as sick call, details within the unit, rostered duties, etc.
____	____	g. People not available for training due to community or post commitments not controlled by the unit commander.
____	____	h. Training requirements difficult to identify.
____	____	i. Too few people need any training.
____	____	j. Not enough people need training on any one subject to conduct training.
____	____	k. People not available due to contact team work on separate detachments unable to attend training.
____	____	l. Insufficient command emphasis.
____	____	m. Other (please identify)

_____

_____

_____

PREPARATION FOR TAKING SQTs

23. Have you conducted special training to prepare your 63C/H personnel for taking their SQTs? Yes_____ No_____

    If no, have you made definite plans to conduct such training?

    Yes_____ No_____

24. Will preparing for the SQT increase the amount of maintenance training normally provided your subordinates? Yes_____ No_____

    If yes, how many additional hours per week per individual? _____

25. What method did you use (or do you plan to use) in preparing subordinates for the SQT?

    _____ Scheduled group instruction

    _____ Unscheduled group instruction

    _____ Training Extension Course (TEC)

    _____ Exportable lessons

    _____ Training team

    _____ Work with experienced mechanics/repairmen

    _____ Technical assistance

    _____ None

    _____ Other (Please specify type)

26. Were any maintenance jobs or other functions left undone or delayed as a result of training to prepare for the SQTs? Yes_____ No_____

    If yes, what?_____

    _____

    _____

27. When are you personally scheduled to take your own SQT?_____

28. How many hours per week do you spend (or plan to spend) training to take your SQT?

During normal duty hours_____

After duty hours _____

29. What training methods have you used or plan to use in preparing for your own SQT?_____

_____

_____

YOUR OPINION ABOUT TRAINING NEEDS

30. What tasks should a new 63C be able to perform immediately upon job entry? (List the five most important) (Answer only if you supervise 63C personnel)

a. _____

b. _____

c. _____

d. _____

e. _____

31. What tasks should a new 63H be able to perform immediately upon job entry? (List the five most important) (Answer only if you supervise 63H personnel)

a. _____

b. _____

c. _____

d. _____

e. _____

32. Rate how well the typical AIT graduate can perform each of the tasks you listed in question 29 or 30. Use the following scale.

5 Very well

4

3 Fairly well

2

1 Not at all

TASK NUMBER	63C	63H
a.	___	___
b.	___	___
c.	___	___
d.	___	___
e.	___	___

33. Rate how valuable you think each of the following methods is in training for troubleshooting and repair tasks performed in your unit. Use the following rating scale. (Circle one number in each block)

5 Very valuable

4

3 Somewhat valuable

2

1 Not valuable

0 Not familiar with the method

	TROUBLESHOOTING	REPAIR
Training Extension Courses (TEC)	0 1 2 3 4 5	0 1 2 3 4 5
Exportable lessons	0 1 2 3 4 5	0 1 2 3 4 5
Training teams from higher headquarters	0 1 2 3 4 5	0 1 2 3 4 5
Group instruction in the shop	0 1 2 3 4 5	0 1 2 3 4 5
Work with experienced mechanic/ repairman	0 1 2 3 4 5	0 1 2 3 4 5
Technical assistance on the job from supervisor or shop technician	0 1 2 3 4 5	0 1 2 3 4 5

34. Rate how valuable you think each of the following methods is in training fast and slow learners to perform tasks in your unit. (Use the rating scale from item 32) (Circle one number in each block)

	FAST LEARNER	SLOW LEARNER
Training Extension Courses (TEC)	0 1 2 3 4 5	0 1 2 3 4 5
Exportable lessons	0 1 2 3 4 5	0 1 2 3 4 5
Training teams	0 1 2 3 4 5	0 1 2 3 4 5
Group instruction in the shop	0 1 2 3 4 5	0 1 2 3 4 5
Work with experienced mechanic/ repairman	0 1 2 3 4 5	0 1 2 3 4 5
Technical assistance on the job from supervised or shop technician person	0 1 2 3 4 5	0 1 2 3 4 5

35. If a new weapons system or vehicle were introduced in your unit, rate how valuable you think each of the following would be to train your mechanics/repairmen to service it. (Use the rating scale from item 32)

	MECHANICS	REPAIRMEN
Training Extension Courses (TEC)	0 1 2 3 4 5	0 1 2 3 4 5
Exportable lessons	0 1 2 3 4 5	0 1 2 3 4 5
Training teams	0 1 2 3 4 5	0 1 2 3 4 5
Group instruction in the shop	0 1 2 3 4 5	0 1 2 3 4 5
Work with experienced mechanic/ repairman	0 1 2 3 4 5	0 1 2 3 4 5
Technical assistance on the job from supervisor or shop technician	0 1 2 3 4 5	0 1 2 3 4 5

36. What do you consider to be the most critical tasks for your MOS? How often should these tasks be performed to maintain proficiency? Where should the tasks be taught (AIT or Unit)? Circle which MOS you are addressing: 63C 63H

Use the following key when indicating frequency of repetitions:

a. Weekly b. Monthly c. Quarterly d. Annually

E2 - E4 TASKS	HOW OFTEN SHOULD THE TASK BE PERFORMED TO MAINTAIN PROFICIENCY (Circle appropriate letter)	CHECK WHERE TASK SHOULD BE TAUGHT	
		AIT	UNIT
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
(Use page 12 if required)			
E5 TASKS			
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
(Use page 12 if required)			

E2 - E4 TASKS	HOW OFTEN SHOULD THE TASK BE PERFORMED TO MAINTAIN PROFICIENCY (Circle appropriate letter)	CHECK WHERE TASK SHOULD BE TAUGHT	
		AIT	UNIT
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
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	a b c d		
E5 TASKS			
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
	a b c d		
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	a b c d		
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	a b c d		
	a b c d		

Appendix D

Instructions for Computing Criterion and Predictor Variables

A. Criterion Variable - Total score on all 8 tasks.

B. Predictor Variables:

1. Average supervisor's rating on all 8 tasks deleting all "0" ratings from the computation.

2. Total number of "yes" answers to have you performed task before?

3. Total number of on-the-job training modes indicated for all 8 tasks deleting item "g" from the computation.

4. Total number of "yes" responses to question 23 of Examinee's Questionnaire.

5. Total months experience in MOS (question 8).

6. Grade.

7. Educational level (question 5).

8. Total benefit score for question 23 (Scoring rules: None = 0; Some or little = 1; Much = 2).

9. Sum of civilian training and experience: Total of questions 21 & 22.

Question 21 score - None = 0 Others = 1 each

Question 22 score - None = 0 Others = 1 each (max 4).

10. Sum of military training and experience total of questions 8, 17, 19 & 20 on Examinee's Questionnaire and 4 on Scoresheet. Scoring rules:

Question 8 - Divide total months by 12; carry to one decimal place

Question 17 - Score a = 1 Others = 0

Question 19 - Divide total areas checked by 10

Question 20 - Divide total number of hours in a, b, c & d by 20

Question 4 -- Total prior performance checked on all 8 tasks and divided by 2.

11. Sum of "yes" answers to questions 12, 13, 14 and 24 on Examinee's Questionnaire.

12. Sum of scores on items e, k, l & m.

13. AFQT scores.

14. MM scores.

15. GT scores.

16. Total hours per week working in maintenance (Add a, b, c & d of question 20).

17. Total number maintenance areas (question 19).

Appendix E

Tabulated Data for Figures

Tabulation for Figure 4

Average Months in the MOS	Number of Subjects	Mean Performance Level: 0 Prompts	0-2 Prompts	All Prompts
2	19	1.3	2.6	3.8
9	80	1.1	2.9	4.0
15	30	0.9	2.8	3.2
24	20	1.2	3.4	3.8
38	8	2.5	4.4	5.4
77	21	2.7	5.1	6.1
	N = 178			

Tabulation for Figure 5

Average Months in the MOS	Number of Subjects	Mean Performance Level: 0 Prompts	0-2 Prompts	All Prompts
0	81	1.8	3.4	5.1
10	43	1.2	2.6	3.1
16	49	1.1	2.0	2.2
23	46	1.0	1.6	2.0
36	12	1.2	1.8	2.1
62	11	2.2	3.5	4.0
	N = 242			

Tabulations for Figures 6, 7, and 8

	Months in MOS				
	0-3	4-18	19-30	31-48	>48
MM > 110					
Number in Sample	10	49	7	5	6
Average Months	2	10	23	39	96
0 Prompts	1.5	1.4	1.8	2.4	3.5
0-2 Prompts	3.3	3.4	4.1	4.8	5.7
All Prompts	4.3	4.2	4.3	6.0	6.3
MM < 111					
Number in Sample	9	50	11	1	1
Average Months	2	12	24	44	68
0 Prompts	1.1	0.8	1.0	3.0	1.0
0-2 Prompts	1.9	2.4	3.2	3.0	5.0
All Prompts	3.2	3.4	3.9	3.0	6.0

Tabulations for Figures 9, 10, and 11

	Months in MOS					
	0-3	4-12	13-18	19-30	31-48	>48
MM > 110						
Number in Sample	1	16	22	18	4	4
Average Months	2	10	16	24	32	57
0 Prompts	2	1.3	1.4	1.6	2.0	2.5
0-2 Prompts	2	2.7	2.4	2.3	3.2	4.5
All Prompts	2	3.2	2.6	2.7	3.5	5.0
MM < 111						
Number in Sample	No Data	20	26	28	5	4
Average Months		10	16	23	40	58
0 Prompts		1.1	0.8	0.6	0.8	1.5
0-2 Prompts		2.6	1.6	1.2	1.4	2.8
All Prompts		3.1	1.9	1.5	1.8	3.2

Tabulations for Figures 12, 13, and 14

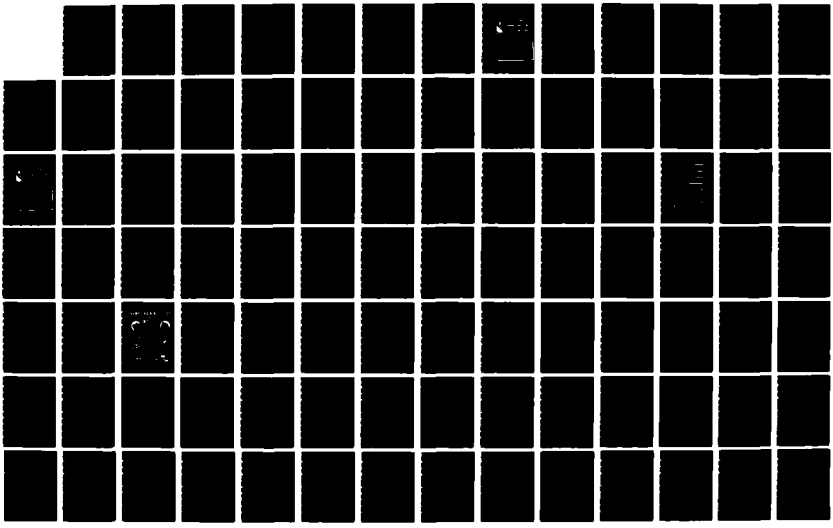
	Months in MOS					
	0-3	4-12	13-18	19-30	31-48	>48
AFQT > 50						
Number in Sample	9	42		11	11	
Average Months	2	10		23	86	
0 Prompts	1.6	1.2		1.5	3.3	
0-2 Prompts	3.2	3.4		3.8	5.7	
All Prompts	4.6	4.3		4.1	6.4	
AFQT < 51						
Number in Sample	9	43	21	8	20	
Average Months	2	9	15	24	62	
0 Prompts	1.1	1.0	1.0	0.9	1.6	
0-2 Prompts	2.1	2.4	2.8	3.0	3.2	
All Prompts	3.1	3.6	3.1	3.8	3.8	

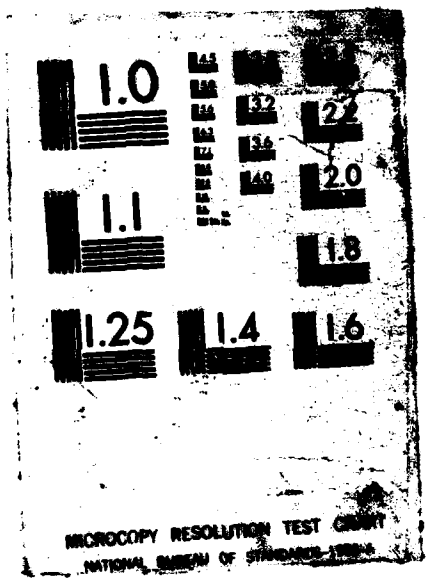
Tabulations for Figures 15, 16, and 17

	Months in MOS					
	0-3	4-12	13-18	19-30	31-48	>48
AFQT > 50						
Number in Sample	No Data	15	17	16	No Data	4
Average Months		10	16	2.3		58
0 Prompts		1.2	1.4	1.5		2.8
0-2 Prompts		2.8	2.4	2.2		4.0
All Prompts		3.3	2.6	2.6		4.5
AFQT < 51						
Number in Sample	1	25	30	29	10	5
Average Months	2	9	16	24	37	68
0 Prompts	2	1.1	0.8	0.7	0.7	1.8
0-2 Prompts	2	2.4	1.6	1.3	1.3	3.0
All Prompts	2	2.9	1.9	1.6	1.5	3.4

AD-A186 326 ARMY TRAINING STUDY: TRAINING EFFECTIVENESS ANALYSIS (TEA) SUMMARY VOLUME (U) ARMY TRAINING AND DOCTRINE COMMAND FORT MONROE VA F J BROWN 08 AUG 78 2/6

UNCLASSIFIED SBI-AD-F000 110 F/G 15/1 NL




1.0
1.1
1.25
1.4
1.6
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS

Tabulations for Figure 18

Months in MOS	Month Average	N	Means 0 Prompts	Means 0-2 Prompts	Means All Prompts
0-12	9	10	0.2	0.5	1.0
13-48	31	7	0.7	1.0	1.7
49-84	71	6	0.8	1.5	2.3
85-156	125	7	0.7	1.0	2.4
157-204	179	7	1.0	1.6	2.3

Tabulations for Figure 19

Number Tasks Correct	0 Prompts N	0 Prompts %	0-2 Prompts N	0-2 Prompts %	All Prompts N	All Prompts %
0	43	24	5	3	2	1
1	67	38	27	15	9	5
2	42	24	29	16	15	8
3	17	10	43	24	37	21
4	5	3	32	18	42	24
5	2	1	29	16	34	19
6	2	1	6	3	37	15
7			6	3	7	4
8			1	1	5	3
Average Number Tasks Correct	1.4		3.2		4.1	

Tabulations for Figure 20

Number Tasks Correct	0 Prompts N	0 Prompts %	0-2 Prompts N	0-2 Prompts %	All Prompts N	All Prompts %
1	50	31	23	14	18	11
2	57	35	37	23	30	18
3	36	22	42	26	40	25
4	14	09	28	17	31	19
5	5	03	23	14	23	14
6			5	3	13	8
7			4	2	6	4
8					1	1
Average Number Tasks Correct	1.2		2.1		2.5	

Tabulations for Figure 21

Prompts	Task Number 1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	5 N	5 %	6 N	6 %	7 N	7 %	8 N	8 %
0	5	3	16	9	6	3	17	10	84	47	37	21	33	19	46	26
0-2	45	25	51	29	23	13	31	17	135	76	115	65	70	39	103	58
All	79	44	80	45	48	27	45	25	152	85	138	78	76	43	121	68

Tabulations for Figure 22

Prompts	Task Number 1 N	1 %	2 N	2 %	3 N	3 %	4 N	4 %	5 N	5 %	6 N	6 %	7 N	7 %	8 N	8 %
0	37	22	25	15	0	0	5	3	1	1	41	25	10	6	72	44
0-2	77	48	53	33	10	6	15	9	7	4	83	51	27	17	74	46
All	80	49	73	45	18	11	19	12	16	10	84	52	39	24	74	46

Tabulations for Figure 23

Number Tasks Correct	0 Prompts		0-2 Prompts		All Prompts	
	N	%	N	%	N	%
0	28	60	19	41	6	13
1	9	20	12	26	12	26
2	9	20	10	22	11	24
3			3	6	14	30
4			2		3	6

Tabulations for Figure 24

Task Number	0 Prompts		0-2 Prompts		All Prompts	
	N	%	N	%	N	%
1	7	15	16	35	28	61
2	11	24	15	33	27	59
3	0	0	2	04	6	13
4	9	20	16	35	27	59

Tabulations for Figures 25, 26, and 27

N = 110 E2-E3 & 68 E4-E6

		Number Tasks Correct																	
		0		1		2		3		4		5		6		7		8	
Prompts	Grade	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
0	E2-E3	29	26	46	42	25	23	9	8	0	0	0	0	1	1	0	0	0	0
	E4-E6	14	20	21	31	17	25	8	12	5	7	2	3	1	1	0	0	0	0
0-2	E2-E3	4	4	22	20	19	17	29	26	21	19	14	13	0	0	1	1	0	0
	E4-E6	1	1	5	7	10	15	14	20	11	16	15	22	6	9	5	7	1	1
All	E2-E3	1	1	6	5	10	9	24	22	35	32	19	17	13	12	0	0	2	2
	E4-E6	1	1	3	4	5	7	13	19	7	10	15	22	14	20	7	10	3	4

Tabulations for Figures 28, 29, and 30

N = 51 E2-E3 & 111 E4-E5

		Number Tasks Correct																	
		0		1		2		3		4		5		6		7		8	
Prompts	Grade	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
0	E2-E3	9	18	24	47	11	22	7	14	0	0	0	0	0	0	0	0	0	0
	E4-E5	41	37	33	30	25	22	7	6	5	4	0	0	0	0	0	0	0	0
0-2	E2-E3	2	4	10	20	20	40	8	16	9	18	2	4	0	0	0	0	0	0
	E4-E5	21	19	27	24	22	20	20	18	14	13	3	3	4	4	0	0	0	0
All	E2-E3	2	4	5	10	20	40	10	20	9	18	3	6	2	4	0	0	0	0
	E4-E5	16	14	25	22	20	18	21	19	14	13	10	9	4	4	1	1	0	0

U.S. ARMY

ORDNANCE AND CHEMICAL

CENTER AND SCHOOL

ARMY TRAINING STUDY (ARTS)

COMBAT SERVICE SUPPORT

MOS 63C AND 63H

SUPPLEMENT NUMBER 1

12 JULY 1978

PROFICIENCY DEVELOPMENT PROFILES

NATIONAL GUARD

ABERDEEN PROVING GROUND, MARYLAND 21005

PROFICIENCY DEVELOPMENT PROFILES
NATIONAL GUARD

SECTION I - ABSTRACT

A. Problem: The purpose of this test was to determine proficiency development profiles for National Guard personnel in MOS 63C Track Vehicle Mechanic, and MOS 63H Automotive Repairman for various levels of experience.

B. Test Design: See Army Training Study (ARTS), Combat Service Support, MOS 63C and 63H, Initial Report dated 1 July 1978 for a description of the test design.

C. Findings:

1. The proficiency of National Guard personnel in the unit visited is considerably lower than that found in the Active Army units.

2. Proficiency in the National Guard unit appears to be closely related to relevant training and experience and ability just as with Active Army personnel.

3. Specialization exists in the National Guard just as it exists in the Active Army.

4. In general, the more experienced E4 - E6 personnel do not appear to be any more proficient than the lesser experienced E1 - E3 personnel.

5. The capability to maintain a high level of proficiency on a broad spectrum of tasks appears doubtful within the current environment.

D. Conclusions:

1. As they are now trained and utilized, National Guard personnel can be expected to perform at a lower level than their Active Army

counterparts on a broad spectrum of critical tasks.

2. The concept of training and developing National Guard maintenance personnel on a broad spectrum MOS basis needs reevaluation.

3. 63C and 63H personnel in the unit tested would require intensive training prior to mobilization. This training should be targeted on those tasks to be performed during activation. This would seem to require a differentiated training program in that some individuals would require skill level one training and others would require skill level two training.

4. Because of prior experience and training, any premobilization training could probably be accomplished in 15-35 percent less time than for nonprior experience personnel.

SECTION II - INTRODUCTION

Objective: The objective of this test was to determine proficiency development profiles for 63C Track Vehicle Mechanics, and 63H Tank Automotive Repairmen in National Guard units.

SECTION III - TEST DESIGN

See Army Training Study (ARTS) Combat Service Support, MOS 63C and 63H, Initial Report, Proficiency Development Profiles dated 1 July 1978 for a description of the test design.

SECTION IV - FINDINGS

A. Proficiency Development Profiles:

1. Figures 1* and 2 show the proficiency curves for 63C and 63H personnel in one selected National Guard unit. These curves show the mean performance level at various experience intervals for the three levels of prompting. Figures 3 and 4 show the performance of these groups by percent of personnel at each total score. Significant aspects of these curves are:

a. The overall performance of both groups is quite low at all experience intervals and prompting levels. As indicated by Figure 5, mean performance of the National Guard group with maximum prompting approximates the Active Army performance with zero prompts.

*Data tabulations for Figures 1, 2, 3, and 4 are at Appendix A.

MOS	COMPONENT	MEAN PERFORMANCE LEVEL 0 PROMPTS	0-2 PROMPTS	ATT PROMPTS
	Active Army N=178	1.4 (1.2)*	3.2 (1.7)	4.1 (1.7)
63C	National Guard N=62	0.5 (0.8)	1.3 (1.3)	1.8 (1.5)
	Active Army N=162	1.2 (1.1)	2.1 (1.5)	2.5 (1.6)
63H	National Guard N=41	0.5 (0.7)	1.0 (1.0)	1.3 (1.4)

*Standard deviation provided in parentheses

Figure 5. Comparison of mean performance levels between Active Army and National Guard groups.

b. Although overall performance is low, there is a general increase in performance level during the 0-18 month interval. A noticeable drop in proficiency occurs for both 63C and 63H groups at about the two year point. Available data does not suggest any reasons for the drop.

2. Tables 1 and 2 contain correlations between scores on the test and the various predictor variables. Correlations above 0.26 are significant at the 0.05 level. For the 63C group, the strongest correlations exist for variables 2, 3, 10, and 17. These data indicate that relevant military training and experience are the strongest contributors to proficiency development.

3. For the 63H group, strong correlations exist for variables 3, 4, 7, 8, 9, 10, 11, 12, 16, and 17. These data also indicate the benefits of training and experience. However, civilian experience appears to be a strong contributor to performance for this group. In addition,

education correlates strongly with performance. Table 3 indicates that the mean education level for the 63H group is 11.3. The range in educational attainment is greatest for this group and thus the opportunity for a correlation to manifest itself.

a. Considering the availability of equipment and time, it is not surprising that overall performance of the National Guard group is lower than that of the Active Army. These data further support the need for relevant and timely on-the-job training and experience for proficiency development and maintenance.

b. Task-by-Task Performance:

1. Tables 4 and 5 indicate the task-by-task performance for 63C and 63H personnel on the eight task performance test for each group. These data indicate the 63C personnel perform best on tasks 6, 7, and 8. Performance is rather low on the other tasks. 63H personnel perform best on tasks 6, 3, and 1.

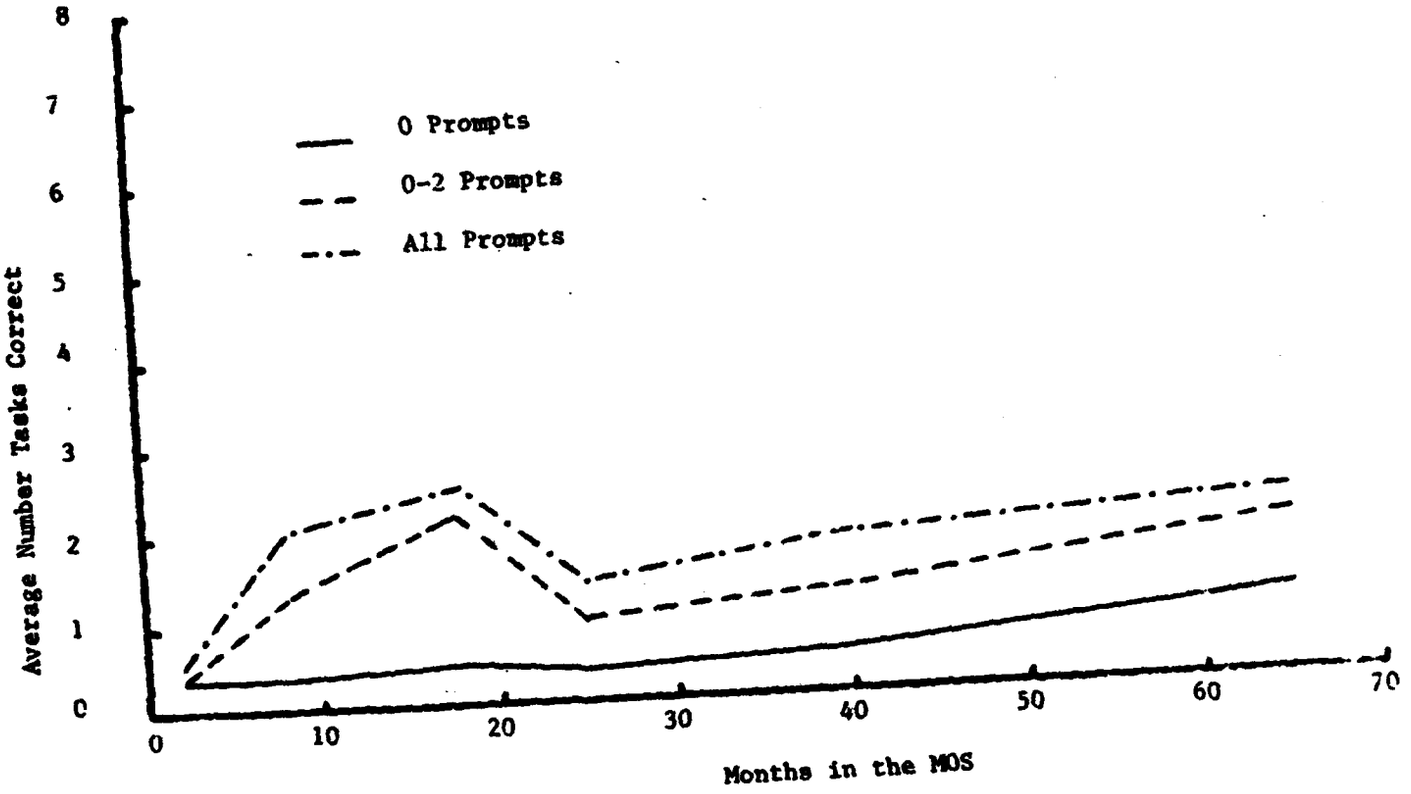


FIGURE 1. Proficiency curves for National Guard personnel in MOS 63C.

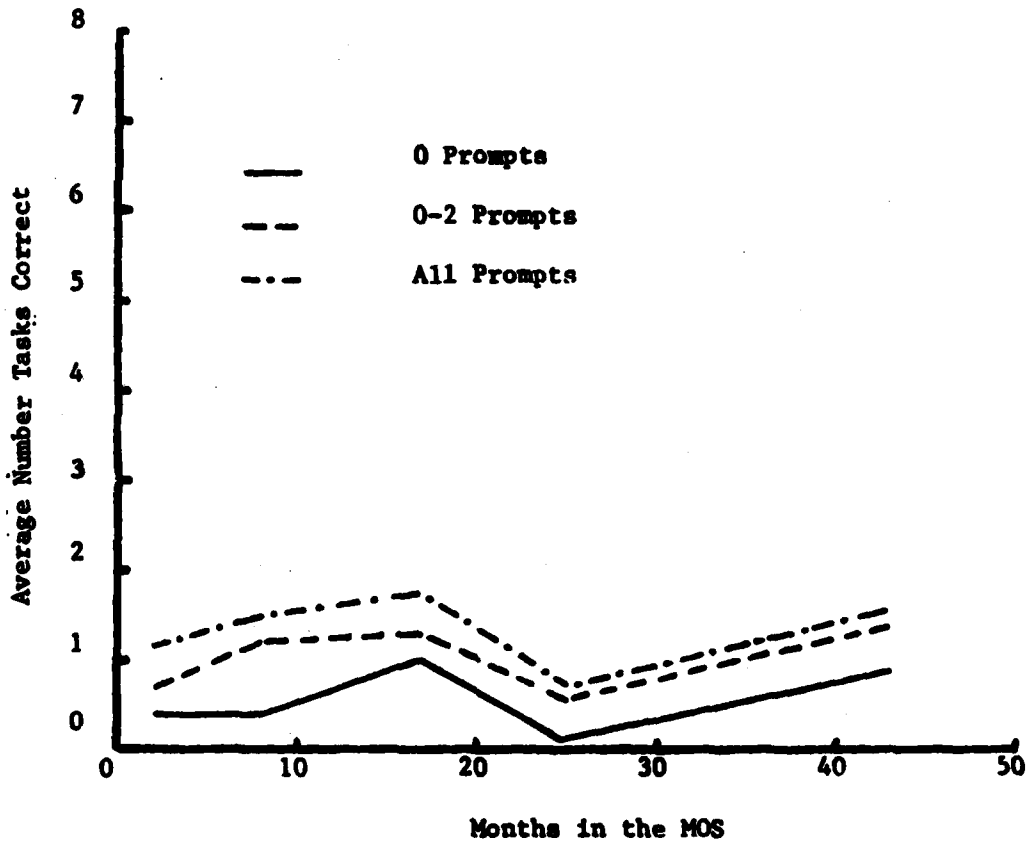


FIGURE 2. Proficiency curves for National Guard personnel in MOS 63H.

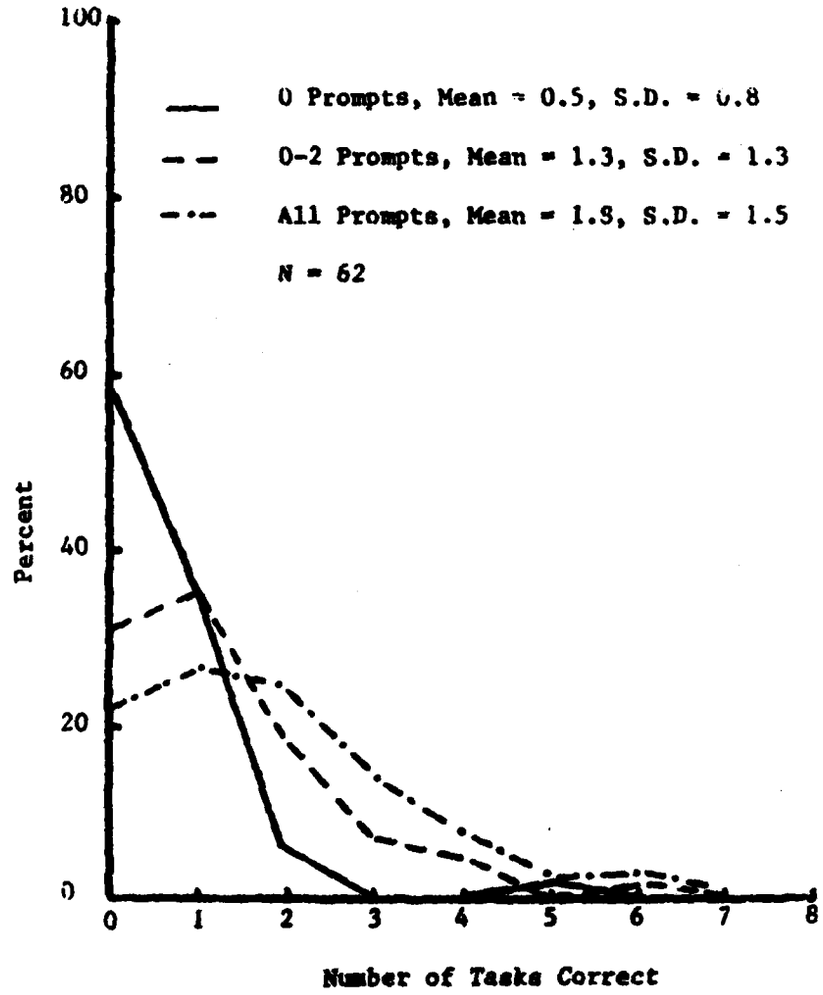


FIGURE 3. Percent of National Guard personnel in MOS 63C receiving various total scores.

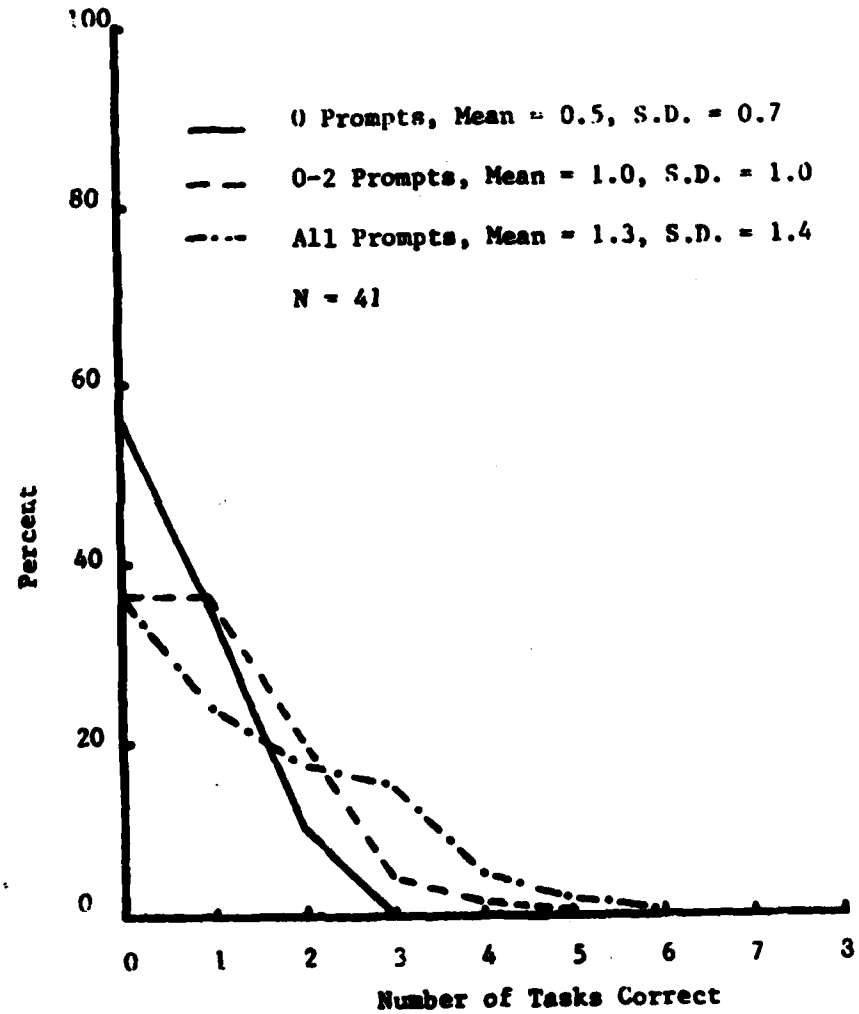


FIGURE 4. Percent of National Guard personnel in MOS 63H receiving various total scores.

TABLE 1

63C NATIONAL GUARD CORRELATIONS

E1-E6

N=62

PREDICTOR VARIABLES	PROMPTS 0	PROMPTS 0-2	All
1. Supervisor's Rating	.38*	1.00*	1.00*
2. Performed task before	.42	.68	.74
3. OJT received on task	.31	.52	.55
4. Types of background and experience	.24	.08	.04
5. Months experience in MOS	.25	.14	.05
6. Grade	.06	-.09	-.15
7. Education	.07	.17	.25
8. Benefits of types of training	.16	.13	.04
9. Types of civilian experience	-.13	-.14	-.19
10. Military training and experience	.40	.51	.26
11. Attitude toward maintenance and job	.08	.04	.03
12. Variables 10 & 11 combined	.30	.33	.08
13. AFQT score	-	-	-
14. MM score	-	-	-
15. GT score	-	-	-
16. Hours per week working in maintenance	.03	.03	.01
17. Number of work areas	.13	.36	.43

*only 5 responses

TABLE 2

63H NATIONAL GUARD CORRELATIONS

E1-E5

N=41

PREDICTOR VARIABLES	PROMPTS 0	0-2	All
1. Supervisor's Rating	.28	.44	.24
2. Performed task before	.17	.14	.17
3. OJT received on task	.38	.38	.35
4. Types of background and experience	.33	.31	.42
5. Months experience in MOS	.14	.07	-.02
6. Grade	.02	.05	.03
7. Education	.39	.46	.43
8. Benefits of types of training	.40	.55	.60
9. Types of civilian experience	.18	.43	.40
10. Military training and experience	.38	.36	.34
11. Attitude toward maintenance and job	.23	.37	.33
12. Variables 10 & 11 combined	.42	.57	.58
13. AFQT score	-	-	-
14. MM score	-	-	-
15. GT score	-	-	-
16. Hours per week working in maintenance	.36	.49	.60
17. Number of work areas	.42	.39	.40

TABLE 3

MEAN VALUES PER PREDICTOR VARIABLES
63C AND 63H NATIONAL GUARD PERSONNEL

PREDICTOR VARIABLES	MEAN VALUES	
	63C	63H
1. Supervisor's Rating	3.2	3.1
2. Performed task before	2.4	2.0
3. OJT received on task	2.2	1.0
4. Types of background and experience	4.0	3.4
5. Months experience in MOS	27.5	17.9
6. Grade	4.1	3.3
7. Education	11.8	11.3
8. Benefits of types of training	5.8	5.1
9. Types of civilian experience	2.0	1.7
10. Military training and experience	5.5	4.4
11. Attitude toward maintenance and job	2.5	2.3
12. Variables 10 & 11 combined	15.9	13.6
13. AFQT score	-	-
14. MM score	-	-
15. GT score	-	-
16. Hours per week working in maintenance	13.4	9.9
17. Number of work areas	5.6	4.8

TABLE 4

TASK-BY-TASK PERFORMANCE OF 63C
NATIONAL GUARD PERSONNEL

TASK	PERCENT PERFORMING CORRECTLY 0 PROMPTS	0-2 PROMPTS	ALL PROMPTS
1. Troubleshoot M151A1/A2 Charging System.	0	6	10
2. Troubleshoot M151A1/A2 Starting System.	2	8	16
3. Troubleshoot M151A1/A2 Battery Ignition System	0	0	2
4. Troubleshoot M113A1 Charging System.	2	3	6
5. Replace M151A1/A2 Steering Linkage.	11	13	14
6. Troubleshoot M60A1 Brakes & Control System.	22	45	63
7. Troubleshoot M60A1 Transmission.	6	27	40
8. Adjust M60A1 Shift Control Linkage	11	24	26

TABLE 5

TASK-BY-TASK PERFORMANCE OF 63H
NATIONAL GUARD PERSONNEL

TASK	PERCENT PERFORMING CORRECTLY 0 PROMPTS	0-2 PROMPTS	ALL PROMPTS
1. Adjust M113A1 Transmission Linkage.	5	15	20
2. Inspect M35A2 Electrical System.	0	0	12
3. Troubleshoot M60A1 Battery/Generator Circuit.	5	24	24
4. Troubleshoot M60A1 Starting System.	0	0	0
5. Adjust M151A1/A2 Cam Dwell.	0	2	15
6. Adjust M809 Clutch Cover Assembly.	44	58	61
7. Adjust M151A1/A2 Alternator Voltage.	0	0	2
8. Remove/Replace M151A1/A2 Front Differential.	0	0	0

2. Table 6 shows the task-by-task performance of 63H personnel on the four task troubleshooting test. Although the sample size is small, N=8, Figure 6 indicates that the average performance of the National Guard personnel approximates that of the Active Army individuals at all prompting levels.

TABLE 6

TASK-BY-TASK PERFORMANCE OF 63H NATIONAL GUARD PERSONNEL ON TROUBLESHOOTING TASKS

TASKS	PERCENT PERFORMING CORRECTLY		
	0 PROMPTS	0-2 PROMPTS	ATT PROMPTS
1. Troubleshoot M809 Power Steering.	1	3	4
2. Troubleshoot M113A1 Starting Circuit.	0	3	3
3. Troubleshoot M151A1/A2 Charging System.	0	0	0
4. Troubleshoot M113A1 Charging System.	4	4	4

COMPONENT		MEAN PERFORMANCE LEVEL		
		0 PROMPTS	0-2 PROMPTS	ATT PROMPTS
Active Army	N=46	0.6	1.1	1.9
National Guard	N=8	0.6	1.2	1.4

Figure 6. Comparison of mean performance levels between Active Army and National Guard 63H personnel on the four task troubleshooting test.

SECTION V - DISCUSSION

A. Results from this test indicate that National Guard personnel in MOS 63C and 63H at the one unit visited performed at a generally lower level than their Active Army counterparts on a broad spectrum of MOS tasks. This generalization may not be true for performance on the four task troubleshooting test administered to the senior 63H personnel. Mean performance levels for Active Army and National Guard personnel is about equal on this test, however, the sample size is small, N=8.

B. The overall lower proficiency is to be expected considering the limited time available for training and the equipment differences that exist between Active Army and National Guard units. Correlations between the various predictor variables and test performance indicates a strong link between relevant training and experience and proficiency level. Aptitude scores were not available for the National Guard personnel but the rather strong correlation between education and performance for the 63H personnel indicates that ability is also an essential ingredient.

C. Although the National Guard personnel did not perform as well overall as their active Army counterparts, the keys to improving proficiency appear to be the same for both groups, i.e., a certain minimum ability plus relevant and timely training and experience that reinforces the skills and knowledges once they are developed. In this connection, the capability to maintain a high level and broad spectrum maintenance capability appears doubtful without a significant change to the existing on-the-job environment.

D. Given the current proficiency at all experience levels, it is apparent that intensive training would be required for these 63C and 63H personnel to perform as required during mobilization. This training should be targeted on tests tasks that individuals will perform during activation and should be consistant with skill level demands. For example, it appears that troubleshooting skills are difficult to develop and maintain. In this connection attempting to train all individuals to be diagnosticians may be counterproductive in that it could detract from the capability to fully develop other critical skills and knowledge.

E. Since these personnel possess some prior training and experience, mobilization training could be expected to be accomplished in less time than for inexperienced individuals. Data contained elsewhere in this report indicate that individuals with one year or more of garage experience complete the 63H10 resident course in 15 percent less time on the average than individuals without any prior automotive experience. The garage experienced individuals beat the average time of the nonexperienced individuals by as much as 35 percent. It seems logical then that mobilization training for these National Guard personnel could be accomplished in 15-35 percent less time than would be required for nonexperienced personnel.

SECTION VI - CONCLUSIONS

A. As they are now trained and utilized, National Guard personnel can be expected to perform at a lower level than their Active Army counterparts on a broad spectrum of critical tasks.

B. The concept of training and developing National Guard maintenance personnel on a broad spectrum MOS basis needs reevaluation.

C. 63C and 63H personnel in the unit tested would require intensive training prior to mobilization. This training should be targeted on those tasks to be performed during activation. This would seem to require a differentiated training approach in that some individuals would require skill level one training and others would require skill level two training.

D. Because of prior experience and training, any premobilization training could probably be accomplished in 15-35 percent less time than for nonprior experience personnel.

APPENDIX A

DATA TABULATIONS BY FIGURES

Tabulation For Figure 1

AVERAGE MONTHS IN MOS	SAMPLE SIZE	MEAN PERFORMANCE LEVEL 0 PROMPTS	0-2 PROMPTS	All Prompts
2	5	0.4 (.5)*	0.4 (.5)	0.6 (.9)
8	20	0.4 (.5)	1.3 (1.4)	2.0 (1.9)
18	4	0.5 (.9)	2.2 (1.3)	2.5 (1.1)
25	8	0.4 (.5)	1.0 (.8)	1.4 (.7)
40	11	0.5 (.7)	1.2 (1.0)	1.8 (1.2)
66	11	1.0 (1.5)	1.8 (1.6)	2.1 (1.6)

*Standard deviation in parentheses

Tabulation For Figure 2

AVERAGE MONTHS IN MOS	SAMPLE SIZE	MEAN PERFORMANCE LEVEL 0 PROMPTS	0-2 PROMPTS	All PROMPTS
2	9	0.4 (.5)*	0.7 (.7)	1.2 (1.3)
8	10	0.4 (.7)	1.2 (1.1)	1.5 (1.3)
17	6	1.0 (.6)	1.3 (.8)	1.8 (1.7)
25	7	0.1 (.4)	0.6 (.8)	0.7 (1.1)
43	8	0.9 (.8)	1.4 (1.3)	1.6 (1.6)

*Standard deviation in parentheses

Tabulation For Figure 3

NUMBER TASKS CORRECT	0 PROMPTS N	0 PROMPTS %	0-2 PROMPTS N	0-2 PROMPTS %	ALL PROMPTS N	ALL PROMPTS %
0	36	58	19	31	14	22
1	21	34	22	35	16	26
2	4	6	12	19	15	24
3			5	8	9	14
4			3	5	5	8
5	1	2			1	2
6			1	2	2	3
7						
8	N = 62					

Tabulation For Figure 4

NUMBER TASKS CORRECT	0 PROMPTS N	0 PROMPTS %	0-2 PROMPTS N	0-2 PROMPTS %	ALL PROMPTS N	ALL PROMPTS %
0	23	56	15	36	15	36
1	14	34	15	36	10	24
2	4	10	8	20	7	17
3			2	5	6	15
4			1	2	2	5
5					1	2
6						
7	N = 41					
8						

U.S. ARMY

ORDNANCE AND CHEMICAL

CENTER AND SCHOOL

ARMY TRAINING STUDY (ARTS)

COMBAT SERVICE SUPPORT

MOS 63C AND 63H

SUPPLEMENT NUMBER 2

12 JULY 1978

COST EFFECTIVENESS OF INSTITUTIONAL AND UNIT TRAINING

DISTRIBUTION OF TASKS BETWEEN INSTITUTIONAL AND UNIT TRAINING

TRAINING SELECTED PERSONNEL FOR MOBILIZATION

ABERDEEN PROVING GROUND, MARYLAND 21005

COST EFFECTIVENESS OF INSTITUTIONAL AND UNIT TRAINING PROGRAMS, DISTRIBUTION OF INDIVIDUAL TRAINING BETWEEN INSTITUTIONAL AND UNIT SETTINGS, AND ALTERNATIVES FOR TRAINING SELECTED PERSONNEL FOR MOBILIZATION

SECTION I - ABSTRACT

A. Problems: The purposes of this effort were to examine the cost effectiveness of various institutional and unit training programs in terms of individual proficiency, to identify a means for distributing training between institutional and unit settings, and to identify alternatives for training selected personnel for mobilization.

B. Test Design: The study was designated to collect data on the cost of various institutional and unit training programs and to determine variations in training time and cost for individuals with various aptitude, training, and experience levels. In addition to the proficiency data contained in the initial report, additional information was obtained from the US Census Bureau, the National Institute for Automotive Service Excellence, historical records from AIT graduates, and questionnaires administered to AIT graduates.

C. Findings:

1. Cost effectiveness of institutional and unit training programs.

a. There were no systematic individual training programs operating within the units visited. Consequently, no basis exists for obtaining cost effectiveness data for unit training programs.

b. The most cost effective institutional training is that training which can be reinforced by on-the-job training and experience. If not reinforced at appropriate intervals, learning produced by any of the

institutional programs soon decays.

c. Remove/replace tasks and simple mechanical adjustments require annual reinforcement to maintain the capability to perform with moderate supervision. Mechanical troubleshooting needs reinforcement about once each quarter and electrical troubleshooting tasks require more frequent reinforcement to maintain a similar level of proficiency. The capability to perform without assistance would require more frequent reinforcement.

d. Self-paced instruction is overall the most cost effective mode of instruction since average completion time is generally less than for conventional instruction.

e. There does not appear to be any cost difference associated with training individuals of different AFQT levels.

f. Individuals with mechanical maintenance (MM) scores greater than 110 complete the 63H10 in approximately 15 percent less time than those individuals with scores in the 90-100 range. This results in a cost savings of approximately $750.00.

g. Individuals with prior experience as an automotive mechanic complete the course in less time than other trainees. Experience is followed by technical/vocational school training and hobby as indicators of reduced training time. Individuals with high school automotive training and no prior experience, complete training in about equal time.

2. Optimum distribution of training between institutional and unit settings. Since no systematic on-the-job training programs exist within the units visited, there is no data on which to recommend tasks for unit training programs.

3. Alternatives for training selected personnel for mobilization.

a. Approximately 50,000 individuals graduate from community college and trade school automotive training programs each year. This results in a pool of approximately one half million individuals in the 20-30 year age group. If properly selected during mobilization, these individuals could be trained in about 15 percent less time than individuals with no prior experience.

b. The NIASE has certified approximately 65,000 individuals 20-30 years of age in one or more automotive repair specialties. Approximately 10,000 of those are certified as general automobile mechanics. Selecting these individuals for mechanic MOS during mobilization could reduce training requirements by 25-50 percent.

D. Conclusions:

1. Cost effectiveness of institutional and unit training programs.

a. The units visited do not conduct systematic OJT to develop mechanics and repairmen across a broad spectrum of maintenance tasks as required by the MOS. The OJT that does exist consists primarily of working with a more experienced mechanic and is designed to develop competencies specifically required in the particular unit.

b. Institutional training can be rather effective in developing broad spectrum maintenance capabilities in a relatively short period of time. However, these capabilities are fragile and decay quickly if not reinforced.

c. The self-paced mode of instruction is generally less expensive than the conventional mode.

d. Performing remove/replace tasks and mechanical adjustments about once a year appears to produce a reasonable capability to perform with moderate supervision. A comparable capability for mechanical troubleshooting would require performance once each three to four months. The capability to perform electrical troubleshooting tasks with moderate supervision could require performance more frequently than once each four months. The capability to perform without supervision or assistance would require a higher frequency of reinforcement.

e. There does not appear to be any cost difference in training low or high ability groups as determined by AFQT scores.

f. High ability individuals as determined by MM scores complete self-paced AIT in about 12 percent less time than low ability individuals. For the 63H10 Course, this equates to a cost difference of approximately $750.00.

g. Individuals that have had one or more years garage experience complete training in about 15 percent less time than individuals with no prior experience or with high school automotive training. Vocational/technical automotive and hobby experiences also result in reduced training time over the no prior experience group.

h. The most cost effective combination of training requirements, methodology, and student input for institutional training appears to be self-paced instruction on tasks that can be reinforced on the job for students with MM scores greater than 110 and with one or more years experience in an automotive garage. The most critical element appears to be whether or not learning can be reinforced on the job because individuals at all aptitude and experience levels investigated have the ability to be successful learners during AIT. Some groups just require more time than others.

2. Optimum distribution of training between institutional and unit settings. See items 1e and 1h in the preceding paragraph.

3. Alternatives for training selected personnel for mobilization.

a. A significant pool of trained and experienced mechanics under the age of 30 years exist in the civilian labor market. This pool consists of graduates of community college and trade school automotive programs and individuals certified by the National Institute for Automotive Service Excellence (NIASE).

b. Currently, community colleges and trade schools graduate over 50,000 individuals from their automotive programs each year. This results in a pool of approximately one half million individuals in the 20-30 year age group.

c. The NIASE certifies annually approximately 20,000 individuals under 30 years of age in one or more automotive areas. Currently, there are about 65,000 certified individuals in the under 30 age group and approximately 10,000 of these are certified as general automobile mechanics.

d. Careful selection and training of individuals from this pool of experienced and trained mechanics could produce a large quantity of highly qualified wheel and track vehicle mechanics in a relatively short time.

e. It appears as though personnel from National Guard and USAR units would also require training prior to deployment during mobilization. By virtue of prior training and experience, training time should be reduced by 25-50 percent over that for nonexperienced individuals.

f. If individuals are selected from these various pools of experience and training, then it is essential that self-paced instruction be utilized to capitalize on the individual differences.

SECTION II - TESTS AND RESULTS

A. Identify Cost Effectiveness of Institutional and Unit Training Programs:

1. Objectives: The objectives of this effort were to identify proficiency levels associated with various resident and on-the-job training programs and to identify the costs and anticipated proficiency levels for various combinations of these programs.

2. Experimental Design:

a. The study was designed to collect data on the cost and effectiveness of four basic approaches to resident instruction. These include broad spectrum initial training via the conventional approach to skill level two as provided to 63H personnel prior to 1 July 1976; initial training via the conventional mode to skill level one for 63C personnel; initial training via the self-paced mode to skill level one for 63C and 63H personnel; and training to a higher standard during AIT for 63H personnel. Training costs would also be investigated for low and high mental aptitude groups and individuals with different levels of experience.

b. To identify through the use of questionnaires and interviews various types of systematic OJT programs that exist within the units visited and to correlate proficiency levels of personnel in each of the programs.

c. The identified programs would then be costed in various combinations to provide cost estimates for various proficiency levels.

3. Subjects: Subjects were those individuals identified in the initial report dated 1 July 1978 plus historical records of other individuals that have completed 63H AIT.

4. Procedures:

a. The procedures used to determine proficiency produced during AIT and on-the-job retention are discussed in the initial report dated 1 July 1978. Information on mental ability, AFQT and mechanical maintenance (MM), was obtained from historical records of recent AIT graduates. Information pertaining to prior training and experience was obtained from questionnaires administered to AIT graduates.

b. Aptitude and experience data was used in conjunction with course completion times to determine differences in time to complete the self-paced AIT course. Table 1 shows the categories studied and the sample size for each category.

TABLE 1

SAMPLE SIZE FOR APTITUDE AND EXPERIENCE LEVELS

CATEGORY	SAMPLE SIZE
AFQT Score	
<46 (CAT III B & IV)	142
46-62 (CAT III A)	62
>63 (CAT I & II)	89
MM Score	
90-100	142
101-110	124
111+	95
Garage Experience (1 year or more)	22
Vocational/Technical School Automotive Training	32
Hobby	73
High School Automotive Training	24
No Prior Automotive Experience or Training	54

c. Cost data for various institutional training programs was obtained from Headquarters, TRADOC. Cost sheets for the various programs are at Appendix A. Table 2 indicates the total training cost per individual for each of the institutional programs.

TABLE 2

TOTAL TRAINING COST FOR VARIOUS INSTITUTIONAL TRAINING PROGRAMS

COURSE	MODE	LENGTH	COST PER INDIVIDUAL
63C10	Conventional	11.6 wks	$9,539[1]
63C10	Self-Paced	9.4 wks	991 + 551 per week[2]
63H20	Conventional	16.0 wks	$9,708[3]
63H10	Conventional	9.8 wks	$6,243[4]
63H10	Self-Paced	9.6 wks	926 + 542 per week[2]

1. Discontinued Dec 77

2. These are estimates based on extrapolated data rather than actual course costs

3. Discontinued Jul 76

4. Discontinued Aug 77

5. Findings and Discussion:

a. A major finding of this effort is that no systematic on-the-job training program exists in any of the units visited. On-the-job training to the extent that it exists consists primarily of working with a more experienced co-worker. To most supervisors interviewed, this was all the OJT required. Many voiced the opinion that as long as an individual was working in the shop, he was getting all the OJT that was necessary. All OJT that existed was aimed at training an individual to perform his presently assigned duties. Performance test results support this lack of a systematic OJT program in any of the units to develop and/or maintain broad spectrum expertise across the MOS. Due to this absence of any systematic OJT that could be quantified and costed, the remainder of this section will be devoted to cost considerations for institutional training only.

b. The findings relating to proficiency development and retention for the various institutional programs are reported in the initial report dated 1 July 1978. These data indicate that proficiency developed during AIT from each of the programs decays very rapidly if not reinforced on the job and the decay is about the same within each MOS for each of the programs. This suggests that one-shot training on a wide variety of tasks not used on the job such as the 63H20 Course conducted prior to 1 July 1976 is not very cost effective. The only advantage of such a course is that the more tasks an individual is trained on, the more likely it is that he will receive training on tasks that he will perform on the job. However, a thorough job analysis appears to be a more cost effective and systematic method of accomplishing this objective.

c. Just performing the tasks occasionally on the job is also not sufficient to produce a high degree of proficiency. Table 3 shows the average time since a particular task had been performed by 63C personnel at various months in the MOS. With the exception of tasks 4 and 6, the tasks were performed on the average about once every 7-18 months. Comparing this with Figure 1 indicates that this frequency produces a relatively high capability to perform with supervision on tasks 5 and 8 which are mechanical remove/replace and adjust tasks. This infrequent performance is not sufficient to produce a reasonable level of proficiency for first term enlisties on task 1, 2, 3, and 7. With maximum supervision, performance does not exceed the fifty percent level on any of these tasks. Tasks 4 and 6 are performed on the average more frequently than the others. For task 4, the reported frequency is still not sufficient to produce a reasonable level of proficiency. The reported frequency for task 6

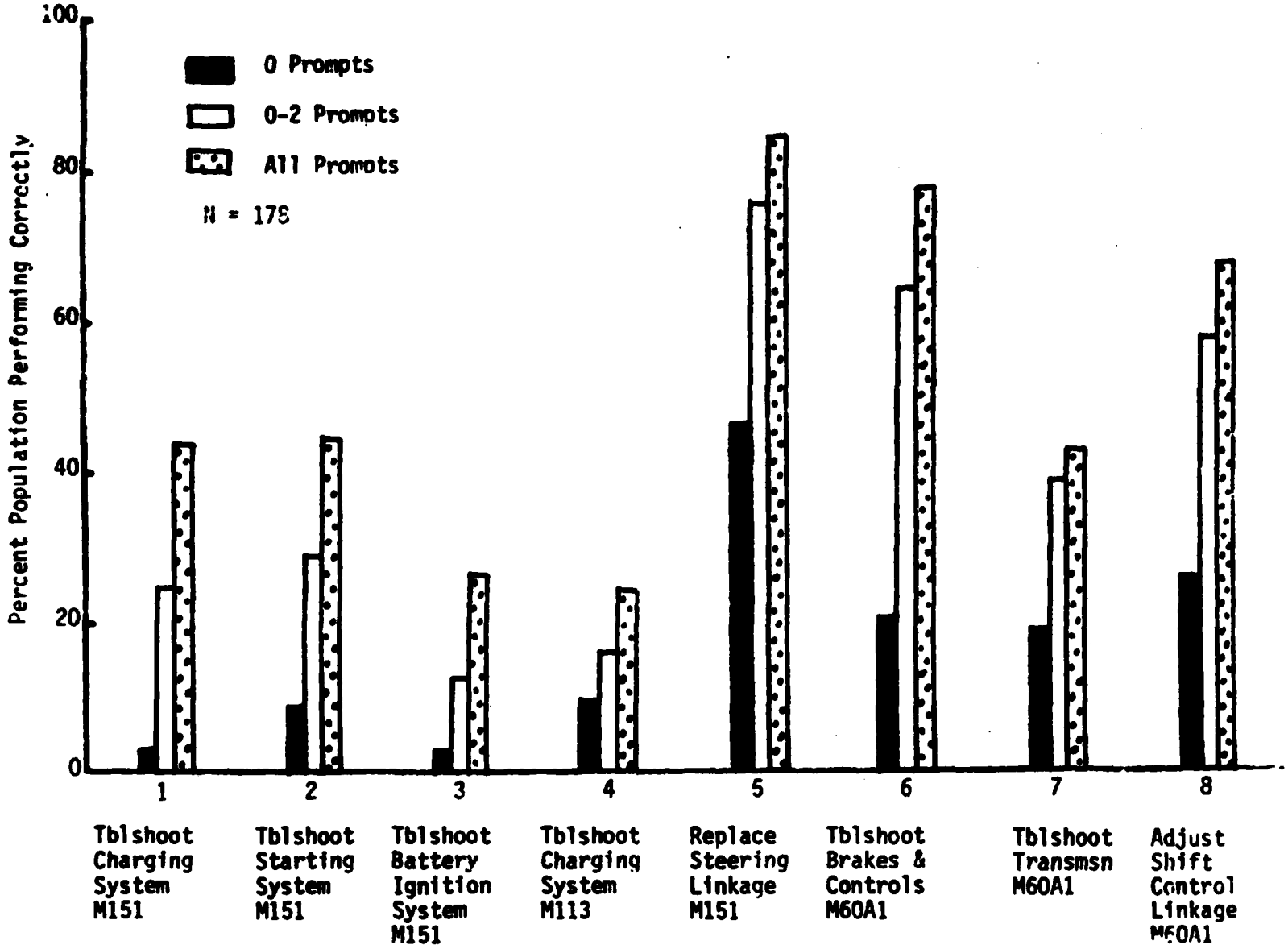


Figure 1. Performing of 63C personnel on each task for the three levels of prompting

indicates that this frequency is sufficient to maintain a respectable performance level with supervision. Task 4 is an electrical troubleshooting task and task 6 is a mechanical troubleshooting task.

TABLE 3

MONTHS SINCE TASK WAS LAST PERFORMED
FOR 63C PERSONNEL

MONTHS IN MOS	TASK NUMBER 1	2	3	4	5	6	7	8
4-12	7.8	7.8	6.6	4.0	6.9	4.8	7.4	7.5
13-18	12.2	11.5	10.4	7.4	11.3	6.1	10.7	11.7
19-30	9.7	14.0	10.1	4.9	7.2	2.2	19.2	18.0

d. These data seem to suggest that annual performance is sufficient to maintain a reasonable capability to perform with supervision for remove/replace type tasks and reasonable simple mechanical adjustments. The capability to perform mechanical troubleshooting with supervision can be maintained with reinforcement about once every three to four months. Electrical troubleshooting seems to require the most frequent reinforcement. The required reinforcement frequency is not apparent from the data but it appears as though reinforcement is required more frequently than once every four months.

e. It appears then that the most cost effective institutional training is training on those tasks that will be reinforced on the job at the appropriate interval. For example, it would seem that the most cost effective initial training for 63C personnel would be on remove/replace tasks and mechanical adjustments that are performed at least annually and on mechanical troubleshooting tasks performed at least quarterly. Training on electrical troubleshooting tasks does not appear

to be cost effective unless the tasks are performed more frequently than once a quarter. It must be noted that this reinforcement frequency could be expected to produce only a limited capability to perform without supervision or assistance. Moderate supervision would be required in most instances.

f. The mode of training, i.e., conventional or self-paced, does not appear to have any significant effect on the initial level of learning or the retention level. Since self-pacing usually results in some savings in training time, then this method is the most cost effective. As shown in Table 2, training cost for a self-paced course depends to a major degree upon the time spent in training. For example, the cost of training each individual in the 63H10 conventional course was $9,539.00 and the cost of training the average student on the self-paced version is estimated to be $6,170.00; a savings of over $3,000.00 per graduate.

g. Table 4 shows the mean course completion time for various AFQT levels in the 63H10 self-paced course. The less than 46 group includes mental categories IIIB and IV, the 46-62 group contains the category IIIA individuals, and the greater than 63 group includes category I and II individuals. In this sample, the greater than 63 group completed training in slightly less time but none of the differences achieve statistical significance beyond the .05 level. These data indicate that it costs about the same to train individuals of all AFQT levels.

TABLE 4

COMPARISON OF COMPLETION TIME IN THE

63H10 COURSE BY AFQT LEVELS

AFQT	SAMPLE SIZE	AVERAGE COMPLETION TIME (WKS)	S.D.	T-STATISTIC	DEGREES OF FREEDOM	LEVEL OF SIGNIFICANCE
<46	142	9.7	1.8	1.300	202	N.S.
46-62	62	9.4	1.1			
<46	142	9.7	1.8	1.383	229	N.S.
>63	89	9.3	2.1			
46-62	62	9.4	1.1	0.130	149	N.S.
>63	89	9.3	2.1			

h. Table 5 shows a similar comparison for the 63H10 course with various mechanical maintenance (MM) scores. A MM score of 90 or above is a prerequisite for entering the course. The 90-100 group requires an average of 10 weeks to complete the course while the greater than 111 group completes the course in an average of 8.8 weeks. The 101-110 group has an average completion time of 9.4 weeks. All these differences are significant beyond the .025 level. Converting these differences to dollars results in a training cost of $6,346.00 for the 90-100 group, a cost of $6,021.00 for the 101-110 group, and a cost of $5,695.00 for the greater than 111 group. From high to low, this is a difference of about $750.00 to train individuals in the low MM group versus individuals in the high group. Selection of higher ability individuals as measured by MM scores can reduce training cost by about 12 percent.

TABLE 5

COMPARISON OF COMPLETION TIME IN THE 63H10

COURSE BY MM LEVELS

MM SCORE	SAMPLE SIZE	COURSE COMPLETION TIME (WKS)	S.D.	T-STATISTIC	DEGREES OF FREEDOM	LEVEL OF SIGNIFICANCE
90-100	142	10.0	1.8	2.969	264	.005
101-110	124	9.4	1.5			
90-100	142	10.0	1.8	4.627	235	.001
110	95	8.8	1.9			
101-110	124	9.4	1.5	2.307	217	.025
110	95	8.8	1.9			

i. Table 6 shows a comparison of training time for individuals with varying experience backgrounds. These data indicate a range of average completion times from 8.7 weeks for those individuals with one or more years garage experience to 10.1 weeks for those individuals without prior experience. Having high school automotive training does not seem to result in any reduction in training time over the no experience group. One or more years of garage experience results in the shortest average training time, followed by vocational/technical school automotive training and hobby.

TABLE 6

COMPARISON OF COMPLETION TIME IN THE 63H10

COURSE BY PRIOR EXPERIENCE

TYPE EXPERIENCE	SAMPLE SIZE	AVERAGE COMPLETION TIME (WKS)	S.D.	T-STATISTIC	DEGREE OF FREEDOM	LEVEL OF SIGNIFICANCE
No Prior Experience	54	10.1	1.1	0.208	76	N.S.
High School Auto	24	10.0	0.9			
No Prior Experience	54	10.1	1.1	2.460	125	.01
Hobby	73	9.6	1.2			
No Prior Experience	54	10.1	1.1	3.220	84	.005
Voc/Tech School Auto	32	9.2	1.3			
No Prior Experience	54	10.1	1.1	4.846	74	.001
Garage Experience	22	8.7	1.2			
High School Auto	24	10.1	0.9	1.710	95	.05
Hobby	73	9.6	1.2			
High School Auto	24	10.1	0.9	2.619	54	.01
Voc/Tech School Auto	32	9.2	1.3			
High School Auto	24	10.1	0.9	4.253	44	.001
Garage Experience	22	8.7	1.2			
Hobby	73	9.6	1.2	1.140	103	N.S.
Voc/Tech School Auto	32	9.2	1.3			
Hobby	73	9.6	1.2	2.914	93	.005
Garage Experience	22	8.7	1.2			
Voc/Tech School Auto	32	9.2	1.3	1.728	52	.05
Garage Experience	22	8.7	1.2			

j. The cost of training each of these groups in the 63H10 course varies from about $6,400.00 for the no experienced and high school automotive groups to slightly under $5,650.00 for individuals with one or more years of garage experience. An individual with one or more years on the job as a mechanic can be trained for about $750.00 less than the no experienced individual.

6. Conclusions:

a. The units visited do not conduct systematic OJT to develop mechanics and repairmen across a broad spectrum of maintenance tasks as required by the MOS. The OJT that does exist consists primarily of working with a more experienced mechanic and is designed to develop competencies specifically required in the particular unit.

b. Institutional training can be rather effective in developing broad spectrum maintenance capabilities in a relatively short period of time. However, these capabilities are fragile and decay quickly if not reinforced.

c. The self-paced mode of instruction is generally less expensive than the conventional mode.

d. Performing remove/replace tasks and mechanical adjustments about once a year appears to produce a reasonable capability to perform with moderate supervision. A comparable capability for mechanical troubleshooting would require performance once each three to four months. The capability to perform electrical troubleshooting tasks with moderate supervision would require performance more frequently than once each four months. The capability to perform without supervision or assistance would require a higher frequence of reinforcement.

B. Identify Optimum Distribution of individual training between institutional and unit settings.

1. Findings and Discussions: Since systematic on-the-job training programs were not found in any of the units, there is no data on which to make statements about the distribution of tasks between institutional training and OJT beyond those contained in paragraphs A 5b, A 5c, (p. S2-10) A 5d, and A 5e (p. S2-12).

2. Conclusions: See paragraphs A 5h and A 6d (pp. S2-14 and S2-17 respectively).

c. Alternatives for Training Selected Personnel for Mobilization.

1. Findings and Discussion:

a. As indicated in paragraph A 5i, (p. S2-15) the best indicators of high performance during AIT as measured by course completion time are one or more years automotive experience and MM score greater than 110. Individuals meeting these criteria could be trained in the shortest time.

b. Vocational/technical school automotive training ranked just behind actual experience as a contributer to decreasing training time. Responses from job incumbents indicated that job experience and vocational/technical school training were the most beneficial to job performance.

c. Surprisingly, general high school automotive training does not appear to result in any savings in training time over individuals with no prior experience.

d. Table #7 indicates the number of individuals completing various automotive programs during 1975-76. These figures are indicative of the number available to the labor market each year.

TABLE 7

NUMBER OF INDIVIDUALS COMPLETING

AUTOMOTIVE TRAINING PROGRAMS 1975-76

TYPE TRAINING	NUMBER COMPLETED
Two-Year Community College Programs	4,685
Trade School Automotive Programs	47,900
High School Automotive Programs	89,965

e. Over 50,000 individuals complete community college and trade school programs each year and for the age group 20-30 this equates to a pool of one half million from which to draw mechanics during mobilization. Individuals drawn from this pool could be trained in at least 15 percent less time than individuals with no prior experience in automotive maintenance.

f. The National Institute for Automotive Service Excellence (NIASE) operates a voluntary certification program for automotive mechanics. The purpose of this program is to upgrade the quality of automotive repair received by the general public in private and dealer operated garages. Automotive certification is obtained by passing a test similar to the written component of the Skill Qualification Test. Tests are offered in the areas of engine repair, automatic transmissions, manual transmission and rear axle, front end, brakes, electrical systems, heating, and air conditioning and engine tune-up. In addition to passing the test, an individual must have two or more years experience as an automotive mechanic.

g. An individual is certified in each area as he passes the test for that area. Individuals that pass all eight tests are certified as general automotive mechanics. Currently, only 17 percent of individuals taking the tests have been certified as general automotive mechanics. The remainder are certified on an average of 2.8 tests which reflects the degree of specialization that occurs on the job. Engine repair, front end, brake systems, and engine tune-up are the most popular areas followed closely by manual transmission and electrical systems, Table 8.

TABLE 8

PERCENT OF TESTS PASSED BY AREA

(GENERAL AUTOMOTIVE MECHANICS EXCLUDED)

TEST AREA	PERCENT OF TOTAL TESTS PASSED
1. Engine Repair	19
2. Automatic Transmission	7
3. Manual Transmission	10
4. Front End	13
5. Brake Systems	18
6. Electrical Systems	10
7. Heating and Air Conditioning	8
8. Engine Tune-Up	15

h. As of November 1977, almost 164,000 mechanics have taken one or more of the certification tests and slightly under 130,000 individuals received passing scores. Nearly 50 percent of these individuals are under 30 years of age. This indicates a highly qualified pool of approximately 65,000 mechanics that are available for mobilization needs. Granted, many

of these individuals are highly specialized but careful selection and training could produce a large number of well-trained mechanics with a strong background of experience and knowledge. Based on previously cited data, it would appear that these individuals could be trained in a fraction, 50-75 percent, of the time required to train individuals without prior experience.

i. If the data obtained from the National Guard are representative of the maintenance proficiency of reserve and National Guard, then additional training would be required prior to mobilization. By virtue of the equipment familiarization received by these individuals, it should be possible to accomplish the required training in less time than for nonexperienced individuals. Training time could possibly be reduced by 25-50 percent.

2. Conclusions:

a. A significant pool of trained and experienced mechanics under the age of 30 years exist in the civilian labor market. This pool consists of graduates of community college and trade school automotive programs and individuals certified by the National Institute for Automotive Service Excellence (NIASE).

b. Currently, community colleges and trade schools graduate over 50,000 individuals from their automotive programs each year. This results in a pool of approximately one half million individuals in the 20-30 year age group.

c. The NIASE certifies approximately 20,000 individuals annually under 30 years of age in one or more automotive areas. Currently, there

are about 65,000 certified individuals in the under 30 age group and approximately 10,000 of these are certified as general automobile mechanics.

d. Careful selection and training of individuals from this pool of experienced and trained mechanics could produce a large quantity of highly qualified wheel and track vehicle mechanics in a relatively short time.

e. It appears as though personnel from National Guard and USAR units would also require training prior to deployment during mobilization. By virtue of prior training and experience, training time should be reduced by 25-50 percent over that for nonexperienced individuals.

f. If individuals are selected from these various pools of experience and training, then it is essential that self-paced instruction be utilized to capitalize on the individual differences.

APPENDIX A

INSTITUTIONAL TRAINING

COST DATA

COURSE TITLE: TRACK VEHICLE MECHANIC (GROUP-PACED)

COURSE NUMBER/MOS: 610-63C10 (Discontinued course)

DOLLARS (FY78)	OMA	MPA	PA
Variable			
Program 8 Mission	$520	$1,501	
Instructional Dept	265	855	
Other	225	646	
Program 8 TOE Spt			
Ammunition			
Pay & Allowances		1,830	
Students		1,830	
All others			
Travel Pay to Course		105	
Per Diem at Course			
Program 8 Base Ops	938	488	
Support Cost (Tng Aids)	28		
TOTAL:	$1,486	$3,924	
Fixed			
Program 8 Mission	$ 748	$ 809	
Program 8 Base Ops	1,904	263	
Program 8 TOE Spt	45	329	
Support Costs (Tng Aids)	21	10	
TOTAL:	$2,718	$1,411	
TOTAL VARIABLE & FIXED	$4,204	$5,335	

TIME/PERSONNEL:

Student Course Length 11.6 weeks

Direct Man Weeks of Effort of

Instructional Depts & School Overhead. Civ_____ Mil_____

COURSE TITLE: TRACK VEHICLE MECHANIC (SELF-PACED)*

COURSE NUMBER/MOS: 610-63C10

DOLLARS (FY78)	OMA	MPA	PA
Variable			
Program 8 Mission	$897	$904	
Instructional Dept	503**	380**	
Other	394	524	
Program 8 TOE Spt			
Ammunition			
Pay & Allowances		1,546	
Students		1,546	
All others			
Travel Pay to Course		105**	
Per Diem at Course			
Program 8 Base Ops	1,497	213	
Support Cost (Tng Aids)	32**	3**	
TOTAL:	$2,426	$2,771	
Fixed			
Program 8 Mission	253	486	
Program 8 Base Ops	807	396	
Program 8 TOE Spt	36	267	
Support Costs (Tng Aids)	17	7	
TOTAL:	$1,113	$1,156	
TOTAL VARIABLE & FIXED	$3,539	$3,927	

TIME/PERSONNEL:

Student Course Length _____

Direct Man Weeks of Effort of

Instructional Depts & School Overhead. Civ_____ Mil_____

*ESTIMATES BASED ON GENERAL INFORMATION RATHER THAN SPECIFIC COURSE COST DATA.

**COSTS THAT DO NOT VARY BASED UPON TIME IN TRAINING.

COURSE TITLE: AUTOMOTIVE REPAIR (GROUP-PACED)

COURSE NUMBER/MOS: 610-63H10 (Discontinued Course)

DOLLARS (FY78)	OMA	MPA	PA
Variable			
Program 8 Mission	$428	$904	
Instructional Dept	104*	584*	
Other	324	380	
Program 8 TOE Spt			
Ammunition			
Pay & Allowances		1,546	
Students		1,546	
All others			
Travel Pay to Course		193*	
Per Diem at Course			
Program 8 Base Ops	717	129	
Support Cost (Tng Aids)	38*	7*	
TOTAL:	$1,183	$2,779	
Fixed			
Program 8 Mission	107	519	
Program 8 Base Ops	1,276	238	
Program 8 TOE Spt			
Support Costs (Tng Aids)	67	14	
TOTAL:	$1,450	$ 771	
TOTAL VARIABLE & FIXED	$2,633	$3,550	

TIME/PERSONNEL:

Student Course Length 9.8 weeks

Direct Man Weeks of Effort of

Instructional Depts & School Overhead. Civ____ Mil____

*STEMS THAT CANNOT BE PRORATED ON A WEEKLY BASIS FOR SELF-PACED INSTRUCTION

COURSE TITLE:

COURSE NUMBER/MOS:

DOLLARS (FY78)	OMA	MPA	PA
Variable			
Program 8 Mission	$736	$1,193	
Instructional Dept	206	644	
Other	830	549	
Program 8 TOE Spt			
Ammunition			
Pay & Allowances		2,525	
Students		2,525	
All others			
Travel Pay to Course		193	
Per Diem at Course			
Program 8 Base Ops	1,328	246	
Support Cost (Tng Aids)	84		
TOTAL:	$2,148	$4,157	
Fixed			
Program 8 Mission	184	643	
Program 8 Base Ops	2,361	109	
Program 8 TOE Spt			
Support Costs (Tng Aids)	84	3	
TOTAL:	$2,629	$ 755	
TOTAL VARIABLE & FIXED	$4,777	$4,912	

TIME/PERSONNEL:

Student Course Length 16 weeks

Direct Man Weeks of Effort of

Instructional Depts & School Overhead. Civ_____ Mil_____

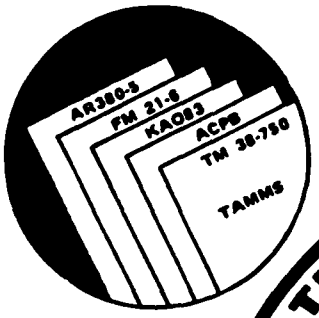
PART II

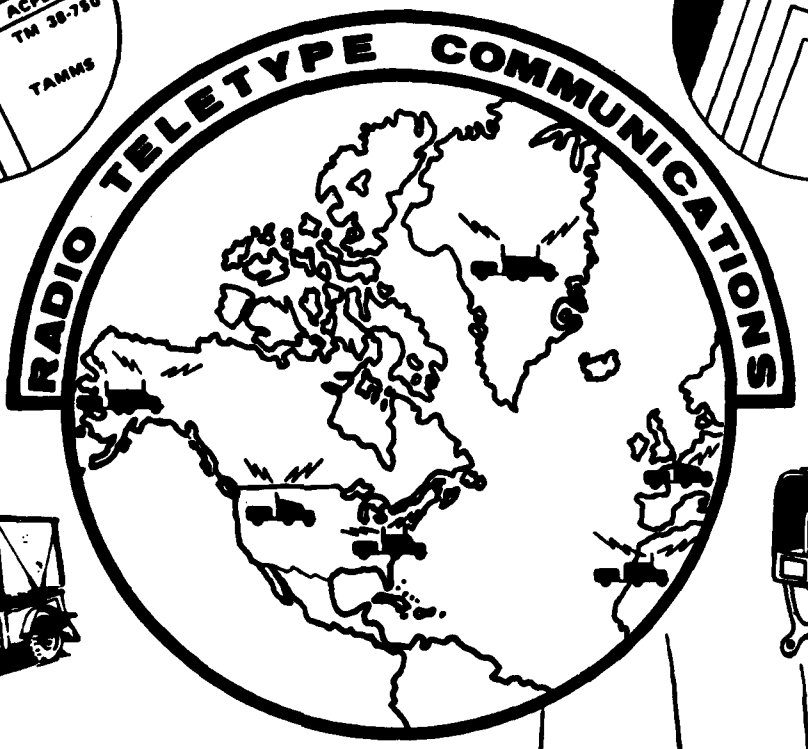
A Comparative Study Relating MOS 05C Training Resources to Combat Readiness

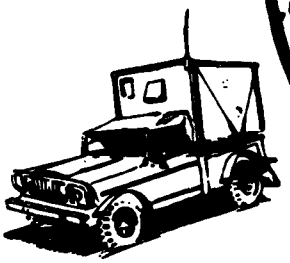
US Army Signal Center and Fort Gordon

Fort Gordon, Georgia

ARMY TRAINING STUDY (ARTS) MOS 05C







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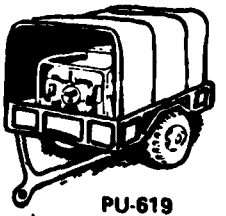

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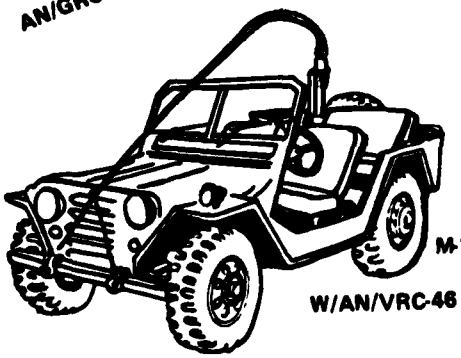

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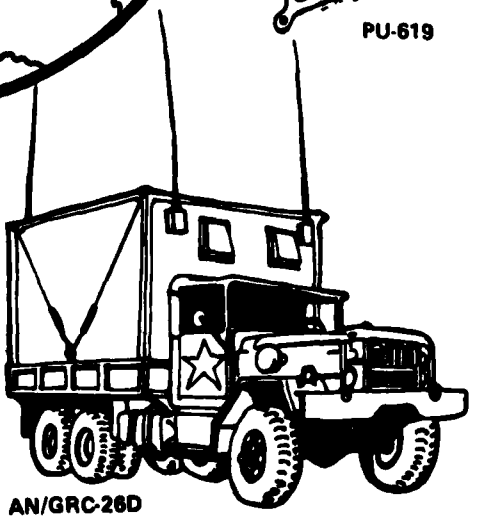

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A Comparative Study Relating MOS 05C Training Resources to Combat Readiness

Prepared for the

Director, Army Training Study

By

The US Army Signal Center and Fort Gordon

System Work Team (SWT)

Fort Gordon, Georgia

AUTOVON 780-3557

CONTENTS

	PAGE
List of Appendices	iii
ABSTRACT	
Problem	1
Test Design	2
Findings	4
Conclusions	6
TESTS AND RESULTS	
Test #1	
Objective	8
Hypothesis	8
Experimental Design	8
Subjects	11
Procedures	11
Findings	15
Discussion	16
Conclusions	19
Test #2	
Objective	20
Hypothesis	20
Experimental Design	20
Subjects	23
Procedures	24
Findings	29

	PAGE
Discussion	30
Conclusions	31
Test #3	
Objective	32
Hypothesis	32
Experimental Design	32
Subjects	34
Procedures	35
Findings, Discussion, and Conclusions	37

APPENDICES

TITLE	APPENDIX
05C End of Course Test, Administrators Manuals	A
Individual Test Items, Standards, Findings, and Conclusions -- From 1977 Study	B
Means, Standard Deviations, Significance of the Differences in the Means of GT Scores and Course Prerequisite Scores of Students in 05 Courses -- From 1977 Study	C
Instructor/Supervisor Attitude Findings and Conclusions -- From 1977 Study	D
05C Group-Paced and Self-Paced Course Cost Data -- From TRADOC	E
Attrition Tables	F
USASC&FG ARTS SWT Test Instrument	G
Test #2 Data Analysis	H
Comparison of Group vs Self-Paced Instructor Performance on Test #2	I
Battalion 05C Assignment Table	J

A Comparative Study Relating Training

Resources to Combat Readiness

I. ABSTRACT

A. Problem. The purpose of the US Army Signal Center and Fort Gordon (USASC&FG) participation in the Army Training Study (ARTS) is to determine the functional relationship between training resources and combat communications readiness, and to determine the type training programs required to optimize the capabilities of major new communications systems programed for delivery to the Army worldwide in the 1980's. MOS 05C, Radio Teletypewriter Operator, was selected as the Signal Center's test population because it is one of the 10 highest density signal MOS's, and because it has been identified by field commanders as one of the signal MOS's most in need of improvement in training. Three objectives were posed to achieve the purpose of the USASC&FG effort. These objectives were:

1. Evaluate the effectiveness of the 05C self-paced program.

2. Compare the performance of the 05C teams in field units who have completed self-paced courses to that of their group-paced counterparts.

3. Compare alternative unit training programs used to correct 05C performance deficiencies.

Each of these objectives was treated separately within the study, and therefore, each is presented as a separate test module in this report.

B. Test Design

1. Objective 1--Evaluate the effectiveness of the 05C self-paced program.

a. A hands-on, end-of-course job performance proficiency test was used to gather data on group-paced and self-paced students.

b. Demographic data were gathered from course records.

c. Attitudinal data were gathered on students using an end-of-course critique. To identify instructor and supervisor attitudes toward the 05C course, an attitude questionnaire was developed for each.

d. Test population included all 05B, Radio Operator; 05C, Radio Teletypewriter Operator; and 05F, Radio Teletypewriter Operator (Non-Morse), students that graduated during the period 27 January to 17 February 1977 (common task areas).

e. Academic factors considered were:

(1) Attrition.

(2) Average number of weeks in training.

(3) Absenteeism.

(4) Student profiles.

f. Statistical consideration.

(1) Vertical collection techniques were used in this part of the study; i.e., the control group and experimental group data were collected simultaneously.

(2) Data analysis consisted of a t-test used to compare test data on common tasks performed by 05C and 05B or 05F.

NOTE: The tests, data collection plan, and report used to support objective 1 were developed, validated, implemented, and written prior to the ARTS. To preclude redundancy of efforts, the test results were considered acceptable as a base for Objective 1.

2. Objective 2--Compare the performance of the 05C team members in field units who have completed self-paced courses to the performance of their group-paced counterparts.

a. A validated hands-on job performance proficiency test was used to test the 05C's assigned to divisions within the Army's worldwide forces. In addition to the hands-on test, a written exam was administered to further facilitate the range of data gathering.

b. Demographic data were gathered from the 05C job holders using questionnaires developed and validated for both the team members and the supervisors.

c. Attitudinal data were gathered using questionnaires developed and validated by Army Research Institute (ARI) for both the team members and the supervisors.

d. Test population consisted of a representation of the 05C job holders within each division tested. Four divisions--24th Infantry, 49th Armored, 4th Infantry, and 1st Infantry--were tested.

e. Statistical considerations.

(1) Vertical collection techniques were used in this part of the study. Demographic data collected on all test participants were used to discriminate between those who had completed self-paced courses and those who had completed group-paced courses.

(2) Initial data analysis was performed by ARI using the Statistical Package for the Social Sciences (SPSS). This package performed multiple correlations, regressions, t-tests, and chi-square tests where necessary.

C. Findings

1. The results of Test 1, "Evaluate the Effectiveness of the 05C Self-Paced Program," showed that:

a. The graduates of the self-paced 05C experimental group had higher mean scores on common tasks than the 05B control group at varying levels of statistical significance (.01 -- .25). The 05C self-paced students had higher mean scores than the 05F group-paced students on common tasks at the .01 level of significance. The 05B students had significantly higher ACB test scores than the 05C students on two of three aptitude areas (GT and SC higher for 05B; AP higher for 05C), yet the 05C students had higher mean scores than the 05B, as indicated above.

b. The completion time of the 05C self-paced course cannot be accurately compared with the 05C group-paced course. Too many factors entered into the training environment to make a meaningful comparison.

c. The academic attrition rate of the 05C self-paced course was initially higher (1st qtr FY 77) than that of the 05C group-paced course. However, a comparison of the academic and total attrition rates for the last four quarters of the group-paced course and the first four quarters of the self-paced course indicates that the academic attrition rate was comparable and the total attrition rate was 19 percent lower for the self-paced course.

d. The cost per graduate decreased when the course was self-paced (based on data provided by TRADOC).

e. The instructor and supervisor survey data indicated that the 05C self-paced course produced the better graduate.

2. The interim results of Test 2, "Compare the Performance of the 05C Teams in Field Units Who Have Completed Self-Paced Courses to That of Their Group-Paced Counterparts," indicate that:

a. The 05C job holders who had completed group-paced training performed statistically significantly better on two of three written tests.

b. The 05C job holders who had completed self-paced training had a higher mean score on four of five hands-on tests. However, the difference in scores was not statistically significant at the .1 level based on statistical data evaluated thus far. (One of the hands-on tests was statistically significant at the .145 level.)

c. The mean score for the total test population was 64.4 with a maximum possible score of 151. The mean score represents correct responses on only 43 percent of all scorable elements.

d. The mean length of assignment for the total test population was 15.6 months with a range of 2-38 months and a standard deviation of 7.5. The average assignment rotation time for 05C E5's and below is 26.6 months as computed by the Military Personnel Office. The expected mid-point of an assignment would be 13.3 months.

3. The results of Test 3, "Compare Alternative Unit Training Programs," will be completed and submitted at a later date.

D. Conclusions

1. Review of the findings of Test 1, "Evaluate the Effectiveness of the 05C Self-paced Program," concluded that the self-paced 05C students had higher mean scores on common tasks than the group-paced 05B students at varying levels of significance (.01 -- .25). The 05C self-paced students had higher mean scores than the 05F group-paced students on common tasks at the .01 level of significance. The course

lengths of the self-paced and group-paced 05C courses cannot be accurately compared. The academic attrition rate increased during the first quarter of the self-paced course, but it stabilized at a level comparable to that of the previous group-paced course. The total attrition rate was 19 percent lower for the self-paced course when the first four quarters of the self-paced course was compared to the last four quarters of the group-paced course. In the majority opinion of the 05C instructors and supervisors, the self-paced course produced the better graduate. Over the long term, the 05C self-paced course cost less per graduate than the group-paced course, based on data provided by TRADOC.

2. The interim findings from Test 2, "Compare the Performance of the 05C Teams in Field Units Who Have Completed Self-Paced Courses to That of Their Group-Paced Counterparts," revealed that the group-paced graduate scored statistically significantly better on two of three written components of the test. Further, the mean test scores showed that the self-paced graduate performed better on four of five hands-on components. However, this latter finding was not determined to be statistically significant at the .1 level. Additionally, the mean test scores for the total population tested depicted a low level of performance. Personnel turnover cannot be a major factor in the performance on the test because the mean length of assignment was longer than average for the Army as a whole.

II. TESTS AND RESULTS

TEST #1

A. Objective. The objective of this module was to evaluate the effectivness of the 05C self-paced program. Efforts supporting this objective focused on three areas of interest:

1. Determine the change, if any, in proficiency of the self-paced graduate when compared with that of the group-paced graduate.

2. Determine the change, if any, in mean training time for the self-paced student when compared with that of the group-paced student.

3. Determine the change, if any, in attrition rates when comparing self-paced 05C figures with historical data on the 05C previously group-paced program.

B. Hypothesis. There are no significant differences in common task job performance proficiency between group-paced 05B or 05F graduates and self-paced 05C graduates.

C. Experimental Design

1. Parameters.

a. The study encompassed: (1) academic factors, (2) attitude factors, and (3) student profiles.

b. The study compared common tasks of 05C self-paced with common tasks of 05B and 05F during the period 27 January to 17 February 1977.

c. Subjects of the study were 05B and 05F students in the control groups and 05C students in the experimental group.

2. Assumptions. To evaluate the effectiveness of the 05C self-paced program, the following basic assumptions were made:

a. The tasks trained in the 05B and 05F control group were identical to the tasks taught to the 05C students under the former group-paced program.

b. The training objectives in both the experimental and control groups under investigation were valid (accurately reflected the duties required of the School's graduates), and all instructional documents were in agreement with the training objectives.

c. The instruction was conducted and tests administered in accordance with course management documents.

d. All tests, rating scales, and other measuring devices used in this study were objective, valid, and reliable.

e. Both the control groups and the experimental group were equally motivated (i.e., desire to complete the course).

f. The instructional personnel were proficient and equally motivated and possessed similar teaching qualifications.

g. That student demographic data used in the study were valid.

3. Definitions.

a. ACB--Army Classification Battery administered to US Army enlistees consisting of 16 tests including the following: Arithmetic Reasoning (AR), Word Knowledge (WK), Mechanical Comprehension (MC), Pattern Analysis (PA), and Auditory Perception (AP). Scores on the ACB tests are used to derive aptitude area scores which, in turn, are used to determine aptitude for certain occupational fields.

b. AP--Auditory Perception. An AP score of 100 is a prerequisite for entry into the 05B and 05C courses.

c. GT--General Technical. Aptitude area consisting of the Arithmetic Reasoning and Word Knowledge Tests.

d. NWPM--Net Words Per Minute. Total words typed per minute, minus one word per error. Only 05F's and 05C's are measured. The standard is 35 WPM clear text and 25 WPM format.

e. SC--Surveillance and Communications. An SC score of 90 is a prerequisite for entry into the 05B, 05C, and 05F courses.

f. WGPM--Word Groups Per Minute. Standard is 15 total 5-letter random Morse code groups copied and 15 transmitted per minute without error. Only 05B's and 05C's are measured.

D. Subjects

1. MOS 05B, Radio Operator, was trained using the group-paced mode of instruction and was used as part of the control group to provide baseline data for comparison. There were 50 MOS 05B's tested.

2. MOS 05C, Radio Teletypewriter Operator, was trained using the self-paced mode of instruction and was the experimental group in the study. There were 30 MOS 05C's tested.

3. MOS 05F, Radio Teletypewriter Operator (Non-Morse), was trained using the group-paced mode of instruction and was utilized as part of the control group for the purpose of providing baseline data for comparison. There were 144 MOS 05F's tested.

NOTE: Eight tasks were identified for data collection and comparison. All tasks were shared by two or more of the MOS's. Three tasks were shared by all three MOS's.

E. Procedures

1. General. This study was conducted under classroom conditions at the Radio Operator, Radio Teletypewriter Operator, and Radio Teletypewriter Operator (Non-Morse) (MOS 05B, 05C, and 05F) Courses, USASC&FG, Fort Gordon, Georgia. It began 27 January and continued until 17 February 1977.

2. Testing. An end-of-course test was administed to each 05B, 05C, and 05F student prior to his/her taking part in the field training exercise. Raw scores were tabulated and the mean scores computed for each task in each course. A t-test was used to determine whether significant differences existed between the means of the 05B

and/or 05F (control) and the 05C (experimental) groups. In order to insure maximum accuracy in the results of the study, only the first administration of the test was used. When prior experience was identified, the subjects were eliminated for that portion of the study. The following areas were evaluated:

a. Typing--Three 5-minute tests were given with a 1-minute break between each test.

b. IMC Sending--Three 3-minute tests were administered for comparison between 05B and 05C students.

c. IMC Receiving--Three 5-minute tests consisting of 42 word groups each were administered for comparison between 05B and 05C students.

d. Station Log--A test consisting of five elements was administered for comparisons of the 05B, 05C, and 05F Courses.

e. Radio Teletypewriter Procedure (RATT)--A test consisting of five elements was administered for a comparison between 05C and 05F students.

f. Radiotelegraph Procedures (RATG)--A test consisting of five elements was administered for comparison between the 05B and 05C students.

g. Radiotelephone Procedure (RATEL)--A test consisting of five elements was administered for comparison of the 05B, 05C, and 05F Courses.

h. Electronic Counter-Countermeasures (ECCM)--A test consisting of four elements was administered for comparison of the 05B, 05C, and 05F courses.

3. Test Instruments and Administrators.

a. An end-of-course test was administered by the Centralized Testing Section to each 05B, 05C, and 05F graduate.

The Centralized Testing Section was composed of experienced military and civilian personnel who have completed the Instructor Training Courses.

b. Summary Training Records were maintained by qualified personnel.

c. Instructor and Supervisor Questionnaires were administered by Directorate of Evaluation representatives.

4. General Areas of Investigation.

a. Academic factors.

(1) Attrition. Academic, administrative, and total attrition rates were computed on the past four quarters of attrition for 05B, 05C, and 05F Courses.

(2) Average number of weeks in training. The number of weeks spent in the course for each graduate of the control groups and experimental groups was totaled.

(3) Absenteeism. The hours absent from the 05C course were computed and totaled. The mean weeks lost to absenteeism were computed.

(4) Student profiles. Selected ACB Scores--GT score and course prerequisite score(s) were computed for the control group and experimental groups. The means and standard deviations were computed for each factor. A t-test was used to determine whether significant differences existed.

b. Attitude factors.

(1) Student attitude--To identify student attitude as reflected in their opinions toward the 05C course, the end-of-course student critique was used. The responses were tabulated and broken down by MOS where possible.

(2) Instructor attitude--To identify instructor and supervisor attitude as reflected in their opinions toward the 05C course, an attitude questionnaire was developed for each. The responses were tabulated and broken down by duty assignment where possible.

(3) All data were analyzed and combined with other data for the development of conclusions.

5. Data Collection.

a. Controlled variables--Students' performance results were compared on all tasks that are common to the group-paced 05B and/or 05F and of the self-paced 05C.

b. Uncontrolled variables--Any study is limited by variables among individuals and by outside influence which cannot be controlled.

c. Desired interactions--By comparing student performance on common tasks of 05B and 05F (group-paced) with the 05C (self-paced), a more effective teaching strategy may be determined.

6. Statistical Considerations.

a. Collection techniques. Vertical collection techniques were used in this study.

b. Collection instruments.

(1) Performance test--Each 05B, 05C, and 05F student was administered the hands-on, process-scored end-of-course test.

(2) Survey questionnaires--To identify student attitudes toward their training, an end-of-course critique was used. Instructor and supervisor attitudes were reflected in attitudinal questionnaires.

(3) Summary training records were used to record all administrative data.

7. Data Analysis. A t-test*was used to compare data on common tasks for 05C and 05B or 05F.

F. Findings

1. The graduates of the self-paced 05C experimental group had higher mean scores on common tasks than the 05B control group at varying levels of significance (.01 -- .25). The 05C self-paced students had higher mean scores than the 05F group-paced students on common tasks at the .01 level of significance (app B). The 05B students had

*This is a statistical test used to compare the means of two small samples when the population standard deviation is unknown.

significantly higher ACB test scores than the 05C students on two of three aptitude areas (GT and SC higher for 05B; AP higher for 05C) (app C), yet the 05C students had higher mean scores than the 05B, as indicated above.

2. The completion time of the 05C self-paced course cannot be accurately compared with the 05C group-paced course. Too many variables were introduced at the time the course changed.

3. The academic attrition rate of the 05C self-paced course was initially higher (1st qtr FY 77) than that of the 05C group-paced course. However, a comparison of the academic and total attrition rates for the last four quarters of the group-paced course and the first four quarters of the self-paced course indicates that the academic attrition rate was comparable and the total attrition rate was 19 percent lower for the self-paced course.

4. The instructor and supervisor survey data indicated that the 05C self-paced course produced the better graduate (app D).

5. The cost per graduate decreased somewhat for the self-paced 05C course based on data provided by TRADOC (app E).

NOTE: Sets of data for paragraphs 3 and 5 above were surfaced in June 1978 by the USASC&FG ARTS SWT.

G. Discussion

1. The sizes of the groups involved in the 1977 study of the 05C courses were relatively small compared to the total population of 05 students during a year. The control and experimental groups were selected for convenience at the time of the study. For these reasons, generalization about the total 05 population based on the findings of the

1977 study would be unwise. However, the study indicates certain trends that are worthy of comment. Replication of the 1977 study with better sampling techniques and tighter control of the variables may provide evidence for the trends indicated.

2. The graduates of the self-paced 05C experimental group had higher mean scores on common tasks than the 05B control group. On two common tasks, the difference was significant at the .01 level. (It should be noted that the ACB indicator for these tasks is the AP score. The 05C students were significantly better at the .25 level in this aptitude area.) On one task, the significance was at the .05 level, on another task it was at the .1 level, and on two other common tasks it was at the .25 level. The 05C self-paced group had higher mean scores than the 05F group-paced group on common tasks at the .01 level of significance (app B). The 05C self-paced students had significantly higher GT and SC scores than the 05F on the ACB. The 05B group had significantly higher GT and SC scores than the 05C group, but the 05C group had higher AP scores (significant at .25 level). However, the 05C students had higher mean scores on performance tasks than the 05B students, as indicated above.

3. The completion times for the 05C self-paced course cannot be accurately compared with the 05C group-paced course. Some equipment was deleted from the course when it was self-paced, and the course criteria were increased at that time.

4. The increased 05C academic attrition during the first quarter following implementation of the self-paced course may have resulted from the following factors:

a. Inadequately trained self-paced instructor personnel.

b. Utilization of course personnel to train both group-paced 05B and self-paced 05C students simultaneously.

c. The 05C student turnbacks in the group-paced course were recycled as 05C self-paced students.

5. The academic attrition of the 05C self-paced course stabilized in the four-quarter period--second, third, and fourth, FY 77, and first quarter FY 78. On comparing this self-paced stabilized academic attrition rate with a four-quarter period (2d, 3d, 4th FY 76, and 7T) for the group-paced 05C course, it was noted that the attrition rates were comparable. The group-paced course had a 28 percent academic attrition rate, while the self-paced course had a 25 percent academic attrition rate. A comparison of the total attrition rate for the same periods shows a 62 percent rate for the group-paced course and 43 percent rate for the self-paced course (app F).

6. Instructor and supervisor survey data indicated that they perceived the 05C self-paced student as the better graduate; however, this perception was not supported by statistical evidence.

7. A comparison of course cost per graduate provided by TRADOC for the group-paced and self-paced courses showed that the FY 77 self-paced graduate cost ($5,219) was slightly less than that computed for the FY 76 group-paced graduate ($5,785). These cost

comparisons may have been significant if optimum training conditions had been experienced for the 05C course from its implementation date.

H. Conclusions. The results from Test 1, "Evaluate the Effectiveness of the 05C Self-paced Program," indicate that the 05C self-paced students were more proficient than the group-paced 05B and 05F students. However, the group sizes were comparatively small. In the year since the initial study, the data on course attrition have changed as the course has stabilized. Based on these findings, it may be concluded that the 05C self-paced course produced a more proficient graduate with approximately the same rate of academic attrition but a lower rate of total attrition at a slightly reduced cost.

TEST #2

A. Objective. The objective of this module is to compare the performance of the 05C team members in field units who have completed self-paced courses with the performance of those who have completed group-paced courses. Test efforts focused on five subobjectives:

1. Determine the job proficiency of the 05C in his/her work environment.

2. Determine the relationship between 05C job proficiency and the methods of training used in attaining the MOS.

3. Determine the relationship between job proficiency and the individual's demographic variables.

4. Determine the relationship between proficiency scores on hands-on component and written component of proficiency test.

5. Determine the variable or variables that are more reliable predictors of job proficiency.

B. Hypothesis. There are no significant differences in job performance proficiencies when comparing 05C field team members who have graduated from self-paced institutional training courses with those who have graduated from group-paced institutional training courses.

C. Experimental Design

1. Parameters.

a. The study encompassed: (1) method and location of training for attaining the MOS 05C; (2) demographic data; (3) attitude factors; and (4) job holder profiles.

b. The study compared: (1) self-paced versus group-paced institutional training; and (2) institutional training versus unit OJT.

c. Subjects of the study were 05C job holders who have completed either self-paced or group-paced institutional training and 05C job holders who have been awarded their MOS as a result of unit/on-the-job training.

d. The 05C assigned to divisions in CONUS were tested using the validated job proficiency exam. The job holders were required to perform the critical tasks of their MOS in a field environment under conditions expected in normal or combat operations. They performed as a team and as individuals and were scored on all tasks performed. A scenario was used to insure the highest degree of objectivity and to control internal operational variables to the greatest degree possible. Climate, weather, equipment malfunction, health, and motivation of testees and other variables of this nature will not be controlled but will be recorded and analyzed for impact upon testee results. Such impact will be discussed, but no attempt will be made to assign weights based on such variables. It is expected that these variables will have a tendency to balance and will, therefore, have little impact on the final results.

2. Assumptions. To compare the performance of 05C team members in field units who have completed self-paced courses with that of team members from group-paced courses, the following basic assumptions were made:

a. The method of institutional training did not produce significant differences in job performance proficiency of 05C field teams and in individual team member proficiency.

b. The 05C job holders awarded their MOS's as a result of unit/on-the-job training performed significantly less proficiently than do the institutionally trained 05C job holders.

c. A relationship exists between training resources expended and 05C job performance proficiency.

d. A relationship exists between end-of-course 05C job performance test proficiency, the 05C performance as team members of field units, and learning decay.

e. A relationship exists between job performance test proficiency of 05C teams in field units and combat readiness.

f. All test rating scales and other measuring devices used in this study were objective, valid, and reliable.

g. The 05C team members, whether institutionally trained or unit/on-the-job training, were equally motivated (i.e., desire to do well).

h. The evaluators were proficient and equally motivated and that interrater reliability was maintained.

i. The individual job holder demographic data collected were valid.

3. Definitions.

a. Group-paced instruction--Course of training in which all members of a class begin, progress through the instruction, and complete together.

b. Self-paced instruction--Course of training in which an open entry/open exit policy has been established and individual participants progress at their own rate.

c. Satellite schools--Formal approved courses of instruction conducted under the auspices of the major commands to meet the specific training needs of the command.

d. On-the-job training--Supervised or unsupervised training performed by the job holder on the equipment for which the MOS is responsible.

e. One station unit training (OSUT)--Course of training in which all critical basic soldier tasks, as well as critical MOS tasks, are integrated.

D. Subjects

1. Test population consisted of both school trained and non-school trained personnel in MOS 05C in the pay grades E5 and below within the division tested.

2. There are approximately 7,000 soldiers serving in the 05C MOS, and four divisions participated in the test sample. One complete

active duty division complement of soldiers in the MOS 05C MOS and at least 50 soldiers of 05C MOS in the remaining three divisions were tested.

3. Test sample consisted of 276 05C team members and supervisors. Due to computer data identification problems, the number was reduced to a population size of 134 for this report. Manipulation of the total population's data will continue so a thorough report can be given at a future date.

E. Procedures

1. General. This study was conducted under field conditions employing MOS 05C, Radio Teletypewriter Operator teams organic to the test unit's TOE. The testing was conducted in accordance with the following schedule:

a. 24th Infantry Division - 24-28 Apr 78

b. 48th Mechanized Infantry Brigade (24th Infantry Division Roundout) - 29-31 May 78

c. 49th Armored Division - 6-16 Jun 78

d. 4th Infantry Division - 12-16 Jun 78

e. 1st Infantry Division - 21-27 Jun 78

2. Testing. Evaluation of the proficiency of the 05C MOS holders was accomplished as outlined below using the instrument at appendix G.

a. A written component consisted of four parts.

b. A hands-on component consisted of 18 critical tasks designed to evaluate both the RATT team and the individual team members under nonstatic conditions.

c. Both the hands-on and the written component of the test were validated prior to the testing.

d. Scoring techniques utilized were: (1) a combination process/product based on the utilization of a scoring checklist developed for each scorable unit of the hands-on component in which a yes or no was given to the examinees' ability to perform the observed performance measure and (2) a weighted written component.

e. Interrator reliability. Interrator reliability was maximized by training and utilized the same evaluation teams for each test administration.

3. Test Administrators. A total of three test administrators were obtained from personnel of the US Army Signal Center and Fort Gordon who possessed the MOS 05C or 31Z and who met the following criteria:

a. They have a thorough working knowledge of MOS 05C.

b. They have attended an SQT/CRI development workshop or have experience teaching MOS 05C.

c. They possess no physical profiles which could interfere with test operations.

d. Their training was accomplished in the following manner:

(1) By assisting in the development of the test instrument.

(2) By assisting in the validation of the test instrument.

(3) By attending a training methodology workshop in which the test administrators/scorers acted as both examiners and examinees.

4. General Areas of Investigation.

a. Duty MOS versus primary MOS--Was the individual's duty MOS the same as his/her primary MOS? If not, was the individual trained to perform his/her duty MOS?

b. Recency of training--How recent was the training that prepared the individual to perform his/her duty MOS?

c. Length of assignment--How long had the individual been in his/her present assignment?

d. Length of service--How long had the individual been in the service?

e. Attitude factors:

(1) Team member--To identify 05C job holder attitude as reflected in their opinions toward their job, an attitudinal survey for team members developed by Army Research Institute was administered. The responses are being correlated with the job performance proficiency data.

(2) Supervisor--To identify 05C supervisor attitude as reflected in their opinions toward their job, an attitudinal survey for supervisors developed by Army

Research Institute was administered. The responses are being correlated with the job performance proficiency data.

5. Data Collection. The data for the dependent variables were obtained by administering a proficiency exam to the sample MOS holders. This exam consisted of a hands-on component and a written component and was validated by administration to a representative sample of the test population. The test consisted of a hands-on component containing 66 practical items that included both process and product performance measures and 44 written items requiring practical performance in a written mode. All respondents were tested and scored by a test team composed of two scorers and a test adminstrator with one backup replacement. Data were collected immediately following each test administration by the test administrator. Data for all other variables were obtained by a questionnaire that was produced and distributed by the Signal Center and Fort Gordon SWT. These data were collected by the SWT prior to testing the MOS holders. These data included the following:

a. Age

b. Sex

c. Education

d. Type training (institutional, satellite, or OJT)

e. Length of training (institutional, satellite, or OJT)

f. Recency of training (institutional, satellite, or OJT)

g. Duty assignment

h. Length of duty assignment

6. Statistical Considerations.

a. Collection technique. The data was collected using a vertical collection technique from 05C team members and supervisors on the dates indicated in the test schedule under Procedures, paragraph 1.

b. Collection instruments.

(1) Written test--Each 05C job holder was administered the 44-item weighted and key-scored written component.

(2) Performance test--Each 05C job holder was administered the 66-item hands-on process scored job performance test.

(3) Survey questionnaires--To identify 05C team members' and supervisors' attitudes toward their jobs, an Army Research Institute attitudinal survey was administered to each.

(4) Demographic survey--To identify 05C job holder information pertaining to the independent variables, a demographic survey was administered.

7. Data Analysis. Several statistical techniques were used to analyze the data.

a. Means, standard deviations, and ranges were calculated for all variables.

b. A t-test was used to determine significant differences between categories of 05C taking the proficiency test.

c. A chi-square test is being used to determine significant relationships between such variables as age, education, recency of training, etc., and job proficiency.

d. A linear multiple correlation program is being used to determine overall relationships among all variables.

e. A multiple regression program is being used to determine which variable or variables are predictors of job proficiency.

F. Findings

1. The 05C job holders who had completed group-paced training performed statistically significantly better on two of three written components of the field test at the .01 level of significance (app I).

2. The 05C job holders who had completed self-paced training had higher mean scores on four of five hands-on components of the field test; however, this was not determined to be statistically significant at the .1 level. The difference on one hands-on component was significant at the .145 level, the rest were not significant at any recognized level (app I).

3. The mean score for the total test population was 64.4 of a maximum possible score of 151 or 43 percent of all scorable elements (app H).

4. The mean length of assignment of the total test population was 15.6 months with a range of 2-38 months and a standard deviation of 7.5 months (app J). (The military personnel office at Fort Gordon reported a mean length of assignment on rotation for all MOS 05C E5's and below as 26.6 months.)

G. Discussion. On reviewing the interim findings of Test 2, "Compare the Performance of the 05C Team members in Field Units Who Have Completed Self-Paced Courses to the performance of Their Group-Paced Counterparts," it was noted that the 05C group-paced graduate performed statistically significantly better on the Radiotelephone Procedures and the Radio Teletypewriter Procedures test components. The data are being further analyzed to ascertain if there is any one statistically supported causal factor for this finding. Additionally, test results show that the 05C self-paced graduate mean scores were higher on four of five hands-on components. Overall, this information was not determined to be statistically significant in every case; however, because of the preponderance of higher test scores being attributed to the self-paced graduates, it was considered an important finding. The relatively poor scoring of the test population was considered an important finding. Two test components, Radiotelephone Procedures and Radio Teletypewriter Procedures, received slightly over 80 percent accurate responses, and the written test received only 65 percent accurate responses. The remaining five hands-on test components received scores of 42 percent or less. This overall low level of performance by a test population which has a mean assignment time of 15.6 months in their respective units points to some very clear skill degradation. Further, the mean assignment time of 15.6 months, when compared to the mean of 26.6 months for the typical 05C rotation should not be construed as a high turnover factor. For example, a random sampling of a population having a mean assignment time of 26.6 months on rotation should divide equally

from a middle point of 13.3 months assuming a routine assignment rotation.

H. Conclusions. Based on the data run thus far, the 05C job holders who have completed group-paced training performed statistically significantly better on two of three written components of the field test. Conversely, the job holders who have completed self-paced training performed better on four of five hands-on components; although this was determined to be statistically significant in just one case, it was perceived as an important finding. Further, the overall poor scoring by the test population reflects a low level of performance. An unusually high level of personnel turnover does not seem to be the apparent reason for the low level of performance for the test population.

TEST #3

A. Objective. The objective of this module is to compare alternative unit training programs used to correct 05C performance deficiencies. Test efforts are focusing on data collection in retraining and post testing 05C team members who were identified as having performance deficiencies in the Objective 2 test. Specific attention will be directed toward:

1. Change in job proficiency, if any, when compared to Objective 2 test data.

2. Change in attitude, if any, when compared to Objective 2 test data.

3. Training package design achieving the greatest degree of change in proficiency or attitude.

4. Training package cost/effectiveness when comparing survey data on acceptability, utilization, and ease of administration.

B. Hypothesis. There will be no significant differences in job performance proficiencies when comparing 05C field team members who have completed different retraining packages to correct similar performance deficiencies.

C. Experimental Design

1. Parameters.

a. The study will include: (1) type of retraining package implemented for each performance deficiency noted in the pretest; (2) attitudinal data from the pretest.

b. The study will compare: (1) training methodology to accomplish the retraining; (2) media devices associated with the retraining effort; and (3) the cost of administering each retraining package.

c. Subjects of the study will be 05C team members who were identified as having job performance deficiencies based on the Objective 2 test data.

d. The 05C team members will be retrained in the operational environment of their assigned units.

2. Assumptions. To compare alternative unit training programs used to correct 05C job performance deficiencies, some basic assumptions are made:

a. That the type of retraining program selected to correct a performance deficiency will produce the desired change in performance.

b. That the post test of the retraining program will determine the degree of change in performance.

c. That the cost of administering the retraining program will impact on the overall effectiveness of the program.

d. That all 05C team members identified as having a performance deficiency will desire to participate in a retraining program to overcome their inadequacies.

3. Definitions.

a. Training Extension Courses (TEC)--Programs are designed to provide a learner with step-by-step instruction in the form of video/audio, audio only, or written form.

b. Job Performance Aids (JPAs)--Designed primarily to be used with other training aids or as a keying device after considerable study within that subject area.

c. Subcourses--Self-contained individual home study lesson material.

d. Study Guides--Learning material designed to direct the learner through a series of performance measures using other study material, such as TMs, job aids, forms, extracts, etc.

e. Audio Tapes--Sound tapes designed to provide the learner with an effective means of insuring that each step is correctly performed before moving to the next step.

f. Multimedia Program--Designed to incorporate as many of the senses as possible through the use of video playback units and television sets.

D. Subjects

1. Test population will consist of 05C team members who were identified as having job performance deficiencies in the Objective 2 test.

2. An initial estimate identified approximately 70 percent of all Objective 2 testees as having one or more areas of performance deficiency in need of a training correction.

E. Procedures

1. This study is being conducted under field conditions in a retraining and testing effort of MOS 05C, Radio Teletypewriter Operator, who are members of communications teams. The retraining and testing is a follow-on action to the test conducted in support of Objective 2. A tentative schedule is as follows:

a. 24th Infantry Division - August

b. 48th Mechanized Infantry Brigade (24th Infantry Division Roundout) - August

c. 49th Armored Division - September

d. 4th Infantry Division - September

e. 1st Infantry Division - September

2. Personnel identified by Objective 2 test data as requiring remedial training are being trained in the following manner:

a. Key NCOs have been identified and selected as trainers in units to be retrained.

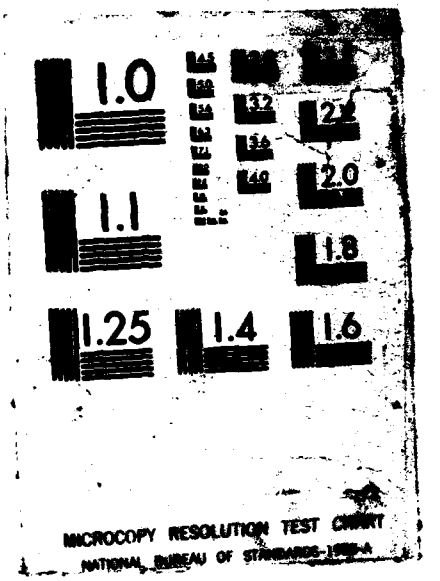
b. ARTS personnel are providing a workshop on the training packages for these key NCOs to insure understanding of both training plans and subject matter

c. The key NCOs will then train unit personne [illegible] identified performance deficiencies using [illegible] packages.

d. Upon completion of training [illegible] return to the units and post test

AD-A186 326 ARMY TRAINING STUDY: TRAINING EFFECTIVENESS ANALYSIS (TEA) SUMMARY VOLUME (U) ARMY TRAINING AND DOCTRINE COMMAND FORT MONROE VA F J BROWN 08 AUG 78 1/6

UNCLASSIFIED SBI-AD-F000 110 F/G 15/1 NL


1.0
1.1
1.25
1.4
1.6
2.0
1.8
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

3. Testing. Reevaluation of the proficiency of the 05C MOS holders is to be accomplished in the same manner as outlined in Test #2 with the following exceptions:

a. No consideration will be given to general areas of investigation, such as (1) duty MOS versus primary MOS, (2) recency of training, (3) length of assignment, or (4) length of service. The overall purpose of post testing is to determine the effectiveness of the alternative training programs, and those items listed above are expected to have negligible effect on the outcome.

b. No demographic data is to be collected on examinees due to the recency of demographic data collected during pretesting.

4. General Areas of Investigation.

a. Task Proficiency--How did the retraining impact on the individual's ability to perform his/her job?

b. Attitude factors--How did the retraining impact on the individual's attitude toward his/her job?

5. Data Collection. The data collection on the retraining is being obtained from the training implementation plan and the training administrators' control documents. Data to be collected from the retesting will be obtained using the same test instrument used in Objective 2.

6. Statistical Consideraton.

a. Collection techniques. The data will be collected using a horizontal collection process from 05C team members, supervisors, and training administrators.

b. Collection instruments.

(1) Training implementation and control documents are being used to determine the data from training and the amount of time spent in retraining.

(2) The same test instruments used in Objective 2 will be used to obtain the post test data.

7. Data Analysis. Several statistical techniques will be used to analyze the data.

a. Cost and training effectiveness analysis (CTEA) will be performed on all training packages implemented.

b. Means, standard deviations, and ranges will be calculated for all variables.

c. A t-test will be used to determine significant gains in performance proficiency and attitudes from the pretest to the post test.

F. Findings, Discussion, and Conclusions. This part of the study will be completed and submitted at a later date. The retraining workshops conducted for key NCOs and team leaders were enthusiastically supported by the personnel at Fort Stewart and Fort Riley. If this level of enthusiasm is maintained through the retraining effort at the respective units, it is anticipated that the post test data should show some conclusive evidence of improvement.

TAB A

05C End Of Course Test
Performance Test Administrator's Manual

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL AND OPERATE FM RADIO EQUIPMENT

113-05B,C,E,F20/D07-PT

APPROVED: 16 December 1976

This is a Signal School publication.

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

SECTION I - EVALUATION CRITERIA

1. Statement of Objectives:

ACTION: Student installs and operates FM radio equipment.

CONDITION: The student is placed at a test position and provided with Radio Set AN/PRC-77, Radio Set AN/VRC-46, Radio Set Control Group AN/GRA-39, accessories required for installation and operation, CEOI extract, DA Form 4004 and training message.

STANDARD:

(A) Minimum acceptable performance will be evident when the student has installed, tuned and aligned Radio Set AN/PRC-77 for operation IAW TM 11-5820-667-12 on the frequency indicated in the CEOI extract within a time limit of 5 minutes.

(B) Minimum acceptable performance will be evident when the student has installed, tuned and aligned Radio Set AN/VRC-46 for operation IAW TM 11-5820-401-12 on the frequency indicated in the CEOI extract within a time limit of 5 minutes.

(C) Minimum acceptable performance will be evident when the student has installed and aligned Radio Set Control Group AN/GRA-39 for operation IAW TM 11-5820-477-12 within a time limit of 10 minutes.

(D) Minimum acceptable performance will be evident when the student opened the net, transmitted a message, received a message and closed the net IAW ACP 125(D) within a time limit of 20 minutes.

(E) Minimum acceptable performance will be evident when the student responds to three of four repetition problems IAW ACP 125(D) within a time limit of 10 minutes.

2. Criteria Action Elements within the Test Group:

a. Install Radio Set AN/PRC-77:

(1) Install battery.

(2) Install antenna.

(3) Connect handset.

b. Operate Radio Set AN/PRC-77:

(1) Align R-T to assigned frequency.

(2) Set function switch to appropriate setting.

c. Install Radio Set AN/VRC-46:

(1) Place receiver-transmitter into mount.

(2) Connect antenna cables.

(3) Erect whip antenna.

(4) Connect microphone.

d. Operate Radio Set AN/VRC-46:

(1) Set power switch to LOW.

(2) Set squelch to new ON.

(3) Set band switch to proper band.

(4) Set MHz and KHz controls to proper frequency.

(5) Set speaker switch to ON.

e. Install Radio Set Control Group AN/GRA-39:

(1) Install batteries in local and remote units.

(2) Connect local unit to R-T.

(3) Connect remote unit to local unit.

f. Operate AN/GRA-39:

(1) Start local unit.

(2) Make telephone communication check.

(3) Make radio communication check from local unit.

g. Transmit radio telephone (voice) message:

(1) Open net.

(2) Prepare message for transmission.

(3) Transmit preliminary call.

(4) Transmit message.

h. Receive radio telephone message:

(1) Receive message.

(2) Receipt for message.

(3) Close net.

(4) Perform stopping procedures.

i. Respond to repetition problems:

(1) Receiving operator.

(2) Transmitting operator.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install and operate FM radio equipment.

2. Prior to the test period:

a. Provide each test administrator with a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is available and operational.

c. Provide each test position with the following:

(1) Radio Set AN/PRC-77.

(2) Battery BA-4386/U on BA-398/U.

(3) Handset H-189.

(4) Whip antenna.

(5) Radio Set AN/VRC-46.

(6) Whip antenna.

(7) Radio Set Control Group AN/GRA-39.

(8) WD-1/TT wire.

(9) CEOI extract.

(10) DA Form 4004.

(11) Training message.

(12) Repetition problems.

(13) Paper.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Assign students to test positions.

(3) Keep students who have not been tested separate from those students being tested or those who have been tested.

(4) Clarify student's questions on test directions.

b. During student performance:

(1) Test administrator will act as remote control oeprator for telephone communications check and as distant radio stations for radiotelephone communications.

(2) Record on the score sheet the time for start and completion of each problem. The student will be allowed five minutes for the installation and operation of the AN/PRC-77, five minutes for the installation and operation of the AN/VRC-46, 10 minutes for the installation and operation of the AN/GRA-39, 20 minutes to open the net, transmit a message, receive a message and close the net, and 10 minutes to respond to three of four repetition problems.

(3) Monitor student's progress to prevent injury to the student and damage to the equipment.

(4) Record "GO" or "NO-GO" and points on the score sheet as the student completes each item.

4. After the Test Period:

a. Summarize the student's accomplishments and inform the student of grade attained and discuss areas of weakness.

b. Insure sets are off and area policed up.

c. Compile student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (READ VERBATIM)

1. Action: You will install and operate FM radio equipment.

2. Conditions: You will be assigned a test position and provided with Radio Set AN/PRC-77, Radio Set AN/VRC-46, Radio Set Control Group AN/GRA-39, accessories and wire required for installation, CEOI extract. DA Form 4004 training message and repetition problem sheet.

3. Standard:

(A) Minimum acceptable performance will be evident when you have installed, tuned and aligned Radio Set AN/PRC-77 for operation IAW TM 11-5820-667-12 on the frequency indicated in the CEOI extract within a time limit of five minutes.

(B) Minimum acceptable performance will be evident when you have installed, tuned and aligned Radio Set AN/VRC-46 for operation IAW TM 11-5820-401-12 on the frequency indicated in the CEOI extract within a time limit of five minutes.

(C) Minimum acceptable performance will be evident when you have installed and aligned Radio Set Control Group AN/GRA-39 for operation IAW TM 11-5820-477-12 within a time limit of 10 minutes.

(D) Minimum acceptable performance will be evident when you have opened the net, transmitted a message, received a message, and closed the net IAW ACP 125(D) within a time limit of 20 minutes.

(E) Minimum acceptable performance will be evident when you respond to three of four repetition problems IAW ACP-125(D) within a time limit of 10 minutes.

4. Procedure:

a. This is a five part test:

(1) You will be given 5 minutes to install and tune Radio Set AN/PRC-77 to the frequency indicated in the CEOI extract.

(2) You will be given 5 minutes to install and tune Radio Set AN/VRC-46 to the frequency indicated in the CEOI extract.

(3) You will be given 10 minutes to install and align Radio Set Control Group AN/GRA-39.

(4) You will be given 20 minutes to open the net, transmit a message, receive a message, and close the net.

(5) You will be given 10 minutes to respond to three of four repetition problems.

b. You will act as NCS when opening and closing the net. The test administrator will act as substations.

c. The test administrator will act as remote control operator for telephone communications check and as distant radio stations for radiotelephone communications.

d. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under the provision of Article 134 of UCMJ.

e. If your equipment fails during the test, immediately notify the test administrator.

f. Are there any questions?

g. Direct student to test position.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. SCORING:

a. Student must correctly perform each item to obtain minimum acceptable performance for each task.

b. Record a "GO" or "NO-GO" as applicable on the Test Administrator's Scoring Sheet for all five tasks. A "NO-GO" recorded in any task constitutes a failure for that particular task and the student will be scheduled for additional training.

c. Award points as indicated for each correct item or "GO." Zero points will be awarded for each "NO-GO." The raw score is determined by adding up the total points awarded for the test.

2. GRADING:

INSTALL AND OPERATE RADIO SET AN/PRC-77

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	15.0	1.50
Pass 2nd Try	14.5	1.45
Pass Subsequent	14.0	1.40

INSTALL AND OPERATE RADIO SET AN/VRC-46

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	15.0	1.50
Pass 2nd Try	14.5	1.45
Pass Subsequent	14.0	1.40

INSTALL AND OPERATE RADIO SET CONTROL GROUP AN/GRA-39

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	15.0	1.50
Pass 2nd Try	14.5	1.45
Pass Subsequent	14.0	1.40

OPEN-CLOSE NET AND TRANSMIT-RECEIVE MESSAGE

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	15.0	1.50
Pass 2nd Try	14.5	1.45
Pass Subsequent	14.0	1.40

REPETITION PROBLEMS

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	15.0	1.50
Pass 2nd Try	14.5	1.45
Pass Subsequent	14.0	1.40

3. REMARKS:

a. The Section Chief will be notified when a student does not achieve minimum acceptable.

b. Student not achieving MAB on a particular task will be allowed to go on to the next task. Administrator will perform steps to prepare equipment for next test.

c. The failing student will receive remedial training on task failed. Course points will be awarded as indicated in the "GRADING" section of this manual.

d. A student taking a retest will be retested in task failed.

SECTION V - PROCEDURAL GUIDE:

1. When assigned to a testing position the student will install and operate Radio Set AN/PRC-77 within a time limit of 5 minutes by:

a. Assembling the AN/PRC-77.

b. Determining the operating frequency using the CEOI extract.

c. Tuning the radio set to appropriate frequency.

2. Install and operate Radio Set AN/VRC-46 within a time limit of 5 minutes by:

a. Placing receiver-transmitter into mount.

b. Connecting antenna cables to receiver-transmitter.

c. Erecting the whip antenna.

d. Connecting the microphone.

e. Setting power switch to low.

f. Setting light switch to ON.

g. Setting squelch to new ON.

h. Setting band switch to appropriate band (A or B).

i. Setting MHz and KHz controls to proper frequency.

j. Setting speaker switch to ON.

k. Adjusting volume control to mid-range.

3. Install and operate Radio Set Control Group AN/GRA-39 within a time limit of 10 minutes by:

a. Installing batteries in local unit.

b. Installing batteries in remote unit.

c. Connecting local unit to receiver-transmitter.

d. Connecting remote unit to local unit.

e. Starting local unit.

f. Making telephone communication check between local and remote units.

g. Making radio communication check from local unit.

5. Transmit message and receive message within a time limit of 20 minutes by:

a. Opening net.

b. Preparing message for transmission.

c. Transmitting preliminary call.

d. Transmit message.

e. Obtain receipt for message.

f. Receive radiotelephone message (Sent by test administrator):

F4S28 THIS IS A2DØ7D MESSAGE PRIORITY -TIME 271625Z JUN 76 FROM A2DØ7 TO F4SØ7 BREAK SUBMIT CASULTY REPORT PRIOR TO 2359Z BREAK OVER

g. Receipt for message.

h. Close net.

i. Perform stopping procedures.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____
GROUP: _____
DATE: _____

INSTRUCTIONS: Administrator will record "GO" or "NO-GO" as applicable.

PART A.

TIME START: _____
TIME STOP: _____

1. Student has installed AN/PRC-77.

2. Student has aligned and tuned AN/PRC-77.

	Go	No-Go	Raw Score
1.			
2.			
TOTAL POINTS			
COURSE POINTS			

PART B.

TIME START: _____
TIME STOP: _____

1. Student has installed AN/VRC-46.

2. Student has aligned and tuned AN/VRC-46.

	Go	No-Go	Raw Score
1.			
2.			
TOTAL POINTS			
COURSE POINTS			

PART C.

TIME START: _____
TIME STOP: _____

1. Student has installed and aligned AN/GRA-39.

	Go	No-Go	Raw Score
1.			
TOTAL POINTS			
COURSE POINTS			

PART D.

TIME START: _____
TIME STOP: _____

	Go	No-Go	Raw Score
1. Student has opened net.			
2. Student has transmitted message.			
3. Student has received message.			
4. Student has closed net.			
		TOTAL POINTS	
		COURSE POINTS	

PART E.

TIME START: _____
TIME STOP: _____

	Go	No-Go	Raw Score
1. Student has responded to three of four repetition problems.			
		TOTAL POINTS	
		COURSE POINTS	

TOTAL COURSE POINTS: 7.5

ADMINISTRATOR'S SIGNATURE _____

APPENDIX A

STUDENT TEST SHEET

1. CEOI extract.

CEOI

NET CALL SIGN F4S

DIV ARTY (NCS) ... F4S28 (Student)

1ST BDE A2DØ7D

2D BDE L2NØ7D

FREQUENCY: _____

SUFFIXES

OPERATOR ..... D

CDR Ø7

2. Open net. You are NCS.

3. Transmit the following message:

THESE SPACES FOR MESSAGE CENTER ONLY

TIME FILED	MSG CEN NO	HOW SENT

MESSAGE (SUBMIT TO MESSAGE CENTER IN DUPLICATE) PRECEDENCE PRIORITY

No 1 DATE 25 JUN 76

To CDR 1ST BDE

AT 12ØØZ PROCEED HONG KONG

TO ARRIVE 16 JULY LOAD

ONE THOUSAND TROOPS FOR

RETURN SHANGHAI

CDR DIV ARTY (OFFICIAL DESIGNATION OF SENDER) 1833Z (TIME SIGNED)

John L. Thomas CPT. (SIGNATURE AND GRADE OF WRITER)

4. Receive message and record on DA Form 4004.

5. Close net.

APPENDIX B

REPETITION PROBLEMS

In Problems 1 through 3 make the necessary transmission to obtain missing portion(s). Your call sign is A2DØ1D.

1. A2DØ1D DE L2N12D ROUTINE TIME 16183ØZ MAY 76
   FROM XXXX XX XXXX BREAK ALL UNITS WILL REPORT
   AT 23ØØZ BREAK OVER

   _____ DE _____

2. A2DØ1D DE L2N12D ROUTINE TIME 16183ØZ
   MAY 76 BREAK ALL XXXXX XXXX XXXXX AT
   23ØØZ BREAK OVER

   _____ DE _____

3. A2DØ1D DE L2N12D ROUTINE TIME 16183ØZ
   MAY 76 BREAK ALL UNITS XXXX REPORT AT
   23ØØZ BREAK OVER

   _____ DE _____

In Problem 4 your call sign is L2N12D. You transmit the following message to A2DØ1D.

4. A2DØ1D DE L2N12D ROUTINE TIME 16183ØZ
   MAY 76 BREAK ALL UNITS WILL REPORT
   AT 23ØØZ BREAK OVER

Instead of a receipt A2DØ1D transmits:

L2N12D THIS IS A2DØ1D SAY AGAIN WORD AFTER ALL OVER

You would transmit:

_____ DE _____

ANSWERS TO APPENDIX B

REPETITION PROBLEMS

1. L2N12D DE A2DØ1D SAY AGAIN FROM TO BREAK OVER
2. L2N12D DE A2DØ1D SAY AGAIN ALL TO AT OVER
3. L2N12D DE A2DØ1D SAY AGAIN WORD AFTER UNITS OVER
4. A2DØ1D DE L2N12D I SAY AGAIN WORD AFTER ALL UNITS OVER

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL AND OPERATE RADIO SET AN/GRC-106

113-05B,C,E,F20/G05-PT

APPROVED: 16 December 1976

This is a Signal School publication.

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

SECTION I - EVALUATION CRITERIA

1. Statement of Objective:

ACTION: Student installs, performs daily maintenance checks and services, fill out DA Form 2404, and operates Radio Set AN/GRC-106.

CONDITION: Student will be assigned a test position and given a Radio Set AN/GRC-106 with pre-installed mount, TM 11-5820-520-12, a training CEOI, station log (blank), DA Form 2404, and cleaning material.

STANDARDS:

A. Minimum acceptable performance will be evident when the student can install the AN/GRC-106 IAW TM 11-5820-520-12, and make necessary cable connections within 25 minutes.

B. Minimum acceptable performance will be evident when the student can tune (operate) the AN/GRC-106, transmit and receive messages in Radiotelegraph and Radiotelephone Net within 45 minutes. (MOS 05E and 05F Radiotelephone only within 35 minutes).

C. Minimum acceptable performance will be evident when the student has performed daily maintenance checks and services IAW Table 4-1 and para 4-3, TM 11-5820-520-12 and fill out DA Form 2404 within 30 minutes.

2. Criteria Action Elements within the Test Group:

a. Install AN/GRC-106:

(1) Position and secure the AN/GRC-106 in the Mount MT-3140.

(2) Connect all cable.

b. Operate AN/GRC-106:

(1) Determine operating frequency and call sign.

(2) Perform preliminary starting procedures.

(3) Perform tuning procedure.

(4) Adjust for mode of operation.

(5) Transmit and receive message.

(6) Maintain station log.

(7) Perform daily maintenance.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install, perform daily maintenance checks and services, fill out the DA Form 2404 and operate the AN/GRC-106.

2. Prior to the Test Period:

a. Assign test administrators to test position. Provide each test administrator a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedure.

b. Insure equipment to be used is operational.

c. Provide each test position with the following:

(1) Radio Set AN/GRC-106 with preinstalled mount.

(2) TM 11-5820-520-12.

(3) Training CEOI.

(4) Station log.

(5) Test situation.

(6) Cleaning material.

(7) DA Form 2404.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim, "Directions to Student" section of this manual, to all students to be tested.

(2) Assign students to test position.

(3) Keep students who have not been tested separate from those who are being tested or have been tested.

(4) Clarify student's questions on test directions.

b. During student performance:

(1) Record on the score sheet the start and stop times of the test. The student will be allowed 25 minutes to install the AN/GRC-106, 45 minutes to tune the AN/GRC-106 and transmit and receive radiotelegraph and radiotelephone messages (MOS 05E and 05F 35 minutes for radiotelephone messages only), 30 minutes to perform daily maintenance checks and services and fill out DA Form 2404.

(2) Monitor students constantly to prevent injury to the student and damage to the equipment.

(3) Record "GO" or NO-GO" as the student completes each item. A "NO-GO" recorded during installation or operation of the radio set constitutes a failure and the student will be scheduled for retraining.

4. After the Test Period:

a. Insure that all equipment is turned off and test positions are policed.

b. Answer questions from students concerning difficulties encountered during the test.

c. Complete student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will install, perform daily maintenance checks and services, fill out DA Form 2404 and operate Radio Set AN/GRC-106.

2. Condition: You will be assigned a test position and given a Radio Set AN/GRC-106 with preinstalled mount, TM 11-5820-520-12, a training CEOI, station log, DA Form 2404 and cleaning material.

3. Standards:

a. Minimum acceptable performance will be evident when you can install the AN/GRC-106 IAW TM 11-5820-520-12, and make necessary cable connection within 25 minutes.

b. Minimum acceptable performance will be evident when you can tune (operate) the AN/GRC-106, transmit and receive messages in radiotelegraph and radiotelephone net within 45 minutes (MOS 05E and 05F radiotelephone only, within 35 minutes).

c. Minimum acceptable performance will be evident when you can perform daily maintenance checks and services IAW Table 4-1 and para 4-3, TM 11-5820-520-12 and fill out DA Form 2404 within 30 minutes.

4. Procedure:

a. To pass this test you must satisfactorily install the radio set, make all necessary cable connections, tune the radio set and transmit and receive messages in a radiotelegraph and radiotelephone net within 45 minutes (MOS 05E and 05F radiotelephone only in 35 minutes).

b. You will be given 25 minutes to complete the installation portion of this test. You may use TM 11-5820-520-12 to install the radio set and make necessary cable connections. Upon completion of the installation portion of this test inform the test administrator. After the test administrator has checked the installation of your radio set you may continue with the operation test. You will be given 45 minutes to tune the AN/GRC-106 and transmit and receive messages in radiotelegraph and radiotelephone net. (MOS 05E and 05F radiotelephone messages only, within 35 minutes).

c. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under the provisions of Article 134 of UMCJ.

d. If your equipment fails during the test immediately notify the test administrator.

e. A test administrator will act as a distant radio station operator during the test.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. Scoring:

a. Student must correctly perform each item to obtain minimum acceptable performance for each task.

b. Record a "GO" or "NO-GO" as applicable on the test administrator's scoring sheet for all three tasks. A "NO-GO" recorded in any task constitutes a failure for that particular task and the student will be scheduled for additional training.

c. Award points as indicated for each correct item or "GO." Zero points will be awarded for each "NO-GO." The raw score is determined by adding up the total points awarded for the test.

2. Grading:

Install Radio Set AN/GRC-106 in preinstalled mount and make all cable connections.

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	25.0	2.50
Pass 2nd Try	24.3	2.43
Pass 3rd Try	23.6	2.36
Pass Subsequent	23.3	2.33

Tune Radio Set AN/GRC-106 and make necessary transmissions to transmit and receive messages.

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	25.0	2.50
Pass 2nd Try	24.3	2.43
Pass 3rd Try	23.6	2.36
Pass Subsequent	23.3	2.33

Perform daily maintenance and fill out DA Form 2404.

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	25.0	2.50
Pass 2nd Try	24.3	2.43
Pass 3rd Try	23.6	2.36
Pass Subsequent	23.3	2.33

3. Remarks:

a. The Section Chief will be notified when a student does not achieve minimum acceptable performance.

b. Student not achieving MAP on a particular task will be allowed to go on to the next task. Administrator will perform steps to prepare equipment for next test.

c. The failing student will receive remedial training on task failed. Course points will be awarded as indicated in the "Grading" section of this manual.

d. A student taking a retest will be retested in task failed.

SECTION V - PROCEDURAL GUIDE

1. Install Radio Set AN/GRC-106 in preinstalled mount.

2. Make all cable connections.

3. Tune Radio Set AN/GRC-106 for CW operations to frequency specified.

4. Send the first transmission to open the net. Student will act as NCS.

5. Transmit CW message.

6. Change to SSB Voice Mode.

7. Receive coice message and record on DA Form 4004.

8. Perform daily maintenance and fill out DA Form 2404.

TEST ADMINISTRATOR'S SCORING SHEET

(05B and 05C)

NAME: _____

GROUP: _____

DATE: _____

INSTRUCTIONS: Administrator will check "GO" or "NO-GO" as applicable for each test item.

PART A.

TIME START: _____
TIME STOP: _____

FOR INSTRUCTOR'S USE

1. Install Radio Set AN/GRC-106.

2. Make all cable connections.

GO	NO-GO	RAW SCORE
TOTAL POINTS		
COURSE POINTS		

PART B.

TIME START: _____
TIME STOP: _____

1. Tune Radio Set AN/GRC-106 for CW.

2. Send first transmission to open net.

3. Transmit CW message.

4. Change to the SSB Voice Mode.

5. Receive Voice Message and record on DA Form 4004.

GO	NO-GO	RAW SCORE
TOTAL POINTS		
COURSE POINTS		

PART C.

TIME START: _____

TIME STOP: _____

1. Perform dail maintenance.

2. Fill out DA Form 2404.

GO	NO-GO	RAW SCORE
	TOTAL POINTS	
	COURSE POINTS	

TOTAL COURSE POINTS _____

ADMINISTRATOR'S SIGNATURE: _____

TEST ADMINISTRATOR'S SCORING SHEET

(05B and 05C)

NAME: _____

GROUP: _____

DATE: _____

INSTRUCTIONS: Administrator will check "GO" or "NO-GO" as applicable for each test item.

PART A.

FOR INSTRUCTOR'S USE

TIME START: _____
TIME STOP: _____

	GO	NO-GO	RAW SCORE
1. Install Radio Set AN/GRC-106.			
2. Make all cable connections.			
	TOTAL POINTS		_____
	COURSE POINTS		_____

PART B.

TIME START: _____
TIME STOP: _____

	GO	NO-GO	RAW SCORE
1. Tune Radio Set AN/GRC-106 for voice.			
2. Send transmission to net that all stations have authenticated correctly. You are the NCS.			
3. Transmit voice message.			
4. Record the first entry on the Circuit Log.			

5. Record the first transmission in opening the net on circuit log. You are the NCS.

GO	NO-GO	RAW SCORE
	TOTAL POINTS	
	COURSE POINTS	

PART C.

TIME START: _____
TIME STOP: _____

1. Perform daily maintenance.

2. Fill out DA Form 2404.

GO	NO-GO	RAW SCORE
	TOTAL POINTS	
	COURSE POINTS	

TOTAL COURSE POINTS: _____

ADMINISTRATOR'S SIGNATURE: _____

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL AND OPERATE GENERATOR SET

3 KW 28V DC

113-05B,C,E,F20/J10-PT

APPROVED: 16 December 1977

This is a Signal School publication.

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

SECTION I - EVALUATION CRITERIA

1. Statement of Objective:

ACTION: Student installs and operates Generator Set 3 KW 28V DC.

CONDITION: Student is provided with sited generator set, predriven ground rod, power cable and ground lead.

STANDARD: Minimum acceptable performance will be evident when the student can install and operate the generator set IAW TM 5-6115-271-14 within a time limit of 20 minutes.

2. Criteria Action Elements within the Test Group:

a. Install generator set:

(1) Ground generator set.

(2) Connect power cable.

(3) Perform preoperational checks.

b. Operate generator set:

(1) Place circuit breaker to OFF.

(2) Start generator set.

(3) Adjust voltage to 28V DC.

(4) Place circuit breaker to ON.

(5) Readjust voltage to 28V DC.

(6) Place circuit breaker to OFF.

(7) Adjust variable resistance knob fully counter-clockwise.

(8) Idle engine for three minutes.

(9) Place ON-OFF switch to OFF.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install and operate Generator Set 3 KW 28V DC.

2. Prior to the Test Period:

a. Provide each test administrator with a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is available and operational.

c. Provide each test position with the following:

(1) Sited Generator Set 3 KW 28V DC.

(2) Pre-driven ground rod.

(3) Ground lead.

(4) Power cable.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Assign students to test positions.

(3) Keep students who have not been tested separate from those students being tested or those who have been tested.

(4) Clarify student's questions on test directions.

b. During student performance:

(1) Record on the score sheet the time for start and completion of each problem. The student will be allowed 20 minutes to install and operate the set.

(2) Monitor student progress to prevent injury to the student and damage to the equipment.

(3) Record GO or NO-GO on the score sheet as the student completes each item.

4. After the Test Period:

a. Summarize the student's accomplishments and inform the student of grade attained and discuss areas of weakness.

b. Insure set is off and area policed up.

c. Compile student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action:. You will install and operate Generator Set 3 KW 28V DC.

2. Condition: You will be assigned a position and given a Sited Generator Set 3KW 28V DC, Predriven ground rod, ground lead, and power cable.

3. Standard: Minimum acceptable performance will be evident when you can install and operate the generator set IAW TM 5-6115-271-14 within a time limit of 20 minutes.

4. Procedures:

a. You will be given 20 minutes to install and operate the generator set.

b. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under the provisions of Article 134 of UCMJ.

c. If your equipment fails during the test notify your test administrator immediately.

d. Are there any questions?

e. Direct students to test positions.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. Scoring:

a. Record a GO or NO-GO as applicable on the test administrator's scoring sheet for each task.

b. Award points as indicated for each GO. Zero points will be awarded for each NO-GO. Raw score is determined by adding up the total points awarded for the test.

2. Grading:

Install Generator Set

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

Operate Generator Set

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

3. Remarks:

a. The section chief will be notified when a student does not achieve minimum acceptable performance.

b. Student not achieving MAP on the install task will be allowed to go on to the operate task. Administrator will perform steps to prepare equipment for next test.

c. The failing student will receive remedial training on task failed.

d. A student taking a retest will be retested on the task failed.

SECTION V - PROCEDURAL GUIDE

1. The student will install and operate generator set within a time limit of 20 minutes:

a. Install generator set by:

(1) Checking ground lead to generator.

(2) Connecting other end of ground lead to ground rod.

(3) Connecting power cable to load terminals.

(4) Performing preoperations checks.

(5) Checking oil level.

b. Operate generator set by:

(1) Starting generator set.

(2) Adjusting voltage to 28V DC.

(3) Placing circuit breaker to ON.

(4) Readjusting to 28V DC.

2. The student will stop generator set within a time limit of five minutes by:

a. Placing circuit breaker to OFF.

b. Adjusting variable resistance knob fully counter-clockwise.

c. Idling engine for three minutes.

d. Placing OFF-RUN switch to OFF.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____
GROUP: _____
DATE: _____

INSTRUCTIONS: Administrator will check student' progress and check GO or NO-GO as applicable.

PART A.

TIME START: _____
TIME STOP: _____

FOR ADMINISTRATOR'S USE ONLY

	GO	NO-GO	RAW SCORE
1. Student has grounded generator set.			
2. Student has connected power cable			
3. Student has performed pre-operation checks.			
	TOTAL POINTS		
	COURSE POINTS		

PART B.

TIME START: _____
TIME STOP: _____

	GO	NO-GO	RAW SCORE
1. Student has placed circuit breaker to OFF.			
2. Student has started set.			
3. Student has adjusted voltage to 28V DC.			
4. Student has placed circuit breaker to ON.			
5. Student has readjusted voltage.			
	TOTAL POINTS		
	COURSE POINTS		

ADMINISTRATOR'S SIGNATURE: _____

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL, OPERATE, PERFORM OPERATOR'S MAINTENANCE AND TROUBLESHOOT GENERATOR SET 10 KW 120VAC

113-05C,F20/J09-PT

APPROVED: 16 December 1976

This is a Signal School publication.

SECTION I - EVALUATION CRITERIA

1. Statement of Objective:

ACTION: Student installs and operates 10 KW 12VAC Generator.

CONDITION: Student is provided with sited generator set, pre-driven ground rod, ground lead, power cable and wrench.

STANDARD:

(A) Minimum acceptable performance for installing the generator set will be evident when the student can connect the ground lead to the generator set and ground rod, connect the power cable to load terminals, set the phase selector and perform pre-operational checks IAW TM 5-6116-275-15 within a time limit of 8 minutes.

(B) Minimum acceptable performance for operating the generator set will be evident when the student can start generator set and perform operating procedures IAW TM 5-6115-275-15 within a time limit of 2 minutes.

2. Criteria Action Elements within the Test Group:

a. Install generator set:

(1) Ground generator set.

(2) Connect power cable.

(3) Set phase selector switch.

(4) Perform pre-operational checks.

b. Operate Generator Set:

(1) Place circuit breaker switch to OFF.

(2) Preset controls.

(3) Start generator set.

(4) Check meters.

(5) Adjust voltage for a reading of 120VAC.

c. Stop Generator Set:

(1) Place circuit breaker to OFF.

(2) Allow set to run at idle speed for 3 minutes.

(3) Stop generator set.

(4) Place emergency stop-run switch to emergency stop.

d. Perform Operator's Maintenance:

(1) Locate five of six deficiencies.

(2) Record results on DA Form 2404.

e. Troubleshoot Generator Set 10 KW 120V AC:

(1) Locate two malfunctions.

(2) Record probable cause and corrective action taken on DA Form 2404.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install, operate, perform operator's maintenance and troubleshoot Generator Set 10 KW 120VAC.

2. Prior to the Test Period:

a. Provide each test administrator with a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is available and operational.

c. Provide each test position with the following:

(1) Sited Generator Set 10 KW 120VAC.

(2) Pre-driven ground rod.

(3) Ground lead.

(4) Power cable.

(5) TM 5-6116-275-15.

(6) Fire extinguisher.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Assign students to test positions.

(3) Keep students who have not been tested separate from those students being tested or those who have been tested.

(4) Clarify student's questions on test directions.

b. During Student Performance:

(1) Record on the score sheet the time for start and completion of each problem. The student will be allowed 15 minutes to install, operate, and stop the set.

(2) Monitor student progress to prevent injury to the student and damage to the equipment.

(3) Record "GO" or "NO-GO" on the score sheet as the student completes each item.

(4) If test position is to be used for more than one test, insure generator set has been prepared for next examination by:

(a) Disconnect power cable.

(b) Position controls to random settings.

4. After the Test Period:

a. Summarize the student's accomplishments and inform the student of grade attained and discuss areas of weakness.

b. Insure set if OFF and area policed up.

c. Compile student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will install, operate, perform operator's maintenance, and troubleshoot Generator Set 10KW 120V AC.

2. Condition: You will be assigned a position and given a sited Generator Set 10KW 120V AC, pre-driven ground rod, connected ground lead, TM 5-6115-275-15, and DA Form 2404.

3. Standard:

a. Minimum acceptable performance will be evident when you have installed and operated the Generator Set IAW TM 5-6116-275-15 within a time limit of 15 minutes.

b. Minimum acceptable performance will be evident when you have located 5 of 6 deficiencies and recorded results on DA Form 2404 IAW TM 5-6116-275-15 and TM 38-750 within a time limit of 20 minutes.

c. Minimum acceptable performance will be evident when you have located two malfunctions and recorded probable cause and corrective action taken on DA Form 2404 IAW TM 5-6116-275-15 and TM 38-750 within a time limit of 15 minutes.

4. Procedures:

a. This is a three part test:

(1) First you will:

(a) Check the ground lead.

(b) Connect the power cable.

(c) Set the phase selector switch.

(d) Perform before-operation checks.

(e) Start the generator set.

(f) Adjust the meters.

(g) Perform stopping procedures.

(2) Second, you will be given 20 minutes to:

(a) Locate five of six deficiencies.

(b) Record results on DA Form 2404.

(3) Third, you will be give7 15 minutes to:

(a) Record probable cause and corrective action taken on DA Form 2404.

b. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under the provisions of Article 134 of UCMJ.

c. If your equipment fails during the test, immediately notify the test administrator.

d. Are there any questions?

c. Direct students to test positions.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. Scoring:

a. Record a "GO" or "NO-GO" as applicable on the Test Administrator's Score Sheet for each task item. A "NO-GO" recorded in Part A or Part B constitutes a failure for that task and the student will be scheduled for additional training.

b. Award 3 points for each "GO." 0 points will be awarded for each "NO-GO." The raw score is determined by adding the points awarded for each item of the task.

2. Grading:

INSTALL AND OPERATE GENERATOR SET

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	25.0	2.5
Pass 2nd Try	24.3	2.43
Pass 2nd Try	23.6	2.36
Pass 3rd Try	23.3	2.33

PERFORM MAINTENANCE ON GENERATOR SET

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	25.0	2.5
Pass 2nd Try	24.3	2.43
Pass 2nd Try	23.6	2.36
Pass Subsequent	23.3	2.33

TROUBLESHOOT GENERATOR SET

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	25.0	2.5
Pass 2nd Try	24.3	2.43
Pass 3rd Try	23.6	2.36
Pass Subsequent	23.3	2.33

3. Remarks:

a. The section chief will be notified when a student does not achieve minimum acceptable performance.

b. Student not achieving MAP on the install task will not be allowed to go on to the operate task. Administerator will perform steps to prepare equipment for next task.

c. The failing student will receive remedial training on the task failed.

d. A student taking a retest will be retested on taks failed.

SECTION V - PRECEDURAL GUIDE

1. When assigned to a testing position the student will install and operate generator set within a time limit of 15 minutes by:

a. Connecting one end of ground lead to generator set.

b. Connecting other end of ground lead to ground rod.

c. Connecting power cable to load terminals.

d. Setting phase selector switch.

e. Checking oil level.

f. Checking air cleaner.

g. Checking batteries.

h. Checking fuel filter.

i. Checking controls and instruments.

j. Starting generator by:

(1) Placing circuit breaker in OFF position.

(2) Placing remote-local switch in local position.

(3) Placing emergency Stop-Run switch in normal position.

(4) Turn voltage adjusting knob fully counter-clockwise.

(5) Set voltage selector switch to monitor voltage.

(6) Set current selector switch to monitor current.

(7) Place govern control in govern position.

(8) Pull out choke control, after engine starts, slowly return to in position.

(9) Press start-stop switch to the START position, release after engine starts.

(10) Check oil pressure meter.

(11) Check battery charging meter.

(12) Check frequency meter.

(13) Adjust voltage adjustment knob for 120V AC.

(14) Place circuit breaker to ON after proper engine warm up (3-5 minutes).

2. The student will perform operator maintenance by:

a. Locating five of six deficiencies.

b. Recording results on DA Form 2404.

3. The student will troubleshoot generator set by:

a. Locating two malfunctions using check list in Annex B of TM 5-6116-275-15.

b. Recording probable cause and corrective action taken on DA Form 2404.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____ TIME START: _____
GROUP: _____ TIME STOP: _____
DATE: _____

PART A. Time Start _____
Time Stop _____

FOR INSTRUCTOR'S USE

	GO	NO-GO	RAW SCORE
1. Student has grounded generator set.			
2. Student has connected power cable.			
3. Student has set phase selector switch			
4. Student has made pre-operational checks			
5. Student has placed circuit breaker switch to OFF.			
6. Student has made control pre-sets.			
7. Student has started set.			
8. Student has checked meters.			
9. Student has adjusted voltage adjust knob for reading of 120V AC.			
10. Student has placed circuit breaker to ON.			

TOTAL POINTS	
COURSE POINTS	

PART B.

Time Start: _____
Time Stop: _____

1. Student will locate five malfunctions.

2. Student will record results on DA Form 2404.

GO	NO-GO	RAW SCORE
	TOTAL POINTS	
	COURSE POINTS	

PART C.

Time Start: _____
Time Stop: _____

1. Student will locate two malfunctions.

2. Student will record probable and corrective action.

GO	NO-GO	RAW SCORE
	TOTAL POINTS	
	COURSE POINTS	

ADMINISTRATOR'S SIGNATURE: _____

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL AND OPERATE

RADIO WIRE INTEGRATION SYSTEM

113-05B,C,E,F20/E02-PT

APPROVED: 16 December 1976

This is a Signal School publication.

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

SECTION I - EVALUATION CRITERIA

1. Statement of Objective:

ACTION: Student installs and operates a radio wire integration station.

CONDITION: Student is provided with Radio Set AN/VRC-46, Radio Set Control AN/GSA-7, Switchboard SB-22/PT, Telephone Set TA-312, Cable Assembly CX-7474, Handset H-33, Handset H-189, Short Wire Pair, two BA-30's, CEOI extract and operation sheet.

STANDARD: Minimum acceptable performance will be evident when the student can install the radio wire integration system within a time limit of 10 minutes.

Minimum acceptable performance will be evident when the student can operate the radio wire integration station by processing one call from a distant radio station to a telephone subscriber, and process one call from a telephone subscriber to a distant FM radio station, within a time limit of 10 minutes.

2. Criteria Action Elements within the Test Group:

a. Install radio wire integration station:

(1) Install Radio Set AN/VRC-46.

(2) Install Radio Set Control AN/GSA-7.

(3) Interconnect radio set, radio set control and wire terminating equipment.

(4) Apply power.

(5) Tune radio set.

b. Operate radio wire integration station:

(1) Process one call from a telephone subscriber to a distant radio station.

(2) Process one call from a distant radio station to a telephone subscriber.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install and operate a radio wire integration station.

2. Prior to the Test Period:

a. Assign a test administrator to each position. Provide each test administrator a copy of the test administrator's manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is available and operational.

c. Provide each test position with the following:

(1) Radio Set AN/VRC-46.

(2) Radio Set Control AN/GSA-7.

(3) Switchboard SB-22/PT.

(4) Telephone Set TA-312/PT.

(5) Cable Assembly CX-7474.

(6) Handset H-33.

(7) Handset H-189.

(8) Short Wire Pair.

(9) Two BA-30's.

(10) CEOI extract.

(11) Operation sheet.

d. Test Administrator's position:

(1) Radio Set AN/PRC-77.

(2) Telephone Set TA-312/PT.

(3) Handset H-189.

(4) BA-386 or BA-4386.

(5) Two BA-30's.

(6) Long wire pair.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Assign students to test positions.

(3) Keep students who have not been tested separate from those students being tested or those who have been tested.

(4) Clarify student's questions on test directions.

b. During student performance:

(1) Record on the score sheet the time for start and completion of each problem. The student will be allowed 10 minutes to interconnect the components of the RWI station and 10 minutes to process the two calls.

(2) Monitor student progress to prevent injury to the student and damage to the equipment.

(3) If the student does not correctly interconnect the RWI station, tune radio, and apply power at the end of 10 minutes, the test administrator will interconnect the RWI station components. The AN/GSA-7 will be connected to the Switchboard SB-22. The RWI operator's telephone will be connected to the AN/GSA-7. The AN/GSA-7 will be connected to the AN/VRC-46. The telephone subscriber's telephone will be connected to the Switchboard SB-22. The H-33 will be connected to the AN/GSA-7.

(4) Record "Go" or "No-Go" on the score sheet as the student completes each item.

4. After the Test Period:

a. Summarize student accomplishments and inform the student of grade attained and discuss areas of weakness.

b. Insure all equipment is turned off and positions are policed and secured.

c. Compile student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will install and operate a radio wire integration station.

2. Condition: You will be assigned a position and given:

(1) Radio Set AN/VRC-46.

(2) Radio Set Control AN/GSA-7.

(3) Switchboard SB-22/PT.

(4) Telephone Set TA-312/PT.

(5) Cable Assembly CX-7474.

(6) Handset H-33.

(7) Handset H-189.

(8) Short wire pair.

(9) Two BA-30's.

(10) CEOI extract.

(11) Operation sheet.

3. Standard: Minimum acceptable performance will be evident when you can install a radio wire integration system within a time limit of 10 minutes.

Minimum acceptable performance will be evident when you can operate a radio wire integration station by processing one call from a telephone subscriber to a distant radio station and one call from a distant radio station to a telephone subscriber within a time limit of 10 minutes.

4. Procedures:

a. This test will be given in two parts. First, you will be given 10 minutes to interconnect RWI components, tune radio and apply power; then you will be given 10 minutes to process the two RWI calls. You must satisfactorily install the RWI equipment and process the two calls satisfactorily to pass each test.

b. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under the provisions of Article 134 of UCMJ.

c. The test administrator will act as the telephone subscriber and FM radio station operator during the test.

d. Use the CEOI extract at your test position to determine the call signs and telephone names.

e. If your equipment fails during the test, immediately notify the test administrator.

f. Are there any questions?

g. Direct students to test positions.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. Scoring:

a. Student must be able to install a radio wire integration station within 10 minutes.

b. Student must be able to operate a radio wire integration station by processing one call from a telephone subscriber to a distant radio station and one call from a distant radio station to a telephone subscriber within 10 minutes.

2. Grading:

a. Install Radio Wire Integration System:

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

b. Process call from telephone-to-radio and process call from radio-to-telephone.

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

3. Remarks:

a. The section chief will be notified when a student does not achieve minimum acceptable performance.

b. A student taking a retest will be retested on task failed.

SECTION V - PROCEDURAL GUIDE

1. When assigned to a testing position the student will connect the RWI components within a time limit of 10 minutes by:

a. Connecting the AN/GSA-7 to the radio set.

b. Connecting the Telephone Subscriber TA-312 line to the SB-22.

c. Connecting the RWI Operator's TA-312 line to the AN/GSA-7.

d. Connecting the H-33 to the AN/GSA-7.

e. Connecting the AN/GSA-7 to the SB-22.

f. Tuning the radio set to the RWI frequency.

g. Applying power to the AN/GSA-7.

2. Within a time limit of 10 minutes the student will:

a. Process one call from a telephone subscriber to a FM radio station.

b. Process one call from an FM radio station to a telephone subscriber.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____

GROUP: _____

DATE: _____

INSTRUCTIONS: Administrator will check student's Progress after Part A and Part B. Check "GO" or "NO-GO" as applicable. A "NO-GO" in Part A or Part B will prevent the student from receiving the minimum acceptable performance on this examination.

FOR INSTRUCTOR'S USE ONLY

PART A.

TIME START: _____

TIME STOP: _____

	GO	NO-GO	RAW SCORE
1. Student has connected AN/GSA-7 to radio set.			
2. Student has connected telephone subscriber line to SB-22/PT.			
3. Student has connected the RWI operators TA-312 to the AN/GSA-7.			
4. Student has connected the AN/GSA-7 to the SB-22/PT.			
5. Student has tuned the radio set to RWI frequency listed in the CEOI extract and has determined the proper RWI call signs and telephone names.			
6. Student has applied proper power to the AN/GSA-7.			
		TOTAL POINTS	
		COURSE POINTS	

PART B.

TIME START: _____

TIME STOP: _____

	GO	NO-GO	RAW SCORE
1. Student processed one call from a telephone subscriber to an FM radio station.			
2. Student processed one call from an FM radio station to a telephone subscriber.			
TOTAL POINTS			
COURSE POINTS			
TOTAL COURSE POINTS			

ADMINISTRATOR'S SIGNATURE: _____

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL SPEECH SECURITY EQUIPMENT

TSEC/KY-8

113-05B,C,E,F20/H04-PT

APPROVED: 16 December 1976

This is a Signal School publication.

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

SECTION I - EVALUATION CRITERIA

1. Statement of Objectives:

ACTION: Student installs Speech Security Equipment TSEC/KY-8.

CONDITION: Student is placed at a test position and provided with a preinstalled radio set, Speech Security Equipment TSEC/KY-8 w/preinstalled mount, cables, keying material, and appropriate call signs and frequency.

STANDARD: Minimum acceptable performance will be evident when the student can connect the secure equipment to the radio set, key the secure equipment, energize the secure equipment and make a secure communication check IAW ACP-125, TM 11-5810-224-10, and KAO 153/TSEC within a time limit of 19 minutes.

2. Criteria Action Elements within the Test Group:

a. Connect secure equipment to radio set.

b. Key secure equipment.

c. Energize secure equipment.

d. Make secure communication check.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install Speech Security Equipment TSEC/KY-8.

2. Prior to the Test Period:

a. Assign a test administrator to a test position. Provide each test administrator a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is operational.

c. Provide each test position with the following:

(1) Preinstalled operational radio set.

(2) TSEC/KY-8 w/preinstalled mount.

(3) Power and interconnecting cables.

(4) Keying material.

(5) Call signs.

(6) Frequency.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Monitor student progress and record "Go" or "No-Go" as the student completes each portion of the test.

4. After the Test Period:

a. Compile student scores and grades according to "Directions for Scoring and Grading" section of this manual.

b. Summarize student's accomplishments and inform the student of grade attained and discuss areas of weakness.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will install Speech Security Equipment TSEC/KY-8.

2. Condition: You will be assigned a test position and given a preinstalled operational Radio Set TSEC/KY-8 w/preinstalled mount, power and interconnecting cables, keying materials, and appropriate call signs and frequency.

3. Standard: Minimum acceptable performance will be evident when you can connect the KY-8 to the radio set, key the KY-8, energize the KY-8, and make a secure communication check IAW ACP-125, TM 11-5820-224-10 and KAO-153/TSEC within a time limit of 19 minutes.

4. Procedure:

a. You must perform all steps outlined in the standard to successfully pass this test.

b. The test administrator will act as the distant radio station for making the secure communication check.

c. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under provisions of Article 134 of UCMJ.

d. Are there any questions?

e. You may begin the test.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. SCORING:

a. Student must correctly perform each item in the task to achieve minimum acceptable performance for test.

b. Record a "Go" or "No-Go" as applicable on the Test Administrator's Score Sheet as the student completes each requirement of the test.

2. GRADING:

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	75.0	7.5
Pass 2nd Try	73.0	7.3
Pass 3rd Try	71.0	7.1
Pass Subsequent	70.0	7.0

3. Remarks:

a. The section chief will be notified when a student does not achieve minimum acceptable performance.

b. The failing student will receive remedial training on task failed.

SECTION V - PROCEDURAL GUIDE

1. When assigned to a test position the student will:

   a. Connect the power cable.

   b. Connect KY-8 to radio set.

   c. Key the KY-3.

   d. Energize the KY-8.

   e. Make secure communication check.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____ TIME START: _____
GROUP: _____ TIME STOP: _____
DATE: _____

INSTRUCTIONS: Administrator will check "GO" or "NO-GO" as applicable.

	GO	NO-GO	RAW SCORE
1. Student has connected power cable.			
2. Student has connected KY-8 to radio set.			
3. Student has keyed the KY-8.			
4. Student has energized KY-8.			
5. Student has made secure communication check.			
		TOTAL POINTS	
		COURSE POINTS	

ADMINISTRATOR'S SIGNATURE: _____

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL THE GROUND PLANE ANTENNA

AND

ANTENNA GROUP AN/GRA-50

113-05B,C,E,F20/J07-PT

APPROVED: 16 December 1976

This is a Signal School publication.

SECTION 1 - EVALUATION CRITERIA

1. Statement of Objective.

ACTION: Student installs ground plane antenna and prepares Antenna Group AN/GRA-50 for installation.

CONDITION: Student is provided with Antenna Equipment RC-292, TM 11-5820-348-15, an assigned frequency, and Antenna Group AN/GRA-50.

STANDARD: A. Minimum acceptable performance will be evident when the student has described suitable siting and has installed Antenna Equipment RC-292 IAW TM 11-5820-348-15 within a time limit of 30 minutes.

B. Minimum acceptable performance will be evident when the student has described suitable siting and orienting and has assembled Antenna Group AN/GRA-50 IAW TM 11-5820-467-15 within a time limit of 15 minutes.

2. Criteria Action Elements within the Test Group:

a. Install Antenna Equipment RC-292:

(1) Describe suitable siting.

(2) Position mast and antenna elements for assigned frequency.

(3) Connect guy ropes.

b. Install Antenna Group AN/GRA-50:

(1) Describe suitable siting and orienting.

(2) Determine correct length of wire for an assigned frequency.

(3) Connect antenna wire to each end of insulator.

(4) Connect RF cable assembly to insulator.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install Ground Plane Antenna and prepare Antenna Group AN/GRA-50 for installation.

2. Prior to the Test Period:

a. Provide each test administrator with a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is available and serviceable.

c. Provide each test position with the following:

(1) Antenna Equipment RC-292.

(2) TM 11-5820-348-15.

(3) List of Frequencies.

(4) Antenna Group AN/GRA-50.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Assign students to test positions.

(3) Keep students who have not been tested separate from students being tested or those who have been tested.

(4) Clarify student's questions on test directions.

b. During student performance:

(1) Record on the score sheet the time for start and completion of each problem. The student will be allowed 30 minutes to install ground plane antenna and 15 minutes to prepare Antenna Group AN/GRA-50 for installation.

(2) Monitor student's progress to prevent injury to the student and damage to the equipment.

(3) Record "GO" or "NO-GO" on the score sheet as the student completes each item.

4. After the Test Period:

a. Summarize the student's accomplishments and inform the student of grade attained and discuss areas of weakness.

b. Insure equipment is stored and area policed up.

c. Complete student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will install ground plane antenna and prepare Antenna Group AN/GRA-50 for installation.

2. Condition: You will be assigned a position and given Antenna Equipment RC-292, TM 11-5820-348-15, an assigned frequency, and Antenna Group AN/GRA-50.

3. Standard:

a. Minimum acceptable performance will be evident when you have described suitable siting and have installed Antenna Equipment RC-292 IAW TM 11-5820-348-15 within a time limit of 30 minutes.

b. Minimum acceptable performance will be evident when you have described suitable siting and orienting, and have assembled Antenna Group AN/GRA-50 IAW TM-5820-467-15 within a time limit of 15 minutes.

4. Procedures:

a. This is a two part test:

(1) Install ground plane antenna:

(a) Describe suitable siting to test administrator.

(b) Position baseplate and guy states.

(c) Assemble mast and antenna elements for assigned frequency.

(d) Connect guy ropes.

(2) Prepare Antenna Group AN/GRA-50 for installation:

(a) Describe suitable siting and orienting to test administrator.

(b) Determine correct length of antenna wire from assigned frequency.

(c) Connect antenna wire to each end of insulator.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____

GROUP: _____

DATE: _____

INSTRUCTIONS: Administrator will check "GO" or "NO-GO" as applicable for each test.

PART A:

TIME START: _____

TIME STOP: _____

FOR INSTRUCTORS'S USE ONLY

	GO	NO-GO	RAW SCORE
1. Student has described suitable siting.			
2. Student has positioned base plate and guy stakes.			
3. Student has assembled mast and antenna elements.			
4. Student has connected guy ropes.			
TOTAL POINTS			
COURSE POINTS			

PART B:

TIME START: _____

TIME STOP: _____

FOR INSTRUCTORS USE ONLY

	GO	NO-GO	RAW SCORE
1. Student has described suitable siting and orienting.			
2. Student has determined length of antenna wire.			
3. Student has connected wire to insulator.			
4. Student has connected RF cable assembly to insulator.			
TOTAL POINTS			
COURSE POINTS			

ADMINISTRATOR'S SIGNATURE: _____

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL THE DOUBLET ANTENNA

113-05C,F20/J08-PT

APPROVED: 16 December 1976

This is a Signal School publication.

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

SECTION I - EVALUATION CRITERIA

1. Objective of Test:

ACTION: Prepare the doublet antenna for installation.

CONDITION: Student is provided with one Mast Base AB-155/U, TL-13A, Wire W-1, cobra head, and assigned frequency.

STANDARD: Minimum acceptable performance will be evident when the student prepares the doublet antenna for installation, IAW TM 11-5815-334-12 within a time limit of 50 minutes.

2. Criteria Action Elements within the Test Group:

a. Construct antenna:

(1) Compute length of antenna from assigned frequency.

(2) Connect antenna wire to one side of cobra head.

b. Assemble Mast Base AB-155/U.

(1) Describe suitable siting and orienting.

(2) Assemble mast sections.

(3) Position guy stakes 25' + or - 2' from mast base.

(4) Connect guy ropes.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to prepare the doublet antenna for installation.

2. Prior to the Test Period:

a. Provide each test administrator with a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is available and serviceable.

c. Provide each test position with the following:

(1) Mast Base AB-155/U.

(2) TL 13A.

(3) Wire W-1.

(4) Coaxial connector.

(5) Assigned frequency.

(6) Paper and pencil.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Assign students to test positions.

(3) Keep students who have been tested separate from those being tested or those to be tested.

(4) Clarify student's questions on test directions.

b. During student performance:

(1) Record on the score sheet the time for start and completion of each problem. The student will be allowed 15 minutes to determine antenna length and connect wire to cobra head and 35 minutes to assemble Mast Base AB-155/U.

(2) Monitor student's progress to prevent injury to the student and damage to the equipment.

(3) Record "GO" or "NO-GO" on the score sheet as the student completes each item.

4. After the Test Period:

a. Summarize the student's accomplishments and inform the student of grade attained and discuss areas of weakness.

b. Insure equipment is stored and area policed up.

c. Complete student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will prepare the doublet antenna for installation.

2. Condition: You will be assigned a position and given one Mast Base AB-55/U, TL-13A, Wire W-1, cobra head, and assigned frequency.

3. Standard: Minimum acceptable performance will be evident when you prepare the doublet antenna for installation IAW TM 11-5815-334-12 within a time limit of 50 minutes.

4. Procedure:

a. This is a two part test. First you will compute the length of the antenna from an assigned frequency and connect antenna wire to one side of cobra head within a time limit of 15 minutes. Then you will describe suitable siting and orienting, assemble mast sections, position guy stakes 25' + or -2' from mast base, and connect guy ropes within a time limit of 35 minutes.

b. You are warned against giving or receiving assistance. Disciplinary action will be taken under provisions of Article 134 of UCMJ.

c. If your equipment fails during the test, immediately notify the test administrator.

d. Are there any questions?

e. Direct students to test positions.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. Scoring:

a. Record a "GO" or "NO-GO" on the Test Administrator's Scoring Sheet for each task.

b. Award points for each correct item on "GO." Zero points will be awarded for each "NO-GO." The raw score is determined by adding the total points awarded for the test.

2. Grading:

Construct Antenna

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

Assemble Mast Base AB-155/U

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

3. Remarks:

a. The section chief will be notified when a student does not achieve MAP.

b. The failing student will receive remedial training on task failed.

c. A student taking a retest will be tested on task failed.

SECTION V - PROCEDURAL GUIDE

1. When assigned to a testing position, the student will construct antenna.:

   a. Compute antenna length from assigned frequency.

   b. Connect antenna wire to one side of cobra head.

2. Assemble Mast Base AB-155/U:

   a. Describe suitable siting and orienting.

   b. Assemble mast sections.

   c. Position guy stakes 25' + or -2' from mast base.

   d. Connect guy ropes.

TEST ADMINISTRATOR'S SCORE SHEET

NAME: _____

GROUP: _____

DATE: _____

INSTRUCTIONS: Administrator will check "GO" or "NO-GO" as applicable for each task.

PART A.

TIME START: _____

TIME STOP: _____

FOR INSTRUCTOR'S USE ONLY

	GO	NO-GO	RAW SCORE
1. Student has computed length of antenna			
2. Student has connected antenna wire to cobra head.			
	TOTAL POINTS		
	COURSE POINTS		

PART B.

TIME START: _____

TIME STOP: _____

	GO	NO-GO	RAW SCORE
1. Student has described suitable siting and orienting.			
2. Student has assembled mast sections.			
3. Student has positioned guy stakes.			
4. Student has connected guy ropes.			
TOTAL POINTS			
COURSE POINTS			

ADMINISTRATOR'S SIGNATURE: _____

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

TELETYPEWRITER COMMUNICATIONS PROCEDURES

113-05C,F20/F04-PT

APPROVED: 16 December 1976

This is a Signal School publication.

SECTION I - EVALUATION CRITERIA

1. Statement of Objective:

ACTION: Student transmits and receives a radio teletypewriter message.

CONDITION: Student is placed at an operational teletypewriter set and provided with appropriate call signs, list of commonly used operating signals, and nine communications procedure problems.

STANDARD: Minimum acceptable performance will be evident when the student has responded to eight of nine communications problems IAW ACP 126(B) within a time limit of 40 minutes.

2. Criteria Action Elements within the Test Group:

a. Open and close a radio teletypewriter net.

b. Request repetitions, corrections and confirmations.

c. Respond to requests for repetition, corrections and confirmations.

d. Prepare message in teletypewriter 16-line format.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to transmit and receive a radio teletypewriter message.

2. Prior to the Test Period:

a. Provide each test administrator with a copy of the Test Administrator's Manual. Insure administrator is familiar with testing and scoring procedures.

b. Insure equipment is operational.

c. Provide each test position with the following:

(1) Teletypewriter set.

(2) Appropriate call signs.

(3) Commonly used operating signals.

3. During the Test Period:

a. Prepare student for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

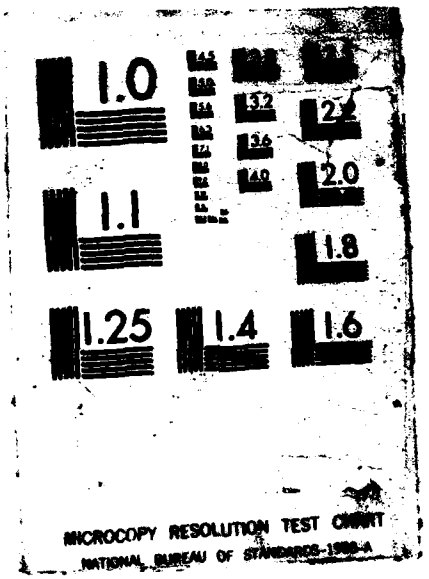
(2) Monitor student progress and record "Go" or "No-Go" as the student completes each portion of the test.

4. After the Test Period:

a. Compile student's scores and grades according to "Directions for Scoring and Grading" section of this manual.

b. Summarize the student's accomplishments and inform the student of grade attained and discuss areas of weakness.

AD-A186 326 ARMY TRAINING STUDY: TRAINING EFFECTIVENESS ANALYSIS 4/6
(TEA) SUMMARY VOLUME (U) ARMY TRAINING AND DOCTRINE
COMMAND FORT MONROE VA F J BROWN 08 AUG 78
UNCLASSIFIED SBI-AD-F000 110 F/G 15/1 NL


1.0
1.1
1.25
1.4
1.6
1.8
2.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will transmit and receive a radio teletypewriter message.

2. Condition: You will be assigned a test position and given a teletypewriter, appropriate call signs, list of commonly used operating signals, and nine communications procedure problems.

3. Standard: Minimum acceptable performance will be evident when you have responded to eight of nine communications procedure problems IAW ACP-126(B) within a time limit of 40 minutes.

4. Procedure:

a. You will be given nine communications procedure problems. You must respond to eight of these problems IAW ACP-126(B):

(1) You will make three randomly selected transmissions to open and close a radio teletypewriter net.

(2) As a receiving operator, you will respond to messages sent to you by making transmissions necessary to obtain missing, incorrect, or garbled portions, on obtaining verifications, acknowledgements or confirmations.

(3) As a transmitting operator, you will respond to requests for repetition, interrogation, verification acknowledgement or confirmation.

(4) You will prepare a multiple address message in 16-line radio teletypewriter procedure format.

b. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under provision of Article 134 of UCMJ.

c. Are there any questions?

d. You may begin the test.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. Scoring:

a. Student must correctly perform eight of nine items of the test to achieve minimum acceptable performance for the test.

b. Record a "Go" or "No-Go" as applicable on the Test Administrator's Score Sheet for each item.

2. Grading:

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	75.0	7.50
Pass 2nd Try	73.0	7.30
Pass 3rd Try	71.0	7.10
Pass Subsequent	70.0	7.00

3. Remarks:

a. The section chief will be notified when student does not achieve MAP.

b. The failing student will receive remedial training and be retested.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____ TIME START: _____

GROUP: _____ TIME STOP: _____

DATE: _____

INSTRUCTIONS: Administrator will check "GO" or "NO-GO" as applicable.

FOR INSTRUCTOR'S USE ONLY

	GO	NO-GO	RAW SCORE
Student has responded to eight of nine communications procedure problems.			
	TOTAL POINTS		
	COURSE POINTS		

TOTAL COURSE POINTS: _____

ADMINISTRATOR'S SIGNATURE: _____

ANSWER SHEET
TELETYPEWRITER PROCEDURES

VERSION I

1. A2D DE A2DØ1 ZRC2 INT ZBK K

2. A2DØ1 DE F6C ZBK1 INT ZBK K

3. A2D DE A2DØ1 ZKJ1 K

4. F6C DE L2N IMI INFO TO BT K

5. F6C DE L2N IMI TO TO GR2Ø 12 TO 16 K

6. L2N DE A2DØ1 J 16151Z OCT 75 K

7. F6C DE A2DØ1
INFO TO BT
INFO CDR 2D BN 21ST INF
BT K

8. F6C DE A2DØ1 WA FOUR IN C 12/1327Z K

9. 2CR 8LF
5SP 2CR 1LF

F6C L2N
DE A2DØ1 NR3 NR5
R 25Ø75ØZ OCT 75
FM CDR 2D BDE INF DIV KOREA
TO CDR 21ST INF DIV KOREA
INFO CDR 1ST BDE 21ST INF DIV KOREA
BT
UNCLAS
SUBJ: SERVICE MESSAGE
DRILL. SERVICE MESSAGE IS A MESSAGE
BETWEEN COMMCEN PERTAINING TO ANY PHASE
OF TRAFFIC HANDLING, COMMUNICATIONS
FACILITIES, OR CIRCUIT CONDITIONS.
DRILL
BT
25/Ø8ØØZ
K

NNNN

ANSWER SHEET

TELETYPEWRITER PROCEDURES

VERSION II

1. F6C DE A2DØ1 ZBK1 ZUJ AR

2. L2N DE A2DØ1 ZBK2 ZRC2 K

3. A2D DE A2DØ1 ZKJ1 K

4. F6C DE L2N INT GR9 K

5. L2N DE A2DØ1 IMI AB BT K

6. L2N DE A2DØ1 INT ZEV 15235ØZ OCT 75 K

7. F6C DE A2DØ1 C WA DELTA MINOR K

8. F6C DE A2DØ1
   P TO FM
   P 161835Z OCT 75
   FM K

9. F6C L2N
   DE A2DØ1 NR7 NR8
   P 25Ø74ØZ SEP 75
   FM CDR 2D BDE 21ST INF DIV KOREA
   TO CDR 121ST ENG BN KOREA
   INFO CDR 1ST BDE 21ST INF DIV KOREA
   BT
   UNCLAS
   SUBJ: MULTIPLE ADDRESS MESSAGE
   DRILL. MULTIPLE ADDRESS MESSAGE: A
   MESSAGE DESTINED TO TWO OR MORE
   ADDRESSEES EACH IS INFORMED OF ALL
   ADDRESSEES WHO RECEIVE THE MESSAGE.
   DRILL
   BT
   25/Ø8ØØZ
   K

NNNN

ANSWER SHEET

TELETYPEWRITER PROCEDURES

VERSION III

1. A2D DE A2DØ1 ZRC2 INT ZBK K

2. L2N DE A2DØ1 ZBK2 ZRC2 K

3. A2D DE A2DØ1 ZKJ1 K

4. F6C DE L2N IMI AA 1219ØØZ K

5. F6C DE L2N IMI TO TO HILL K

6. F6C DE A2DØ1
   AA BT
   UNCLAS
   PLAN RED DOG FOUR IN OPERATION
   IMMEDIATELY
   BT
   12/1327Z
   K

   NNNN

7. F6C DE A2DØ1 C K

8. PAGE FIVE L2N NR3 UNCLAS

9. F6C L2N
   DE A2DØ1 NR2 NR3
   P Ø6Ø9ØØZ SEP 75
   FM CDR 2D BDE 21ST INF DIV KOREA
   TO CDR 1ST ARMD CAV SQDN 21ST CAV KOREA
   INFO CDR 1ST BDE 21ST INF DIV KOREA
   BT
   UNCLAS
   SUBJ: RANGE OF GROUND WAVE
   DRILL. IN THE HIGH FREQUENCY BAND 3 TO 30 MHz,
   THE RANGE OF THE GROUND WAVE DECREASES WITH
   AN INCREASE IN FREQUENCY AND THE SKY WAVES
   ARE GREATLY INFLUENCED BY IONOSPHERIC CON-
   SIDERATIONS.
   DRILL
   BT
   CFN 3 3D
   Ø6/Ø91ØZ
   K

   NNNN

UNITED STATES ARMY SIGNAL SCHOOL FORT GORDON, GEORGIA

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

INSTALL AND OPERATE

RADIO TELETYPEWRITER SET AN/GRC-142

113-05C,F20/I03-PT

APPROVED: 16 December 1977

This is a Signal School publication.

PERFORMANCE TEST ADMINISTRATOR'S MANUAL

SECTION I - EVALUATION CRITERIA

1. Statement of Objective:

ACTION: Student installs and operates Radio Teletypewriter Set AN/GRC-142.

CONDITION: Student is provided with sited Radio Teletypewriter Set AN/GRC-142, pre-driven ground rod, ground lead, whip antenna, 120V AC power source w/cable, TSEC/KW-7, training key list, and operating frequency.

STANDARD: Minimum acceptable performance for installing the Radio Teletypewriter Set is evident when the student has completed the five installation steps IAW TM 11-5815-334-12 within 20 minutes.

Minimum acceptable performance for operating the Radio Teletypewriter Set is evident when the student has performed starting procedures, tuning procedures, and has adjusted for 85 Hz TTY operation IAW TM 11-5815-334-12 within 15 minutes.

2. Criteria Action Elements within the Test Group:

a. Install AN/GRC-142:

(1) Erect whip antenna.

(2) Ground shelter.

(3) Connect power cable.

(4) Install TSEC/KW-7.

(5) Key TSEC/KW-7.

b. Operate AN/GRC-142.

(1) Perform starting procedures.

(2) Perform tuning procedures.

(3) Adjust for 85 Hz TTY.

SECTION II - DIRECTIONS TO ADMINISTRATOR

1. Objective of Test. This is a test of the student's ability to install and operate Radio Teletypewriter Set AN/GRC-142.

2. Prior to the Test Period:

a. Assign a test administrator to each position. Provide each test administrator with a copy of the Test Administrator's Manual and insure that he is familiar with testing and scoring procedures.

b. Insure equipment to be used is available and operational.

c. Provide each test position with the following:

(1) Sited Radio Teletypewriter Set AN/GRC-142.

(2) Pre-driven ground rod.

(3) Ground lead.

(4) Whip antenna.

(5) 120V AC power source w/cable.

(6) TSEC/KW-7.

(7) Training key list.

(8) Operating frequency.

3. During the Test Period:

a. Prepare students for testing:

(1) Read verbatim the "Directions to Student" section of this manual to all students to be tested.

(2) Assign students to test positions.

(3) Keep students who have not been tested separate from those students being tested or those who have been tested.

(4) Clarify student's questions on test directions.

b. During student performance:

(1) Record on the score sheet the time for start and completion of each problem. The student will be allowed 20 minutes to install the set, 15 minutes to tune the set.

(2) Monitor student's progress to prevent injury to the student and damage to the equipment.

(3) Record "Go" or No-Go" on the score sheet as the student completes each item.

4. After the Test Period:

a. Summarize the student's accomplishments and inform the student of grade attained and discuss areas of weakness.

b. Insure set is OFF and area policed up.

c. Complete student's scores and grades according to the "Directions for Scoring and Grading" section of this manual.

SECTION III - DIRECTIONS TO STUDENT (Read Verbatim)

1. Action: You will install and operate Radio Teletypewriter Set AN/GRC-142.

2. Condition: You will be assigned a position and given a Sited Radio Teletypewriter Set AN/GRC-142, pre-driven ground rod, ground lead, whip antenna, 120V AC power source, power cable, TSEC/KW-7, trainer key list and operating frequency.

3. Standard: (A) Minimum acceptable performance for installing the Radio Teletypewriter Set is evident when you can complete the five installation steps IAW TM 11-5815-334-12 within 20 minutes.

(B) Minimum acceptable performance for operating the Radio Teletypewriter Set is evident when you can perform starting procedures, tuning procedures, and adjust for 85 Hz TTY operation IAW TM 11-5815-334-12 within 15 minutes.

4. Procedures:

a. This is a two part test. First, you will be given 20 minutes to install whip antenna, ground shelter, connect the power cable, and install and key the TSEC/KW-7; then, you will be given 15 minutes to perform starting procedures, tune the radio set, and adjust for 85 Hz teletype.

b. You are warned against giving or receiving unauthorized assistance. Disciplinary action will be taken under the provisions of Article 134 of UCMJ.

c. If your equipment fails during the test, immediately notify the test administrator.

d. Are there any questions?

e. Direct students to test positions.

SECTION IV - DIRECTIONS FOR SCORING AND GRADING

1. Scoring:

a. Record a "go" or "No-Go" as applicable on the Test Administrator's Scoring Sheet for each task.

b. Award points for each correct item or "Go". Zero points will be awarded for each "No-Go." The raw score is determined by adding up the total points awarded for the test.

2. Grading:

Install AN/GRC-142

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

Operate AN/GRC-142

TEST ADMINISTRATIONS	GRADE	COURSE POINTS
Pass 1st Try	37.5	3.75
Pass 2nd Try	36.5	3.65
Pass 3rd Try	35.5	3.55
Pass Subsequent	35.0	3.50

3. Remarks:

a. The section chief will be notified when a student does not achieve minimum acceptable performance.

b. Student not achieving MAP on the install task will be allowed to go on to the operate task. Administrator will perform steps to prepare equipment for next test.

c. The failing student will receive remedial training on task failed.

d. A student taking a retest will be retested on task failed.

SECTION V - PROCEDURAL GUIDE

1. When assigned to a testing position, the student will install Radio Teletypewriter Set AN/GRC-142 within a time limit of 20 minutes by:

a. Erecting whip antenna.

b. Grounding shelter.

c. Connecting power cable.

d. Installing TSEC/KW-7.

e. Keying TSEC/KW-7.

2. Tune Radio Teletypewriter Set AN/GRC-142 within a time limit of 15 minutes by:

a. Performing starting procedures.

b. Performing tuning procedures.

c. Adjusting controls for 85 Hz TTY operation.

TEST ADMINISTRATOR'S SCORING SHEET

NAME: _____
GROUP: _____
DATE: _____

INSTRUCTIONS: Administrator will check student's progress after Part A and Part B. Check "Go" or "No-Go" as applicable.

PART A.

TIME START: _____
TIME STOP: _____

FOR INSTRUCTOR'S USE ONLY

	GO	NO-GO	RAW SCORE
1. Student has erected the whip antenna.			
2. Student has grounded shelter.			
3. Student has connected power cable.			
4. Student has installed TSEC/KW-7.			
5. Student has keyed TSEC/KW-7.			
		TOTAL POINTS	
		COURSE POINTS	

PART B.

TIME START: _____
TIME STOP: _____

	GO	NO-GO	RAW SCORE
1. Student has performed starting procedures.			
2. Student has performed tuning procedures.			
3. Student has adjusted for 85 Hz TTY operation.			
	TOTAL POINTS		
	COURSE POINTS		

TOTAL COURSE POINTS: _____

ADMINISTRATOR'S SIGNATURE: _____

TAB B

Individual Test Items
Standards, Findings And Conclusions
From 1977 Study

INDIVIDUAL TEST ITEMS, STANDARDS, FINDINGS AND CONCLUSIONS

1. Standards and Findings:

a. Typing - Standards were met when the student typed 35 NWPM in lower case only. Three 5-minute tests were given on the same page of the typing booklet. A 1 minute rest was given between tests.

(1) The 05C students were significantly better than the 05F students at the .01 level. (There is less than 1 chance in 100 that the actual difference between the two means might have arisen due to chance.)

(2) While both groups (05C and 05F) were tested at 35 NWPM, the 05C students were trained at 35 NWPM and the 05F students were trained at 25 NWPM.

(3) On the first attempt 56.7% of the 05C and 6.3% of the 05F students could type 35 NWPM or better.

(4) All students with prior typing training or experience were apparently not identified.

(a) One 05C student had no prior typing and after 8 hours of instruction typed 52 NWPM.

(b) Another 05C student had no prior typing and after 18 hours of instruction typed 47 NWPM.

(c) Another example is an 05C student had no prior typing and after 17 hours of instruction typed 39 NWPM.

b. IMC Sending - Standards were met when the student could send 30 random 5-letter groups within 3 minutes and could copy back 20 consecutive groups without error. The recording of the sending was played back and the student was required to copy. A second playback was given to allow for corrections to the copy.

(1) The 05C students were significantly better than the 05B students at .01 level.

(2) On the first attempt 8% of the 05B and 16.7% of the 05C students could send 30 words groups and copy 20 consecutive groups or better without error each within a 3 minute period.

c. IMC Receiving - Standards were met when the student could copy 26 consecutive groups without error from a possible 42 groups. Each student was given three 5-minute messages containing 42 groups each.

(1) The 05C students were significantly better than the 05B at the .01 level.

(2) On the first attempt 28% of the 05B and 40% of the 05C students could receive and copy 26 consecutive groups or better without error.

d. Station Log - Standards were met when the student could maintain the log by making entries on the log and number sheet with no more than one entry error. The log is made up of five elements which are: enter the headings on both log and number sheet, enter operator on duty, enter a received message on the log, sign off duty, and enter a received message on the number sheet.

(1) The 05C students were significantly better than the 05B students at the .25 level.

(2) The 05C students were significantly better than the 05F students at the .01 level.

(3) On the first attempt none of the 05B and 05F students passed and 3.3% of the 05C students passed all five elements.

e. Radio Teletypewriter Procedure (RATT) - Standards were met when the student could employ RATT Procedures to perform five situation problems without error within 25 minutes. The five situations were: establish and open a net with three stations, preliminary call and response, request for repetition and response, prepare a multiple address message for transmission, and close a net with three stations.

(1) The 05C students were significantly better than the 05F students at the .01 level.

(2) On the first attempt none of the 05C and 05F students passed all five elements.

f. Radiotelegraph Procedure (RATG) - Standards were met when the student could employ RATG procedures to perform five situation problems without error within 25 minutes. The five situations were: open a net with three stations using authentication, preliminary call and response; interrogation transmission, and response, prepare a CODRESS message for transmission, and close a net with three stations using authentication.

(1) The 05C students were significantly better than the 05B students at the .25 level.

(2) On the first attempt 8% of the 05B students and 3.3% of the 05C students passed all five elements.

g. Radiotelephone Procedure (RATEL) - Standards were met when the student could employ RATEL procedures to perform five situation problems

within 30 minutes. The five situations were: open a net with three stations using authentication, preliminary call and response, request for repetition and response, prepare a plain address message for transmission, and close a net using authentication.

(1) The 05C students were significantly better than the 05B students at the .1 level.

(2) The 05C students were significantly better than the 05F students at the .01 level.

(3) On the first attempt 22% of the 05B, 30% of the 05C and none of the 05F students passed all five elements.

h. Electronic Counter-Countermeasures (ECCM) - Standards were met when the student could implement ECCM by performing the following four actions within 20 minutes: respond to imitative deception, differentiate between external-internal interference, state 7 of 8 antijamming measures listed on the test situation and using the CEOI.

(1) The 05C students were significantly better than the 05B students at the .05 level.

(2) The 05C students were significantly better than the 05F students at the .01 level.

(3) On the first attempt 16% of the 05B, 20% of the 05C and 3.5% of the 05F students passed all four elements.

2. Conclusions:

A. Although it appears the 05C students were significantly better than the 05F students in all five common test areas, this conclusion is invalid on the typing test because:

(1) While the staffed and approved evaluation plan assumed training to the same standards, 05C students were trained to type to the test standard, 35 NWPM, but 05F students were trained to type to a 25 NWPM standard.

(2) Prior typists in the 05C Course were apparently not identified.

b. The otherwise logical conclusions that the 05C self-paced program produces a better student than the 05F group-paced program in all cases except typing and better than the 05B group-paced program may also be questionable because passing the end-of-course test was not a requirement for the control groups to graduate. This could possibly have an impact on the results of the control groups who may have had no incentive to pass the test.

TASK AVERAGES (MEANS AND STANDARD DEVIATIONS)
AND SIGNIFICANCE OF THE DIFFERENCES IN THE MEANS IN 05 COURSES
(17 January - 11 February 1977)

Task	N	05B20 MEAN	SD	N	05C20 MEAN	SD	N	05F20 MEAN	SD	****t-test	COURSES COMPARED
Typing				25	*95.1	26.6	112	*58.7	19.6	.01	05C and 05F
IMC Sending	48	*24.1	18.3	25	*38.8	17.0				.01	05B and 05C
IMC Receiving	48	*52.3	26.7	25	*74.1	28.8				.01	05B and 05C
Station Log	50	** 2.3	1.1	30	** 2.6	1.3	144	** .3	.6	.01 .25	05C and 05F 05B and 05C
Radio Teletypewriter Procedure				30	** 1.7	1.1	144	** .5	.8	.01	05C and 05F
Radiotelegraph Procedure	50	** 2.6	1.4	30	** 2.9	1.3				.25	05B and 05C
Radiotelephone Procedure	50	** 3.2	1.6	30	** 3.7	1.3	144	** .4	.8	.1 .01	05B and 05C 05C and 05F
Electronic Counter-Countermeasures	50	*** 2.5	1.0	30	*** 2.9	.7	144	*** 1.7	1.1	.05 .01	05B and 05C 05C and 05F

* Mean sum of three test.

** Mean goes out of five tries.

*** Mean goes out of four tries.

**** .01 Significant at the .01 level (would occur by chance not more than 1% of the time).
.05 Significant at the .05 level (would occur by chance not more than 5% of the time).
.1 Significant at the .1 level (would occur by chance not more than 10% of the time).
.25 Significant at the .25 level (would occur by chance not more than 25% of the time).

TAB C

Means, Standards Deviations, Significance
Of the Differences in the Means of GT Scores
And Course Prerequisite Scores of Students
In 05C Courses--From 1977 Study

MEANS, STANDARD DEVIATIONS (SD), AND SIGNIFICANCE OF THE DIFFERENCES IN THE MEANS OF GT SCORES AND COURSE PREREQUISITE SCORES OF STUDENTS IN 05 COURSES

	05B20			05C20			05F20				
	N	Mean	SE	N	Mean	SD	N	Mean	SD	t-test	Courses Compared
AP Scores	20	116.6	13.6	21	118.9	12.9				.25	05B and 05C
GT Scores	26	120.4	14.8	25	113.6	14.2	130	100.0	12.7	.1	05B and 05C
										.01	05C and 05F
SC Scores	26	117.9	12.1	24	109.7	11.4	131	99.4	8.9	.02	05B and 05C
										.01	05C and 05F

.25 - Significant at the .25 level (would occur by chance not more than 25% of the time).
.1 - Significant at the .1 level (would occur by chance not more than 10% of the time).
.02 - Significant at the .02 level (would occur by chance not more than 2% of the time).
.01 - Significant at the .01 level (would occur by chance not more than 1% of the time).

TAB D

Instructor/Supervisor Attitude Findings
And Conclusions--From 1977 Study

INSTRUCTOR/SUPERVISOR ATTITUDE FINDINGS AND CONCLUSIONS

1. Findings:

a. Instructor attitude

(1) Self-paced - 88% of respondents indicated there was a shortage of instructors and 68.2% indicated self-paced instruction produces the best student.

(2) Group-paced - 77.4% of respondents indicated there was a shortage of instructors and 61.1% indicated self-paced instruction produces the best student.

(3) Combination of self-paced, group-paced and instructors who taught in both courses - 80.2% of respondents indicated there was a shortage of instructors and 70.4% indicated self-paced instruction produces the best student.

b. Supervisor attitude

(1) Supervisors - 100% of respondents indicated there was a shortage of instructors, 87.5% indicated self-paced instruction produces the best student, and 54.5% indicated students pull details during the academic day.

(2) Supervisor/Support - 100% of respondents indicated there was a shortage of instructors, 80% indicated self-paced instruction produces the best student and 53.9% indicated students pull details during the academic day.

2. Conclusions: Of the instructors interviewed in the 05 courses 80.2% indicated there was a shortage of instructors and 100% of the supervisors indicated this. It may be concluded that this could cause an attitude problem and could cause a higher failure rate due to the fact that instructors are not available to assist students. Of the supervisors interviewed 54.5% indicated the students pull details during the academic day and 53.9% of the supervisor/support personnel indicated this. It may be concluded that this could possibly cause attitude problems and could have an effect on how well the student performs in the classroom.

BREAKDOWN OF RESPONSES TO INSTRUCTOR QUESTIONNAIRE

Question	Self-Paced %	Group-Paced %	* Combined %
1. Training equipment			
a. Not adequate	30.4	20.0	29.1
b. Adequate	69.6	80.0	69.6
c. Excessive	0	0	1.3
2. Instructional materials			
a. Poor	21.7	5.0	18.0
b. Adequate	73.9	85.0	74.4
c. Excellent	4.4	10.0	7.7
3. Facilities			
a. Not adequate	52.2	41.2	44.0
b. Adequate	47.8	58.8	56.0
4. Shortage of training time			
a. Yes	30.4	55.0	45.5
b. No	69.6	45.0	55.5
5. Excess training time			
a. Yes	13.6	5.0	9.1
b. No	86.4	95.0	90.9
6. Shortage of instructors			
a. Yes	88.0	77.4	80.2
b. No	12.0	22.6	19.8
7. Excess of instructors			
a. Yes	8.7	5.0	3.9
b. No	91.3	95.0	96.1
8. Preference for equipment			
a. Group-paced	28.6	20.0	16.2
b. Self-paced	23.8	35.0	36.5
c. Neither	47.6	45.0	47.3

Question	Self-Paced %	Group-Paced %	* Combined %
9. Preference for facilities			
a. Group-paced	27.3	15.8	13.7
b. Self-paced	27.3	47.4	37.0
c. Neither	45.5	36.8	49.3
10. Produces best students			
a. Group-paced	31.8	38.9	29.6
b. Self-paced	68.2	61.1	70.4
11. Feel students meet prerequisites			
a. Yes	40.0	21.1	29.7
b. No	60.0	78.9	70.3
12. Others feel students meet prerequisites			
a. Yes	45.5	27.8	33.8
b. No	54.5	72.2	66.2
13. Student attitude			
a. Below average	36.4	45.0	47.4
b. Average	54.6	55.0	50.0
c. Above average	9.1	0	2.7
14. Others feel about attitude			
a. Below average	36.4	44.4	51.4
b. Average	54.6	55.6	46.0
c. Above average	9.1	0	2.7
15. Students pull details			
a. Yes	47.8	57.1	51.3
b. No	52.2	42.9	48.7
16. Details affect student's ability			
a. Yes	22.7	55.6	39.4
b. No	77.3	44.4	60.6

* This includes self-paced, group-paced and instructors who taught in both programs.

BREAKDOWN OF RESPONSES TO SUPERVISOR QUESTIONNAIRE

Question	% Responding	
	Supervisor	Supervisor/Support
1. Training equipment		
a. Not adequate	45.5	46.2
b. Adequate	54.5	53.8
c. Excessive	0	0
2. Instructional Materials		
a. Poor	0	0
b. Adequate	90.9	92.3
c. Excellent	9.1	7.7
3. Facilities		
a. Not adequate	27.3	30.8
b. Adequate	72.7	69.2
4. Shortage of training time		
a. Yes	54.5	53.8
b. No	44.5	46.2
5. Excess training time		
a. Yes	36.4	30.8
b. No	63.6	69.2
6. Instructor shortage		
a. Yes	100.0	100.0
b. No	0	0
7. Excess instructors		
a. Yes	0	0
b. No	100	100
8. Preferential treatment for equipment		
a. Group-paced	0	0
b. Self-paced	27.3	23.1
c. Neither	72.7	76.9

Questions	% Responding Supervisor	% Responding Supervisor/Support
9. Preferential treatment for facilities		
a. Group-paced	0	0
b. Self-paced	18.2	15.4
c. Neither	81.8	84.6
10. Instructional method that produces best students		
a. Group-paced	12.5	20.0
b. Self-paced	87.5	80.0
11. Students meet prerequisites		
a, Yes	27.5	30.8
b. No	62.5	69.2
12. Do instructors feel students meet prerequisites		
a. Yes	27.5	23.1
b. No	62.5	76.9
13. Student attitude		
a. Below average	18.2	15.4
b. Average	63.6	69.2
c. Above average	18.2	15.4
14. Instructors feel student attitude is:		
a. Below average	27.3	23.1
b. Average	54.5	61.5
c. Above average	18.2	15.4
15. Other supervisors feel student attitude is:		
a. Below average	30.0	33.3
b. Average	60.0	58.3
c. Above average	10.0	8.3

Questions	% Responding Supervisor	Supervisor/Support
16. Do students pull details during academic day		
a. Yes	54.5	53.9
b. No	45.5	46.1
17. Details affect ability to perform		
a. Yes	0	8.3
b. No	100.0	91.7
18. Preferential treatment for instructors		
a. Group-paced	9.1	7.7
b. Self-paced	36.4	30.8
c. Neither	54.5	61.5

TAB E

05C Group-Paced and Self-Paced Course
Cost Data--From TRADOC

Group Pace 05C

COURSE TITLE:

COURSE NUMBER/MOS:

DOLLARS (FY78)	OMA	MPA	
Variable			
Program 8 Mission	$806	1838	
Instructional Dept	591	1340	
Other	215	498	
Program 8 TOE Spt			
Ammunition			
Pay & Allowances		2105	
Students		2105	
All others		0	
Travel Pay to Course		14	
Per Diem at Course		0	
Program 8 Base Ops	869	288	
Support Cost (Tng Aids)	42	6	
TOTAL:	1717	4251	
Fixed			
Program 8 Mission	189	989	
Program 8 Base Ops	1106	535	
Program 8 TOE Spt	0	0	
Support Costs (Tng Aids)	53	10	
TOTAL:	1348	1534	
TOTAL VARIABLE & FIXED	3065	5785	

TIME/PERSONNEL:

Student Course Length 14

Direct Man weeks of effort --

Instructional Depts & School Overhead. Civ_____ Mil____

Self Pace 05C

COURSE TITLE:

COURSE NUMBER/MOS:

DOLLARS (FY78)	OMA	MAP	[illegible]
Variable			
Program 8 Mission	$766	1387	
Instructional Dept	471	1065	
Other	295	322	
Program 8 TOE Spt			
Ammunition			
Pay & Allowances		2195	
Students		2195	
All others		0	
Travel Pay to Course		14	
Per Diem at Course			
Program 8 Base Ops	873	298	
Support Cost (Tng Aids)	65	9	
TOTAL:	1704	3903	
Fixed			
Program 8 Mission	180	747	
Program 8 Base Ops	1111	554	
Program 8 TOE Spt	0	15	
Support Costs (Tng Aids)	82	1316	
TOTAL:	1373		
TOTAL VARIABLE & FIXED	3077	5219	

TIME/PERSONNEL:

Student Course Length 14.6

Direct Man weeks of effort of

Instructional Depts & School Overhead. Civ_____ Mil_____

TAB F

Attrition Tables

ATTRITION RATES BY COURSE

1st Qtr FY 76		Academic		Admin		Total	
Course	Grads	No	%	No	%	No	%
05B20	74	12	16	16	22	28	38
05C20	148	14	9	38	26	52	35
05F20	409	25	6	70	17	95	23

2nd Qtr FY 76	Academic		Admin		Total	
Grads	No	%	No	%	No	%
44	9	20	14	32	23	52
108	5	5	16	15	21	19
224	25	11	72	32	97	43

3rd Qtr FY 76		Academic		Admin		Total	
Course	Grads	No	%	No	%	No	%
05B20	50	35	70	18	36	53	106
05C20	125	44	35	48	38	92	74
05F20	396	87	22	68	17	155	39

4th Qtr FY 76	Academic		Admin		Total	
Grads	No	%	No	%	No	%
65	38	28.2	29	22.0	67	50.2
137	28	14.2	32	16.2	60	30.4
406	87	15.0	87	15.0	174	30.0

Qtr FY 7T		Academic		Admin		Total	
Course	Grads	No	%	No	%	No	%
05B20	101	62	32.5	28	14.6	90	47.1
05C20	144	65	23.8	80	27.2	145	51.0
05F20	447	140	18.6	164	21.8	304	40.4

1st Qtr FY 77		Academic		Admin		Total		2nd Qtr FY 77	Academic		Admin		Total	
Course	Grads	No	%	No	%	No	%	Grads	No	%	No	%	No	%
05B20	124	67	30.9	26	12.0	93	42.9	138	63	28.9	17	7.8	80	36.7
05C20	107	98	36.8	61	23.0	159	59.8	147	52	23.0	27	11.9	79	35.0
05F20	542	138	18.1	82	10.8	220	28.9	465	55	9.5	62	10.7	117	20.2

3rd Qtr FY 77		Academic		Admin		Total		4th Qtr FY 77	Academic		Admin		Total	
Course	Grads	No	%	No	%	No	%	Grads	No	%	No	%	No	%
05B20	110	25	22.6	9	8.2	34	30.8	43	15	34.8	1	2.9	16	37.7
05C20	74	16	21.3	7	10.2	23	31.5	38	8	19.7	9	22.7	17	43.4
05F20	418	54	12.8	40	9.6	94	22.4	318	70	25.3	71	25.6	141	50.9

Oct-Dec 77

2D TRAINING BATTALION

STUDENT TRAINING SUMMARY

1ST QUARTER, FY 78

COURSE	PROJECTED INPUT	ENROLLED	GRADUATES	ACADEMIC ATTRITION NUMBER	ACADEMIC ATTRITION %	ADMINISTRATIVE ATTRITION NUMBER	ADMINISTRATIVE ATTRITION %
05B20	198	91	48	10	14.7%	10	14.7%
05C20	154	91	44	1	1.8%	9	16.7%
05E20	231	245	431	10	2.0%	51	10.4%
05F20	418	418	658	97	10.6%	160	17.5%
	1001	845	1181	118	7.7%	230	15.0%

2D BATTALION (OSUT)

STUDENT TRAINING SUMMARY

2D QUARTER, FY 78

COURSE	PROJECTED INPUT	ENROLLED	GRADUATES	ACADEMIC ATTRITION NUMBER	ACADEMIC ATTRITION %	ADMINISTRATIVE ATTRITION NUMBER	ADMINISTRATIVE ATTRITION %
05B20	172	107	59	16	18.4%	12	13.8%
05C20	146	44	60	10	11.6%	16	18.6%
05E20	145	180	201	2	0.9%	9	4.2%
05F20	294	399	409	44	8.8%	46	9.2%
TOTAL	757	730	729	72	8.1%	83	9.4%
05B10	160	175	1	0	0	0	0
05C10	237	201	0	0	0	0	0
TOTAL	397	376	1	0	0	0	0

TAB G

USASC&FG ARTS SWT TEST INSTRUMENT

ARMY TRAINING STUDY

WRITTEN TEST

NAME _____

RANK _____ PMOS _____

START TIME _____ STOP TIME _____

INSTRUCTIONS:

1. This test has 29 multiple choice questions. Put a (✓) in the space that you feel BEST answers the question.

2. There is a 45 minute time limit on this test. When time is called stop writing and close your test booklet.

3. If you finish early, go back and check your answers.

4. Once the test begins, no questions will be answered. There will be no talking during the test.

5. DO NOT OPEN THE TEST BOOKLET UNTIL TOLD TO DO SO.

1. You are the operator at the NCS and traffic within the net is heavy. For best control, what type of net should you impose?

   a. _____ Disciplined
   b. _____ Directed
   c. _____ Controlled
   d. _____ Policed

2. The call signs of substations in a net in which you are working are BØV, M2N and V6H. Your call sign is M2N. The NCS makes a net call and BØV fails to answer. What should you do?

   a. _____ Not answer until the NCS makes another call.
   b. _____ Wait 30 seconds before replying
   c. _____ Wait 45 seconds; then call BØV and have him answer the NCS
   d. _____ Wait 5 seconds and answer

3. While operating as the NCS you have a message for all your substations. To prepare all stations to copy your message, what should you transmit?

   a. _____ A net call
   b. _____ A directed call
   c. _____ A collective call
   d. _____ The message with a priority indicator

4. You are preparing a message for transmission. What precedence prosign should you use to identify the message as an immediate message?

   a. _____ II
   b. _____ OO
   c. _____ I
   d. _____ O

5. Where does the classification appear on a classified document?

   a. _____ Top and bottom of first and last page
   b. _____ Bottom and back of each page
   c. _____ Top and back of each page
   d. _____ Top and bottom of each page

6. You receive a message with format line 12 garbled. What would be your request?

   a. _____ IMI 12 K
   b. _____ IMI BT TO BT K
   c. _____ IMI AA BT K
   d. _____ IMI K

7. You just started receiving a message, beginning with the preamble the message becomes garbled. What is your response?

a. _____ IMI K
b. _____ IMI AA BT K
c. _____ IMI BT TO BT K
d. _____ IMI AB BT K

8. For which stations must you maintain a series of station serial numbers on DA Form 4158?

a. _____ Those assigned to your net
b. _____ Those listed in the CEOI
c. _____ Those listed in the battalion net
d. _____ Those in the company net

9. You receive instructions to change frequencies, where would you find the alternate frequency?

a. _____ CEOI
b. _____ Chart on the RT-834
c. _____ CESI
d. _____ Frequency branch

10. Where will you find your call sign and frequency when you start a new shift?

a. _____ SOP
b. _____ CEOI
c. _____ CESI
d. _____ Unit SOP

11. You have just received a package of classified material from a courier. The wrappings on the package are hanging in shreds and you believe a compromise may have occurred. What should you do?

a. _____ Notify your immediate supervisor
b. _____ Contact the local CID and your team chief
c. _____ Detain and turn the courier over to the MP's or CID
d. _____ Refuse to receipt for the material and call the MP's or CID

12. Your unit is preparing to go on a field exercise. You sign for your COMSEC material but have no way to store this material. What action should you take to safeguard it?

a. _____ Place it under watch of qualified personnel
b. _____ Let the C-E officer appoint a person to guard it
c. _____ Put it in your radio hut
d. _____ File it in the file cabinet and mark it classified

13. A message with a date-time group of 140740Z has been transmitted and receipted for, how do you request acknowledgment?

a. _____ Transmit INT QSL 140740Z K
b. _____ Transmit INT ZEV 140740Z K
c. _____ Send a service message asking for acknowledgment
d. _____ Transmit IMI ZEV 140740Z K

14. You receive a message and the action addressee wants the message verified. How will you request this?

a. _____ Transmit the prosign J and the date-time group of the message
b. _____ Send a service message to the addressee
c. _____ Send an operator verification to the distant operator
d. _____ Tell the addressee that the originator requests verification

15. While transmitting a message in a radioteletype net you discover an error in the text and wish to cancel the entire transmission. What should you transmit?

a. _____ 2 CR 1 LF 8 E's BT AR
b. _____ 2 CR 1 LF 8 E's BT K
c. _____ 2 CR 1 LF 8 spaced E's AR
d. _____ 2 CR 1 LF 8 E's AR

16. What does the prosign ZRC 2 mean?

a. _____ I am receiving your signal weak
b. _____ Change to alternate frequency
c. _____ Zero beat your receiver to my transmitter
d. _____ Authenticate

17. You receive a message with the prosign G in the transmission instructions. You should

a. _____ Verify the message
b. _____ Not answer
c. _____ Repeat the entire transmission back
d. _____ Stand by for more to follow

18. When the proword "RELAY" is used alone, it tells the station called to relay to whom?

a. _____ An on net station
b. _____ All addressees
c. _____ An off net station
d. _____ Second substation

19. As NCS in a radioteletype net you transmit a "READ BACK" message to your first substation. He repeats the message back to you correctly. To inform him that he received the message correctly, you should transmit

a. _____ C AR
b. _____ G AR
c. _____ R AR
d. _____ AS AR

20. You have received an incomplete message in a radioteletype net. To get a complete copy you should transmit

a. _____ IMI K
b. _____ A codress message
c. _____ INT IMI FROM _____ TO _____ K
d. _____ INT IMI BT TO _____ K

21. What format line contains the originator's identification?

a. _____ 6
b. _____ 8
c. _____ 7
d. _____ 4

22. You have a priority message for the NCS. You are the third substation and the second substation is sending an immediate message. What must you do with the priority message?

a. _____ Employ the break in procedure and send it
b. _____ Wait until the immediate message is transmitted
c. _____ Call the second sub and have him finish so you can send your priority message
d. _____ Call the NCS and transmit the message by telephone

23. You receive a coded message that has a group count of 10. You copy the message and count only 9 groups. What should be your reply?

a. _____ INT GR 9 K
b. _____ IMI GR 10 K
c. _____ INT GR 10 K
d. _____ IMI GR 9 K

24. You have received a message and receipted for it. You then spill coffee on it and can not read it. What transmission should you make to receive another copy of it?

a. _____ IMI date-time group K
b. _____ IMI message number ____ K
c. _____ ZDK date-time group K
d. _____ IMI K

25. For help with your daily or weekly preventive maintenance checks, you should refer to

a. _____ The appropriate TM
b. _____ The appropriate FM
c. _____ The appropriate LO
d. _____ Maintenance NCO

26. According to your maintenance schedule, your generator set is due for an oil change and lubrication, You will lubricate

a. _____ The trailer chassis
b. _____ All lubrication points listed in the appropriate LO
c. _____ The engine only
d. _____ Everything listed in the appropriate TM

27. You are performing an ESC on your radioteletypewriter set. You find one item that you list as amber. All other items are listed as green. You will rate the entire radioteletypewriter set as

a. _____ Green
b. _____ Amber
c. _____ Red
d. _____ Not assign any rating; maintenance personnel perform this function

28. You are starting your generator set. When you try to adjust the voltage, nothing happens. You should

a. _____ Check the troubleshooting chart in the TM
b. _____ Take the control panel off any change the voltage regulator
c. _____ Call your team chief
d. _____ Operate the generator and not worry about the voltage

29. The oil level in your generator is overfull. You should

a. _____ Run the generator and let the excess burn off
b. _____ Turn the generator in to your maintenance section
c. _____ Carefully drain enough oil to bring it down to the proper level
d. _____ Operate the generator for only short periods at a time

(END OF TEST)

STARTING PROCEDURE	YES	NO
1. PRESETS:		
a. MAIN POWER circuit breaker OFF	____	____
b. LIGHTS, BLOWER, TTY, CRYPTO switches OFF	____	____
c. T-195 SERVICE SELECTOR switch OFF	____	____
d. Modulator POWER switch OFF	____	____
e. R-392 FUNCTION switch OFF	____	____
f. Converter POWER switch OFF	____	____
g. SEND-RECEIVE-MARK HOLD switch to MARK HOLD	____	____
h. CRYPTO switch to SECURITY EQUIPMENT INSTALLED	____	____
2. MAIN POWER circuit breaker ON	____	____
3. LIGHTS, BLOWER, TTY AND CRYPTO switches ON	____	____
4. BIAS CONTROL to 30ma; LINE CONTROL to 60ma	____	____
5. START EQUIPMENT:		
a. T-195 SERVICE SELECTOR switch to STANDBY	____	____
b. R-392 FUNCTION switch to STANDBY	____	____
c. Modulator POWER switch ON	____	____
d. Modulator BAND SELECTOR switch to proper band	____	____
e. Converter POWER switch to ON	____	____
f. NORMAL-REVERSE-MARK HOLD switch to NORMAL	____	____
6. TELETYPEWRITER:		
a. MOTOR switch ON	____	____
b. LIGHT switch ON	____	____
c. LINE BREAK switch to LINE	____	____
d. SEND-LOCK switch to SEND	____	____
7. REPERFORATOR:		
a. POWER, MOTOR, LIGHT switches ON	____	____
b. KEYBOARD switch to SEND	____	____
c. SELECTOR switch to 1	____	____
d. START-STOP-FEED RETRACT switch to FEED RETRACT	____	____
8. KW-7 POWER switch to AC ON - DC OFF	____	____
9. Conduct ALARM CHECK on KW-7	____	____

NAME_____ RANK_____ PMOS_____

START TIME_____ STOP TIME_____

TUNING PROCEDURE	YES	NO
1. PRESET R-392:		
a. ANTENNA TRIM to O	____	____
b. BFO to ON	____	____
c. AGC switch to CALIBRATE	____	____
d. RF GAIN fully CLOCKWISE	____	____
e. BFO PITCH to 0	____	____
f. AF GAIN to MIDRANGE	____	____
g. DIAL ZERO switch UNLOCKED	____	____
h. DIAL LOCK switch UNLOCKED	____	____
i. BAND WIDTH to 4KC	____	____
j. DIAL DIM switch to ON	____	____
k. FUNCTION switch to NET	____	____
2. TUNE R-392:		
a. MEGACYCLE control to frequency	____	____
b. KILOCYCLE contro to nearest 100 Hz	____	____
c. DIAL ZERO control LOCKED	____	____
d. ZERO BEAT R-392	____	____
e. AGC switch ON	____	____
f. DIAL ZERO control UNLOCKED	____	____
g. KILOCYCLE control to assigned frequency	____	____
3. PRESET T-195:		
a. TEST METER switch to PA CATH	____	____
b. RELAY-DUPLEX-NORMAL switch to NORMAL	____	____
c. LINE LEVEL switch to +12	____	____
d. DIAL DIM switch to DIM or FULL	____	____
e. CHANNEL selector to M	____	____
4. TUNE T-195:		
a. BAND SELECTOR switch UNLOCKED	____	____
b. BAND SELECTOR switch to frequency band	____	____
c. BAND SELECTOR switch LOCKED	____	____
d. TUNING control UNLOCKED	____	____
e. TUNING control to desired frequency	____	____
f. SERVICE SELECTOR switch to CALIBRATE	____	____
g. ZERO BEAT T-195	____	____
h. SERVICE SELECTOR switch to CW	____	____
i. TEST KEY to ON - TUNING INDICATOR lights	____	____
j. SERVICE SELECTOR switch to VOICE/FSK	____	____

STOPPING PROCEDURE	YES	NO
1. SEND-RECEIVE-MARK HOLD switch to MARK HOLD	____	____
2. T-195 SERVICE SELECTOR switch to OFF	____	____
3. R-392 FUNCTION switch to OFF	____	____
4. Teletypewriter MOTOR and LIGHT switches OFF	____	____
5. REPERFORATOR MOTOR, POWER and LIGHT switches OFF	____	____
6. KW-7 POWER switch to AC OFF - DC ON	____	____
7. Modulator POWER switch to OFF	____	____
8. Converter POWER switch to OFF	____	____
9. TTY, CRYPTO, BLOWER and LIGHT switches to OFF	____	____
10. MAIN POWER circuit breaker to OFF	____	____

SCORER'S SIGNATURE_____

AN/VRC-46 AND AN/GRA-39

NAME _____ RANK _____

START TIME _____ STOP TIME _____

AN/VRC-46	YES	NO
1. POWER switch to LOW	____	____
2. MC and KC controls to ASSIGNED FREQUENCY	____	____
3. SQUELCH switch to NEW ON	____	____
4. SPEAKER switch to ON	____	____
5. VOLUME control to MIDRANGE	____	____
6. MICROPHONE to either AUDIO CONNECTOR	____	____

SCORER'S SIGNATURE _____

AN/GRA-39	YES	NO
1. BATTERIES in LOCAL UNIT correctly	____	____
2. RADIO CABLE CONNECTOR to RETRANSMIT R/W connector	____	____
3. Connect FIELD WIRE to LOCAL UNIT	____	____
4. BATTERIES in REMOTE UNIT correctly	____	____
5. Connect FIELD WIRE to REMOTE UNIT	____	____
6. Connect HANDSET to AUDIO connector on REMOTE UNIT	____	____

SCORER'S SIGNATURE _____

GRA-50

Name _____ Rank _____

Start Time _____ Stop Time _____

	Yes	No
1. Compute Antenna Length	____	____
2. Cut Antenna to Proper Length	____	____
3. Lay Antenna Out and Orientate the Antenna Correctly	____	____
4. Connect Cobra Head to Antenna Wire	____	____
5. Connect Coax Cable to Both Cobra Head and Shelter	____	____

Scorers Signature _____

AN/GRC-142

NAME _____ RANK _____

START TIME _____ STOP TIME _____

	YES	NO
1. AN/GRC-142 Preparation:		
a. GROUND STRAP securely fastened	___	___
b. Install WHIP ANTENNA CORRECTLY	___	___
c. AC POWER CABLE correctly connected	___	___
d. SAFETY CHECKS completed (ALL equipment turned OFF)	___	___
e. TSEC/KW-7:		
(1) POWER switch to AC OFF - DC ON	___	___
(2) FUNCTION switch to CIPHER	___	___
(3) ALARM TEST switch to OFF	___	___
(4) WHITE, BLACK and BLUE loop cables to E-1, E-3, and E-5	___	___
(5) JUMPER wire between E-2 and E-4	___	___
(6) AC POWER cable to J-1	___	___
(7) SEND and RECEIVE cables to J-3 and J-7	___	___
(8) DUMMY PLUGS to J-4 and J-8	___	___
(9) AC POWER cable to Outlet On Inverter or Under Teletype	___	___
(10) First FIVE settings of KWK-7 programmed correctly	___	___
(11) KWK-7 inserted in KW-7 correctly	___	___
(12) DOOR closed and KEY removed	___	___
2. AN/GRC-142 Starting Procedure:		
a. Push On - Pull Off Switch to Push On; Check for 27, 5V DC	___	___
b. Inverter Switch to ON	___	___
c. Blower, Light and Lockout Switches ON	___	___
d. Switch Assembly SA-1650:		
(1) LOCAL - REMOTE switch to LOCAL	___	___
(2) TT-98 DX and OWR BLACK-RED switches to RED	___	___
(3) TT-76 TAPE PUNCH switch to OWR-DX SEND	___	___
e. RT-662 (RT-834):		
(1) SERVICE SELECTOR switch to OVEN ON	___	___
(2) VOX switch to PUSH TO TALK	___	___
(3) SQUELCH control to OFF	___	___
(4) NOISE BLANKER switch to OFF (RT-662 only)	___	___
(5) BFO control to MIDRANGE	___	___
(6) MANUAL RF GAIN fully CLOCKWISE	___	___
(7) AUDIO GAIN control to MIDRANGE	___	___
(8) FREQ VERNIER control to OFF	___	___

	YES	NO
f. Modem MD-522 (*):		
(1) AUDIO GAIN control to MIDRANGE	___	___
(2) ONE WAY-DUPLEX switch to ONE WAY	___	___
(3) MODE SELECTOR switch to 85 Hz	___	___
(4) SEND-RECEIVE switch to RECEIVE	___	___
(5) RECEIVE-REVERSE-NORMAL switch to NORMAL	___	___
(6) DC LOOP 1 switch to 20 ma	___	___
(7) AUTOMATIC MARK HOLD switch to ON	___	___
(8) SCOPE INTENSITY control to MIDRANGE	___	___
(9) SQUELCH SENSITIVITY fully COUNTERCLOCKWISE	___	___
(10) METER FUNCTION switch to REGULATED DC	___	___
(11) ON-OFF switch to ON	___	___
g. TSEC/KW-7:		
(1) POWER switch to AC ON - DC OFF	___	___
(2) Conduct ALARM CHECK	___	___
h. TT-98 MOTOR and LIGHT switches to ON	___	___

3. AN/GRC-142 Tuning Procedure:

a. RT-662 (RT-834):		
(1) SERVICE SELECTOR switch in OVEN ON 10 Minutes		
(2) SERVICE SELECTOR switch to STANDBY	___	___
b. AM-3349 PRIMARY POWER switch to ON	___	___
c. Allow 2 minute WARM UP time	___	___
d. TEST METER FUNCTION switch to PRIM VOLT	___	___
e. SERVICE SELECTOR switch to SSB-NSK (test meter in green)	___	___
f. TEST METER FUNCTION switch to POWER OUT	___	___
g. MHz and KHz controls to assigned frequency	___	___
h. ANT LOAD and ANT TUNE controls to proper settings	___	___
i. HV RESET switch to TUNE (2 minute limit while tuning)	___	___
j. Adjust ANT LOAD and ANT TUNE controls for center scale	___	___
k. Check TEST METER FUNCTIONS	___	___
l. HV RESET switch to OPERATE	___	___

4. Convert to Generator Power:

a. AC MAIN circuit breakers ON; chech for 115 V + 10%	___	___
b. Power Supply ON-OFF circuit breaker ON	___	___
c. AC - DC Switch to AC	___	___
d. Push On - Pull Off Switch to Pull Off	___	___
e. Inverter Switch to OFF	___	___
f. AC POWER cable to 115 Volt Receptacle	___	___

5. AN/GRC-142 Stopping Procedure:

a. ZEROIZE frequency	___	___
b. RT-662 SERVICE SELECTOR to STANDBY (2 minute)	___	___
c. AM-3349 PRIMARY POWER switch to OFF	___	___
d. RT-662 SERVICE SELECTOR switch to OFF	___	___
e. TT-98 MOTOR and LIGHTS switches to OFF	___	___
f. Modem ON-OFF switch to OFF	___	___
g. TSEC/KW-7 POWER switch to AC OFF - DC ON	___	___
h. BLOWER, LIGHT and LOCKOUT switches to OFF	___	___
i. Power Supply ON-OFF circuit breaker to OFF	___	___
j. AC MAIN circuit breakers to OFF	___	___

ARMY TRAINING STUDY

RADIOTELEPHONE
PROCEDURE
TEST

NAME _____

RANK _____ PMOS _____

START TIME _____ STOP TIME _____

INSTRUCTIONS:

1. This test has five questions. Read the conditions and directions for each question carefully. Answer EXACTLY what is asked by each question.

2. There is a 30 minute time limit on this test. When time is called, stop writing and close your test booklet.

3. If you finish early, go back and check your answers.

4. Once the test begins, no questions will be answered. There will be no talking during the test.

5. DO NOT OPEN THE TEST BOOKLET UNTIL TOLD TO DO SO.

GENERAL DIRECTIONS FOR ALL QUESTIONS.

1. Use CEOI Extract below:

(NET CALL)	A2D	
(NCS)	A2D28	4TH BDE
(1ST SUB)	B6F	1ST BN
(2ND SUB)	D9T	2ND BN

2. You are operating in a SSB Voice radio net. All stations are operating.

3. Today's date is 19 JUN 78.

4. You are in the ROMEO time zone.

5. Print all answers CLEARLY in the space provided.

6. Use the sample authentication table on Page 2.

Sample Authentication System
DRYAD (DAL-61)

	0	1	2	3	4	5	6	7	8	9
A	HPQC	FOC	RUE	VT	KW	LIB	NG	JM	YX	AS
B	SAHF	CYO	KPB	UG	WE	KNV	QM	LJ	DT	IR
C	ATDL	FFY	UCJ	EO	MW	IQB	GN	HV	SK	RX
D	WAFQ	JYX	DVH	NS	LG	PMO	RE	BT	UK	IC
E	HPUI	JLC	KAG	WD	MS	VNB	XF	OT	QE	RY
F	JETV	BFH	CAD	WU	QX	KRG	IO	NL	SY	MP
G	BRHC	AVK	WGE	UO	QN	MSX	TI	YF	PL	DJ
H	NTER	AMU	VWD	GY	HJ	XPQ	FX	IC	SB	IO
I	VGHM	LOF	UXI	DA	BN	YQT	WK	EP	RJ	CS
J	LBTS	UDK	AHF	VW	RE	JNX	CQ	MG	IC	OP
K	LCKM	IFR	HUB	NV	YE	TPA	GD	QZ	CW	JS
L	KHGA	OLT	XVS	FI	YB	UNJ	DW	ME	CQ	RP
M	QNSH	DGK	WLI	AB	EU	MJF	CX	YT	VP	OH
N	DHYB	WRV	SUG	MX	TI	OKL	FC	NQ	AP	EJ
O	KGHN	DYL	BUT	XE	RQ	OSC	AF	VI	JW	MP
P	GENY	UJP	TOA	CK	VR	MQL	BX	HI	SW	DF
Q	NELT	JDP	UXQ	RB	MH	FIY	CO	KW	SG	AX
R	OAYG	JIM	PUN	XK	ER	YSQ	DW	FI	LC	VB
S	RUDW	LTM	XGF	SA	OB	EJN	QH	PY	VI	KC
T	IALC	TQH	JPV	OE	GS	RDX	YK	MF	WN	BU
U	BYED	KRI	DAJ	NM	QU	LFP	XC	TV	GW	OH
V	HRBI	MNC	SUV	WE	PT	GDY	XF	KO	JL	AQ
W	EFBY	ILP	VMU	OT	WD	GXJ	SF	HK	QC	NA
X	JNIK	ERG	FXP	HU	LY	DOW	TQ	MA	VB	SC
Y	GNML	DQI	BAO	RP	WF	XUK	HS	EF	CJ	TY

SITUATION #1:

All stations in the net have their equipment installed and are ready to begin Radiotelephone communications. You will act as the operator for each station and make transmissions for all. You will use the authentication challenges DA, DB, and DC.

1. PRINT ALL TRANSMISSIONS NEEDED TO OPEN THE NET USING THE AUTHENTICATION CHALLENGES ABOVE AND THE TABLE ON PAGE 2.

SITUATION #2:

You are operating in a voice radio net and the following message is transmitted:

B6F THIS IS A2D28 MESSAGE NUMBER 2 PRIORITY TIME 191435 ROMEO JUNE 78 FROM A2D28 TO B6F BREAK EXECUTE PLAN ********** AT THE AGREED TIME BREAK OVER

1. YOU ARE THE OPERATOR AT B6F. WRITE DOWN THE TRANSMISSION NEEDED TO GET THE MISSING WORD REPEATED.

2. YOU ARE THE OPERATOR AT A2D28. WRITE DOWN YOUR REPLY TO THE REQUEST ABOVE FROM B6F. (Give ALPHA as the missing word.)

SITUATION #3:

You are the operator for the 4th Brigade. A messenger has just given you a priority message to transmit to the 1st Battalion.

1. WRITE THE PRELIMINARY CALL YOU WOULD MAKE FOR THIS MESSAGE.

2. YOU ARE NOW THE OPERATOR FOR THE 1ST BATTALION. WRITE THE REPLY YOU WOULD GIVE TO THE ABOVE TRANSMISSION.

SITUATION #4:

You are the operator for the 1st Battalion. A messenger has given you the following message to transmit:

PRECEDENCE: Priority
DATE-TIME: 191845R June 78
FROM: CDR, 1st Battalion
TO: CDR, 4th Brigade
TEXT: Send rations to my location at this time

You have sent the preliminary call for this message and the 4th Brigade operator is ready to copy.

1. PUT THE MESSAGE INTO THE PROPER RADIOTELEPHONE FORMAT AND WRITE IT DOWN AS IT SHOULD BE SENT. THIS IS THE FIRST MESSAGE YOU HAVE SENT TODAY.

SITUATION #5:

You have been told to shut down and end the field problem you are on. You will act as the operator at all stations.

1. WRITE DOWN ALL THE TRANSMISSIONS MADE BY THE THREE STATIONS TO CLOSE THE NET USING AUTHENTICATION. YOU WILL USE THE AUTHENTICATION CHALLENGE DD AND THE AUTHENTICATION TABLE ON PAGE 2.

(END OF TEST)
(7)

ARMY TRAINING STUDY

RADIOTELETYPEWRITER
PROCEDURE
TEST

NAME _____

RANK _____ PMOS _____

START TIME _____ STOP TIME _____

INSTRUCTIONS:

1. This test has five questions. Read the conditions and directions for each question carefully and answer EXACTLY what is asked by each question.

2. There is a 45 minute time limit on this test. When time is called, stop writing and close your test booklet.

3. If you finish early, go back and check your answers.

4. Once the test begins, no questions will be answered. There will be no talking during the test.

5. DO NOT OPEN THE TEST BOOKLET UNTIL TOLD TO DO SO.

GENERAL DIRECTIONS FOR ALL QUESTIONS:

1. Use CEOI Extract below:

(NET CALL)	A2D	
(NCS)	A2D28	4TH BDE
(1ST SUB)	B6F	1ST BN
(2ND SUB)	D9T	2ND BN

2. You are operating using secure equipment and all stations in the net are operating.

3. Today's date is 27 March 1978.

4. You are in the ROMEO time zone.

5. Print each answer CLEARLY in the space provided.

SITUATION #1:

All stations have their equipment installed and are ready to start Radioteletypewriter communications. You will act as the operator for all three stations and write the transmission you would make for each.

1. ALL TRANSMISSIONS TO ESTABLISH COMMUNICATIONS:

2. ALL TRANSMISSIONS TO OPEN THE NET:

SITUATION #2:

The following questions are about this message:

A2D28
DE B6F NR1
P 27***** *** **
**********NY Ø9272//ATSIGS-BY
TO CDR 4TH BDE APO NY Ø9272//ATSIGS-DG
BT
UNCLAS
REQUEST YOU SEND RATIONS AND ********** TO MY
LOCATION AS SOON AS POSSIBLE
BT
27/1155R
K

(8 LF's)

NNNN

1. You are the operator at A2D28. Make the transmission to get the missing or incorrect parts of the message.

2. You are the operator at B6F. Make the transmission to reply to A2D28's request.

(The missing word is AMMUNITION)
(The missing part of the heading is
27113ØR MAR 78
FM CDR 1ST BN APO)

JOINT MESSAGEFORM							SECURITY CLASSIFICATION UNCLASSIFIED		
PAGE	DRAFTER OR RELEASER TIME	PRECEDENCE ACT	PRECEDENCE INFO	LMF	CLASS	CIC	FOR MESSAGE CENTER/COMMUNICATIONS CENTER ONLY	DATE - TIME	MONTH / YR
01 of 01	271430R	PR	RR		UUUU			271545R	MAR 78

BOOK | MESSAGE HANDLING INSTRUCTIONS

FROM: CDR 4TH BDE APO NY 09272//ATSIGS-DD

TO: CDR 1ST BN APO NY 09272//ATSIGS-BY

INFO: CDR 2ND BN APO NY 09272//ATSIGS-BW

UNCLAS

SGD WILLIAMS

SUBJ: PLAN BRAVO

EXECUTE PLAN BRAVO AT DESIGNATED TIME

27/1600R

DISTR:

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL, PHONE & DATE	SPECIAL INSTRUCTIONS
J. B. BROWN, CPT, ATSIGS-DH 27 MAR 78 6474	HAVE ACKNOWLEDGED
RELEASER: TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE 6474 D. F. WILLIAMS, MAJ ATSIGS-DH	
SIGNATURE: D.F. Williams	SECURITY CLASSIFICATION: UNCLASSIFIED / DATE TIME GROUP: 271545R MAR 78

DD FORM 1 DEC 70 173 REPLACES DD FORM 173, 1 JUL 65, WHICH WILL BE USED.

SITUATION #3:

The following questions are about the Joint Messageform (DD Form 173) on Page 4.

1. You are the operator for the 4th Brigade. Write the preliminary call you would send for this message.

2. You are the operator for all other substations. Write the reply you would make to the preliminary call above for each station in the net.

SITUATION #4:

The following question is about the Joint Messageform (DD Form 173) on page 4.

You are the operator for the 4th Brigade. You have sent the 1st Bn 2 messages today and they have receipted for both. You have just sent the 2nd Bn their first message today. Now a messenger has given you the DD-173 on Page 4 for you to transmit. Put the message into proper PLAINDRESS Format and write it down EXACTLY as you would transmit it.

SITUATION #5:

The field problem you are on has just ended and you are about to close the net and break down your equipment. You will act as the operator for all three stations and write the transmission you would make for each.

1. ALL TRANSMISSIONS TO CLOSE THE NET.

(END OF TEST)

DEMOGRAPHIC INFORMATION
(Team Member)

PART I

Name _____
Last First MI

Rank _____ Age _____ Time in Grade (months)_____

SSN _____Unit _____

PART II

1. Primary MOS _____ Secondary MOS _____

2. Time in Army (months) _____ Time in MOS (months) _____

3. Time in this job (months) _____

4. Number of different assignments in this job _____

5. What type training did you receive for your PMOS? School _____

   On-Job-Training (OJT) _____ On-Job-Experience (OJE) _____

6. Where did you receive your PMOS training? _____

   Date completed _____ Time in Training (full weeks) _____

7. What was your last PMOS test score? _____

8. Were you an honor graduate from your PMOS school? _____

9. What is your Duty MOS?(If same as PMOS, Do Not Answer 9, 10, & 11)

   _____

10. What type training did you receive for your Duty MOS? School _____

    OJT _____ OJE _____

11. Where did you receive your Duty MOS Training? _____

    Date Completed _____ Time in Training (full weeks) _____

12. In how many field training exercises (24 hrs or longer) have you been in since assigned to your current unit?Less than 3___3-6_____

    7-9 ___ 10-12 ___ 12 or more _____

13. In the past six months, what is the total length of time you have spent in field exercises? (hours) _____

PART III

Section A

How often have you done the following items in the past six months?

Establish a RATT Site	Never	1-4 Times	5-10 Times	11-20 Times	More Than 20 Times
a. Check equipment for completeness	____	____	____	____	____
b. Site RATT Set	____	____	____	____	____
c. Ground shelter	____	____	____	____	____
d. Erect whip antenna	____	____	____	____	____
e. Connect correct power cables	____	____	____	____	____
f. Erect shade tarpaulin	____	____	____	____	____
g. Place TSEC/KW-7 in rack provided	____	____	____	____	____
h. Connect signal cables to TSEC/KW-7	____	____	____	____	____
i. Position vehicle boarding ladder	____	____	____	____	____
j. Site generator set	____	____	____	____	____
k. Ground generator set	____	____	____	____	____
l. Connect auxiliary fuel hose	____	____	____	____	____
m. Assure voltage/phase switch (output selector switch) is set to the desired voltage/phase position	____	____	____	____	____
N. Perform starting procedures	____	____	____	____	____

	Never	1-4 Times	5-10 Times	11-20 Times	More Than 20 Times
o. Start generator set electrically	____	____	____	____	____
p. Start generator set manually	____	____	____	____	____
q. Perform operating procedures	____	____	____	____	____
r. Perform stopping procedures	____	____	____	____	____
s. Operate required vehicle	____	____	____	____	____

How much time have you spent doing the above 19 actions during the past six months? _____ hours

How many of these hours have you received help or guidance from other Ø5 MOS holders or supervisors? _____ hours

PART III

Section D

How often have you done the following items in the past six months?

	Never	1-4 Times	5-10 Times	11-20 Times	More Than 20 Times
Operate RATT Set AN/GRC-142 or AN/GRC-122					
a. Determine operating frequency from current CEOI	____	____	____	____	____
b. Perform preliminary starting procedures	____	____	____	____	____
c. Preset	____	____	____	____	____
d. Perform tuning procedures	____	____	____	____	____
e. Adjust for local one-way reversible 85 Hz TTY operation	____	____	____	____	____
f. Adjust for local duplex 85 Hz TTY operation	____	____	____	____	____
g. Establish communication & open net	____	____	____	____	____
h. Prepare msg	____	____	____	____	____
i. Send/Receive msg in secure mode	____	____	____	____	____
j. Maintain station log	____	____	____	____	____
k. Perform stopping procedures	____	____	____	____	____

How much time have you spent doing the above 11 actions during the past six months? _____hours

How many of these hours have you received help or guidance from other Ø5 MOS holders or supervisors? _____hours

PART III

Section E

How often have you done the following items in the past six months?

	Never	1-4 Times	5-10 Times	11-20 Times	More Than 20 Times
Install & Operate Radio Set Control Group AN/GRA-6					
a. Install radio set control group AN/GRA-6	____	____	____	____	____
b. Prepare remote control C-433/GRC of radio set control group AN/GRA-6 for installation	____	____	____	____	____
c. Prepare local control C-434/GRC of radio set control group AN/GRA-6 for installatinn	____	____	____	____	____
d. Connect local control C-434/GRC to radio set AN/VRC-46	____	____	____	____	____
e. Connect field wire WD-1/TT between local & remote control units of radio set control group AN/GRA-6	____	____	____	____	____
f. Perform preliminary starting procedures	____	____	____	____	____
g. Conduct telephone communication between control units	____	____	____	____	____
h. Conduct push-to-talk operations	____	____	____	____	____
i. Cnnduct break-in operations	____	____	____	____	____
j. Conduct stopping procedures	____	____	____	____	____

How much time have you spent doing the above 10 actions during the past six months? _____hours

How many of these hours have you received help or guidance from other Ø5 MOS holders or supervisors? _____hours

PART III

Section F

How often have you done the following items in the past six months?

	Never	1-4 Times	5-10 Times	11-20 Times	More Than 20 Times
Install & Operate Radio Set Control Group AN/GRA-39					
a. Prepare local control unit C-2329/GRA-39 for installation	____	____	____	____	____
b. Prepare remote control unit C-2928/GRA-39 for installation	____	____	____	____	____
c. Connect local control unit C-2329/GRA-39 to radio set AN/VRC-46	____	____	____	____	____
d. Connect remote control unit C-2328/GRA-39	____	____	____	____	____
e. Insure radio set control group AN/GRA-39 is properly installed	____	____	____	____	____
f. Place local control unit in operation C-2329/GRA-39	____	____	____	____	____
g. Place remote control unit in operation C-2328/GRA-39	____	____	____	____	____
h. Conduct telephone communication check between local & remote control units	____	____	____	____	____
i. Conduct radio transmission & reception check from remote control unit	____	____	____	____	____
j. Conduct radio transmission & reception check from local control unit	____	____	____	____	____

How much time have you spent doing the above 10 actions during the past six months? _____ hours

How many of these hours have you received help or guidance from other 05 MOS holders or supervisors? _____ hours

PART III

Section G

How often have you done the following items in the past six months?

	Never	1-4 Times	5-10 Times	11-20 Times	More Than 20 Times
Install & Operate Radio Set AN/GRC-106					
a. Position AN/GRC-106 in mount	____	____	____	____	____
b. Connect all cables	____	____	____	____	____
c. Connect audio accessories	____	____	____	____	____
d. Install whip antenna	____	____	____	____	____
e. Determine operating frequency from CEOI	____	____	____	____	____
f. Implement preliminary starting procedures	____	____	____	____	____
g. Conduct starting procedures	____	____	____	____	____
h. Conduct tuning procedures for CW operation	____	____	____	____	____
i. Conduct CW & Voice operating procedures	____	____	____	____	____
j. Establish communication & open net	____	____	____	____	____
k. Prepare msg	____	____	____	____	____
l. Send/Receive msg	____	____	____	____	____
m. Maintain station log	____	____	____	____	____
n. Perform stopping procedures	____	____	____	____	____

How much time have you spent doing the above 14 actions during the past six months? _____ hours

How many of these hours have you received help or guidance from other Ø5 MOS holders or supervisors? _____ hours

PART III

Section H

How often have you done the following items in the past six months?

	Never	1-4 Times	5-10 Times	11-20 Times	More Than 20 Times
Install & Operate Radio Set AN/VRC-46 (AN/VRC-12 Series)					
a. Turn power switch on & receiver-transmitter off	____	____	____	____	____
b. Clean surface of mount MT-1029/VRC, and remove electrical connector cover from radio receptacle	____	____	____	____	____
c. Place receiver-transmitter into mount (MT-1029/VRC)	____	____	____	____	____
d. Tighten MT-1029/VRC clamps	____	____	____	____	____
e. Erect antenna AS-1729/VRC or AT-912/VRC	____	____	____	____	____
f. Determine operating frequency from current CEOI	____	____	____	____	____
g. Align receiver-transmitter	____	____	____	____	____
h. Establish communication & open net	____	____	____	____	____
i. Prepare msg	____	____	____	____	____
j. Send/Receive msg	____	____	____	____	____
k. Maintain station log	____	____	____	____	____
l. Perform stopping procedures	____	____	____	____	____

How much time have you spent doing the above 12 actions during the past six months? _____hours

How many of these hours have you received help or guidance from other Ø5 MOS holders or supervisors? _____hours

Generator Set

NAME _____ RANK _____

START TIME _____ STOP TIME _____

	YES	NO
1. Safety Checks:		
a. GROUND STRAP securely fastened	____	____
b. AC POWER cable correctly connected to load terminals	____	____
c. Generator properly VENTILATED	____	____
d. AC MAIN circuit breaker OFF	____	____
e. POL POINT and FIRE EXTINGUISHER properly positioned	____	____
2. Starting Procedure:		
a. Check OIL LEVEL	____	____
b. Check BATTERY	____	____
c. SUMMER/WINTER switch to appropriate setting	____	____
d. GOVERNOR control to MIDRANGE	____	____
e. Check AIR FILTER	____	____
f. VOLTAGE ADJUSTING KNOB fully COUNTERCLOCKWISE	____	____
g. REMOTE-LOCAL switch to LOCAL	____	____
h. EMERGENCY STOP-RUN switch to NORMAL	____	____
i. START-STOP switch to START; HOLD until 20 psi oil pressure	____	____
j. Allow engine to WARM UP	____	____
k. ADJUST voltage to 120 volts	____	____
l. AC MAIN circuit breaker ON	____	____
3. Stopping Procedure:		
a. AC MAIN circuit breaker to OFF	____	____
b. Allow enough time for engine COOL DOWN	____	____
c. START-STOP switch to STOP; hold until engine STOPS	____	____
d. FUEL SELECTOR VALVE to OFF	____	____
e. EMERGENCY STOP-RUN switch to EMERGENCY STOP	____	____

INSTRUCTIONS

1. This questionnaire has two parts: an answer sheet and a question booklet. The section that you are now reading is the question booklet. Check to see that you have an answer sheet.

2. Read each statement carefully.

3. As soon as you understand a statement, decide how much you agree with it. Your first impressions are more valuable than your second thoughts.

4. After you have decided on your answer, it will be recorded on the separate Answer Sheet that indicates the amount of your agreement.

5. If no answer category exactly expresses your thoughts, use the best answer available. Be sure to mark only one answer for each statement and to respond to all statements.

6. Be sure to follow the answer sheet carefully. Match the numbers on the answer sheet with the number of each statement.

7. Please use a pencil in completing this form.

8. Please do not make any marks on the Question Booklet.

9. Now that you have completed the instructions, please go to Section A and begin responding to the statements.

SECTION A

In this section each question has the scale printed under it. Put your answer to these questions (numbers 1 to 17) on the answer sheet.

1. Sex

   A. Male
   B. Female

2. Marital Status

   A. Single
   B. Married, living with family
   C. Married, separated from family due to lack of affordable housing
   D. Married, separated from family due to other reasons
   E. Divorced

3. Housing

A. On post - barracks
B. On post - family housing
C. On post - other
D. Off post - government furnished housing
E. Off post - civilian housing

3a. OFFICERS

What is your duty assignment?

A. Battalion Primary Staff Officer
B. Other Battalion Staff Officer
C. Company Commander
D. Platoon Leader
E. Other Company Officer

3b. NCOs

What is your duty assignment?

A. Squad/Section Leader
B. Platoon or First Sgt.
C. Commander Sergeant Major
D. Other (Company level & below)
E. Other (Battalion level & above)

4. Race

A. Black
B. White
C. Other

5. Ethnic Background

A. Hispanic
B. Asian American or Oriental
C. Native American
D. Other

6. Is your present salary sufficient to provide you with a decent standard of living?

A. I can live quite comfortably within my salary.
B. My salary is adequate to meet my needs.
C. It is difficult to live decently with my salary.
D. Trying to live within my salary imposes a great hardship on me and my family (if any).
E. I can get by on my salary only by going heavily in debt.

7. What is your level of education?

A. Less than high school
B. High school or G.E.D. diploma
C. Some college
D. College degree
E. Advanced degree

8. What type of unit are you in?

A. Combat
B. Combat Support
C. Combat Service Support

9. To what extent does your job require you to <u>work closely with other people</u> (either civilian or soldiers in related jobs in your own organization)?

A----------B----------C----------D----------E

Very little; dealing with other people is not at all necessary in doing the job.	Moderately; some dealing with others is necessary.	Very much; dealing with other people is an absolute essential and crucial part of doing the job.

10. To what extent do your <u>supervisors or co-workers</u> let you know how well you are doing on your job?

A----------B----------C----------D----------E

Very little; people almost never let me know how well I am doing.	Moderately; sometimes people may give me "feedback;" other times they may not.	Very much; managers or co-workers provide me with almost constant "feedback" about how well I am doing.

11. To what extent <u>does doing the job itself</u> provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing--aside from any "feedback" co-workers or supervisors may provide?

A----------B----------C----------D----------E

Very little; the job itself is set so I could work forever without finding out how I am doing.	Moderately; sometimes doing the job provides "feedback" to me; sometimes it does not.	Very much; the job is set up so that I get almost constant "feedback" as I work about how well I am doing.

12. To what extent does your job permit you to decide on your own how to go about doing the work?

A----------B----------C----------D----------E

Very little; the job gives me almost no personal "say" about how and when the work is done.	Moderate amount; many things are standardized and not under my control but I can make some decisions about the work.	Very much; the job gives me almost complete responsibility for deciding how and when the work is done.

13. How much variety is there in your job? That is, to what extent does the job require you to do different things at work, using a variety of your skills and talents?

A----------B----------C----------D----------E

Very little; the job requires me to do the same routine things over and over again.	Moderate variety	Very much; the job requires me to do many different things, using a number of different skills and talents.

14. In general, how significant or important is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people?

A----------B----------C----------D----------E

Very insignificant; outcomes of my work are not likely to have instant effects on other people.	Moderately significant.	Highly significant; the outcomes of my work can affect other people in very important ways.

15. What is your evaluation of the overall work effectiveness of your company/troop/battery?

A. Not effective
B. Slightly effective
C. Effective
D. Very effective
E. Extremely effective

16. Compared to all other units that you have ever served in how effective is your company/troop/battery?

A----------B----------C----------D----------E

Least effective — Most effective

17. How many improvements would it take to make this unit the most effective company/troop/battery that you have ever served in?

A. Many improvements are needed
B. Quite a few improvements are needed
C. Few improvements are needed
D. Very few improvements are needed
E. No improvements are needed

SECTION B

The following questions (18-28) concern your current supervisor. Please use the response scale below.

A	B	C	D	E
To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent

18. To what extent is your supervisor friendly and easy to approach?

19. When you talk with your supervisor, to what extent does he pay attention to what you're saying?

20. To what extent is your supervisor willing to listen to your problems?

21. To what extent does your supervisor maintain high standards of performance?

22. To what extent does your supervisor encourage people to give their best effort?

23. To what extent does your supervisor offer new ideas for solving job-related problems?

24. To what extent does your supervisor show you how to improve your performance?

25. To what extent does your supervisor provide the help you need so that you can schedule work ahead of time?

26. To what extent does your supervisor encourage the persons who work for him to work as a team?

27. To what extent does your supervisor encourage people who work for him to exchange opinions and ideas?

28. To what extent does your supervisor know what he is doing?

SECTION C

The following scale is used to indicate your agreement or disagreement with statements (29-89).

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

29. My job itself is not very significant or important in the broader scheme of things.

30. My job is one where a lot of other people can be affected by how well the work gets done.

31. My job is arranged so that a person does not have the chance to do an entire piece of work from beginning to end.

32. My job provides a person with the chance to finish completely any work he or she starts.

33. My job denies a person any chance to use his or her personal initiative or discretion in carrying out the work.

34. My job gives a person considerable opportunity for independence and freedom in how he or she does the work.

35. I am working in the job areas for which I have been trained.

36. I get all the information I need about what is going on in other sections or departments in my unit.

37. The information I received down through formal channels is generally accurate.

38. All in all, I am satisfied with my job.

39. In general, I feel that I have gotten a fair deal from the Army.

40. Considering my skills and the effort I put into the work, I am satisfied with my pay.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

41. All in all, I am satisfied with my supervisor.

42. All in all, I am satisfied with the persons in my work group.

43. All in all, I am satisfied with the Army compared to most other organizations.

44. My job requires a lot of cooperative work with other people.

45. My job can be done adequately by a person working alone-- without talking or checking with other people.

46. The supervisors and co-workers on this job almost never give a person any "feedback" about how well he or she is doing the work.

47. Supervisors often let the person know how well they think he or she is performing the job.

48. Just doing the work required by my job provides many chances for a person to figure out how well he or she is doing.

49. My job is quite simple and repetitive.

50. My job provides very few clues about whether or not the person is performing well.

51. My job requires a person to use a number of complex or sophisticated skills.

52. My unit is willing to try new or improved methods of doing work.

53. Work priorities are established in line with the unit's objectives.

54. Meetings in this unit generally accomplish meaningful objectives.

55. I am not afraid to make an occasional mistake.

56. Decisions are made in this unit at those levels where the most adequate information is available.

57. The job I have is a respected one on this post.

58. Decisions are made in this unit after getting information from those who actually do the job.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

59. My unit is respected on this post.

60. People in my work group work hard.

61. I would like to stay in this unit as long as I can.

62. I get a sense of accomplishment from the work I do.

63. Workload and time factors are taken into consideration in planning our work group assignments.

64. I look forward to coming to work every day.

65. This unit places a high emphasis on accomplishing the mission.

66. I want to contribute my best efforts to the unit's mission and my assigned tasks.

67. My performance evaluations and efficiency reports have been helpful.

68. This unit has a real interest in the welfare of assigned personnel.

69. My job helps me to achieve my personal goals.

70. I have enough time off to take care of my personal and family needs.

71. There is enough emphasis on competition in this unit.

72. There is reverse discrimination in this unit.

73. Rules in this unit are enforced.

74. There is racial discrimination against minorities in this unit.

75. There is a little interference from outside units in doing our work.

76. My supervisor puts suggestions by the members of the unit into operation.

77. There is a good working relationship among the personnel in this unit.

78. My supervisor acts without consulting the men in the unit.

79. My job is directly related to meeting the unit's goals.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

80. My supervisor refuses to explain his actions.

81. This unit is able to respond to all the demands put on it to accomplish its mission.

82. My supervisor decides what shall be done and how it shall be done.

83. My supervisor makes sure his role in the company is understood by the men.

84. My supervisor insists that individuals follow standard operating procedures.

85. My supervisor lets individuals know what is expected of them.

86. My supervisor sees to it that the work of the company is coordinated.

87. My unit does not have a drug problem.

88. Excessive drinking is not a problem in my unit.

89. People of all races get along well with each other in this unit.

90. What is your evaluation of the <u>overall</u> work effectiveness of your battalion?

A. Not effective
B. Slightly effective
C. Effective
D. Very effective
E. Extremely effective

91. Compared to all other units that you have <u>ever served</u> in how effective is <u>your</u> battalion?

A----------B----------C----------D----------E

Least effective — Most effective

92. How many improvements would it take to make this unit the <u>most effective</u> battalion that you have ever served in?

A. Many improvements are needed
B. Quite a few improvements are needed
C. Few improvements are needed
D. Very few improvements are needed
E. No improvements are needed

The next series of items deals with your opinion concerning the use of Organizational Effectiveness (OE). For each of the unit conditions described below, please indicate how much you would welcome the services of an Organizational Effectiveness Staff Officer (OESO). Do this by using the following response scale.

A. I would be strongly opposed to calling in an OESO under these circumstances.

B. I would be opposed to calling in an OESO under these circumstances.

C. I would be neither opposed nor in favor of calling in an OESO under these circumstances.

D. I would be in favor of calling in an OESO under these circumstances.

E. I would be strongly in favor of calling in an OESO under these circumstances.

If you do not feel that you are familiar enough with the Organizational Effectiveness program to make these judgements, skip items 93 to 97.

93. Your unit is having difficulty accomplishing its objectives and it is having serious morale problems.

94. Your unit is functioning smoothly but you feel that it could be better.

95. Your unit is reasonably effective in accomplishing its objectives but it has a serious morale problem.

96. Your unit is quite likely to fail an upcoming evaluation.

97. Your unit is having difficulty accomplishing its objectives but has no apparent morale problems.

SECTION D

In this section we would like to ask you some questions about your experiences and policies for dealing with "problem" and "marginal" soldiers. By problem soldiers, we mean those who are AWOL, get article 15s, and/or who are adversely separated from service. By marginal soldiers we mean those you might recommend for discharge under the Trainee Discharge Program (TDP) or the Expeditious Discharge Program (EDP).

In responding to these items, use the following response scale:

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

98. "I can usually predict within the first couple of weeks which first tour soldiers are going to get into trouble in my unit."

99. "Most of those who get into trouble in my unit were in trouble before they got to my unit."

100. "My mission is readiness. I do not have time to try to make marginal soldiers into productive ones."

101. "Most soldiers separated under the Expeditious Discharge Program (EDP) have always been marginal performers."

102. "The EDP is an extremely useful management tool for dealing with soldiers who cannot or will not adjust to the demands of Army life."

103. "Soldiers discharged under EDP should receive Honorable, not General, Discharges."

104. "The reasons for discharge under EDP should be as thoroughly documented and defendable as the reasons for discharge under Chapter 13 (Unsuitable or unfit)".

105. "Soldiers who ask for EDP discharges should be given them. Otherwise, they will keep "screwing-up" until you have to discharge them anyway."

106. "Those recommended for EDP discharge are better off taking them than fighting them."

107. "The policy of transferring potential EDP discharges from one section/platoon or company to another before considering them for discharge is a good idea."

108. "Potential EDP dischargees should be personally interviewed by the battalion commander before the final decision is made to discharge them."

109. "EDP discharges involve too much red tape and paper work."

110. How do those below you in the chain-of-command feel about the number of EDP discharges you recommend/approve?

A. They would like to see more.
B. They feel the number is about right.
C. They would like to see less.

111. How do those above you in the chain-of-command feel about the number of EDP discharges you recommend/approve?

A. They would like to see more.
B. They feel the number is about right.
C. They would like to see less.

112. What percent of first term soldiers in this company perform so poorly that the company would be better off without them?

A. 0%
B. 5%
C. 10%
D. 20%
E. 30% or more

113. What percent of your time is spent on administrative matters related to poor performance of marginal or problem soldiers?

A. 0%
B. 5%
C. 10%
D. 20%
E. 30% or more

114. What percent of marginally performing first term soldiers can be made into productive ones by counseling, inter-unit transfer, or some other technique available at the company level?

A. less than 10%
B. 10 to 19%
C. 20 to 29%
D. 30 to 39%
E. 40% or more

115. What percent of your time is spent trying to remotivate or salvage marginal or problem soldiers?

A. 0%
B. 5%
C. 10%
D. 20%
E. 30% or more

116. What percent of first term soldiers entering the Army in a given month will be discharged for all reasons, prior to completion of first tour?

A. Less than 10%
B. 10 thru 20%
C. 21 thru 30%
D. 31 thru 40%
E. 41 thru 50%

Please look at the following 11 questions and tell us: (1) which is the most important reason men are discharged under EDP and (2) which other reasons are also important. Mark in A, B, or C on your answer sheet to show whether a given reason is:

A. The main reason
B. Important, but not the main reason
C. Not important

Note: Only one of the following eleven questions (numbers 117 through 127) should be answered "A" (The main reason.)

117. The current generation of soldiers lack self-discipline.

118. Current recruiting/enlistment standards are too low.

119. Discipline standards in the Army are too low.

120. Not enough soldiers are discharged under the Trainee Discharge Program.

121. BCT/AIT does not adequately prepare soldiers for their job or life in TO&E units.

122. Those discharged have too many personal, family, or financial problems to make productive soldiers.

123. The Army makes it too easy to get out.

124. Soldiers become disenchanted with the Army.

125. Soldiers receive too much harassment.

126. Company leaders lack the time or techniques to make marginal soldiers into productive ones.

127. Other (other important reasons should be spelled out on the back of your answer sheet).

78:5203b

DEMOGRAPHIC INFORMATION
(Supervisor)

PART I

Name _____
Last First MI

Rank _____ Age _____ Time in Grade (months) _____

SSN _____ Length of Service (months) _____

PMOS _____ Date Assigned _____

SMOS _____ Date Assigned _____

PART II

1. What is needed to make the 05C/F a better soldier/operator?

	Yes	No
a. More school training	____	____
b. Higher entry level	____	____
c. More unit/individual training	____	____
d. Closer supervision on the job	____	____
e. More field exercises	____	____
f. More time on equipment	____	____
g. Quicker promotions	____	____
h. Better working conditions	____	____
i. Rewards for goals reached	____	____
j. Punishment for goals not reached	____	____

k. Other _____

_____

2. How many school trained 05C/F soldiers have you supervised through On-Job-Training or On-Job-Evaluation?Males___Females___

3. On the average, how much OJT or OJE training time is required to produce a soldier capable of operating a RATT Rig with minimum supervision?One week ___2 to 3 weeks___4 to 6 weeks___ More than 6 weeks ___

4. How many non-school trained soldiers have you supervised through OJT or OJE? Males _____ Females _____

5. How much OJT or OJE training time is required for the non-school trained soldier to be capable of operating a RATT Rig with minimum supervision?One week ___ 2 to 3 weeks ___ 4 to 6 weeks ___ More Than 6 weeks ___

PART III

Section A

Since your assignment as a supervisor, what percentage of the 05C/F Signal School graduates have been able to perform the following job tasks upon arrival in the unit?

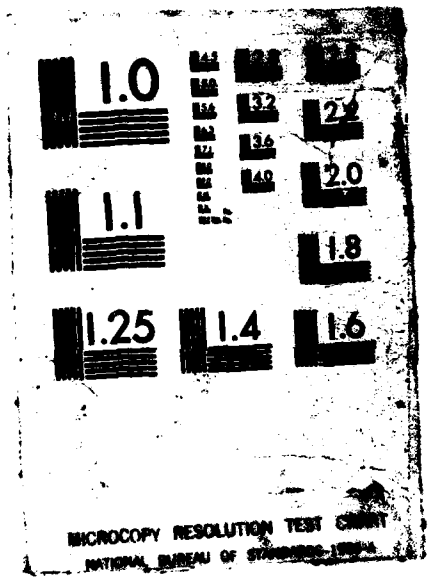
	0%	1-25%	26-50%	51-75%	76-100%
Establish a RATT Site					
a. Check equipment for completeness	___	___	___	___	___
b. Site RATT Set	___	___	___	___	___
c. Ground shelter	___	___	___	___	___
d. Erect whip antenna	___	___	___	___	___
e. Connect correct power cables	___	___	___	___	___
f. Erect shade tarpaulin	___	___	___	___	___
g. Place TSEC/KW-7 in rack provided	___	___	___	___	___
h. Connect signal cables to TSEC/KW-7	___	___	___	___	___
i. Position vehicle boarding ladder	___	___	___	___	___
j. Site generator set	___	___	___	___	___
k. Ground generator set	___	___	___	___	___
l. Connect auxiliary fuel hose	___	___	___	___	___
m. Set voltage/phase switch (output selector switch) to the desired voltage/phase position	___	___	___	___	___
n. Perform starting procedures	___	___	___	___	___

	0%	1-25%	26-50%	51-75%	76-100%
o. Start generator set electrically	____	____	____	____	____
p. Start generator set manually	____	____	____	____	____
q. Perform operating procedures	____	____	____	____	____
r. Perform stopping procedures	____	____	____	____	____
s. Operate required vehicles	____	____	____	____	____

On the average, how much time was needed to bring those graduates to minimum acceptable performance? _____weeks

AD-A186 326 ARMY TRAINING STUDY: TRAINING EFFECTIVENESS ANALYSIS (TEA) SUMMARY VOLUME (U) ARMY TRAINING AND DOCTRINE COMMAND FORT MONROE VA F J BROWN 08 AUG 78 5/6

UNCLASSIFIED SBI-AD-F000 110 F/G 15/1 NL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1.1
1.25
1.4
1.6
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

PART III

Section D

Since your assignment as a supervisor, what percentage of the 05C/F Signal School graduates have been able to perform the following job tasks upon arrival in the unit?

	0%	1-25%	26-50%	51-75%	76-100%
Operate RATT Set AN/GRC-142 or AN/GRC-122					
a. Determine operating frequency from current CEOI	____	____	____	____	____
b. Perform preliminary starting procedures	____	____	____	____	____
c. Preset	____	____	____	____	____
d. Perform tuning procedures	____	____	____	____	____
e. Adjust for local one-way reversible 85 Hz TTY operation	____	____	____	____	____
f. Adjust for local duplex 85 Hz TTY operation	____	____	____	____	____
g. Establish communication & open net	____	____	____	____	____
h. Prepare msg	____	____	____	____	____
i. Send/Receive msg in secure mode	____	____	____	____	____
j. Maintain station log	____	____	____	____	____
k. Perform stopping procedures	____	____	____	____	____

PART III

Section E

Since your assignment as a supervisor, what percentage of the 05C/F Signal School graduates have been able to perform the following job tasks upon arrival in the unit?

	0%	1-25%	26-50%	51-75%	76-100%
Install & Operate Radio Set Control Group AN/GRA-6					
a. Install radio set control group AN/GRA-6	___	___	___	___	___
b. Prepare remote control C-433/GRC or radio set control group AN/GRA-6 for installation	___	___	___	___	___
c. Prepare local control C-434/GRC or radio set control group AN/GRA-6 for installation	___	___	___	___	___
d. Connect local control C-434/GRC to radio set AN/VRC-46	___	___	___	___	___
e. Connect field wire WD-1/TT between local and remote control units of radio set control group AN/GRA-6	___	___	___	___	___
f. Perform preliminary starting procedures	___	___	___	___	___
g. Conduct telephone communication between control units	___	___	___	___	___
h. Conduct push-to-talk operations	___	___	___	___	___
i. Conduct break-in operation	___	___	___	___	___

PART III

Section F

Since your assignment as a supervisor, what percentage of the 05C/F Signal School graduates have been able to perform the following job tasks upon arrival in the unit?

	0%	1-25%	26-50%	51-75%	76-100%
Install & Operate Radio Set Control Group AN/GRA-39					
a. Prepare local control unit C-2329/GRA-39 for installation	____	____	____	____	____
b. Prepare remote control unit C-2928/GRA-39 for installation	____	____	____	____	____
c. Connect local control unit C-2329/GRA-39 to radio set AN/VRC-46	____	____	____	____	____
d. Connect remote control unit C-2328/GRA-39	____	____	____	____	____
e. Insure radio set control group AN/GRA-39 is properly installed	____	____	____	____	____
f. Start local control unit C-2329/GRA-99	____	____	____	____	____
g. Start remote control unit C-2328/GRA-39	____	____	____	____	____
h. Conduct telephone communication check between local & remote control units	____	____	____	____	____
i. Conduct radio transmission & reception check from remote control unit	____	____	____	____	____
j. Conduct radio transmission & reception check from local control unit	____	____	____	____	____

	0%	1-25%	26-50%	51-75%	76-100%
j. Conduct stopping procedures	___	___	___	___	___

PART III

Section G

Since your assignment as a supervisor, what percentage of the 05C/F Signal School graduates have been able to perform the following job tasks upon arrival in the unit?

	0%	1-25%	26-50%	51-75%	76-100%
Install & Operate Radio Set AN/GRC-106					
a. Position AN/GRC-106 in mount	____	____	____	____	____
b. Connect all cables	____	____	____	____	____
c. Connect audio accessories	____	____	____	____	____
d. Install whip antenna	____	____	____	____	____
e. Determine operating frequency from CEOI	____	____	____	____	____
f. Implement preliminary starting procedures	____	____	____	____	____
g. Conduct starting procedure	____	____	____	____	____
h. Conduct tuning procedures for CW operation	____	____	____	____	____
i. Conduct CW & Voice operating procedures	____	____	____	____	____
j. Establish communication & open net	____	____	____	____	____
k. Prepare msg	____	____	____	____	____
l. Send/Receive msg	____	____	____	____	____
m. Maintain station log	____	____	____	____	____
n. Perform stopping procedures	____	____	____	____	____

PART III

Section H

Since your assignment as a supervisor, what percentage of the 05C/F Signal School graduates have been able to perform the following job tasks upon arrival in the unit?

	0%	1-25%	26-50%	51-75%	76-100%
Install & Operate Radio Set AN/VRC-46 (AN/VRC-12 Series)					
a. Insure power switch on receiver-transmitter is off	___	___	___	___	___
b. Clean surface of mount MT-1029/VRC, and remove electrical connector cover from radio receptacle	___	___	___	___	___
c. Insert receiver-transmitter into MT-1029/VRC	___	___	___	___	___
d. Tighten MT-1029/VRC clamps	___	___	___	___	___
e. Erect antenna AS-1729/VRC or AT-912/VRC	___	___	___	___	___
f. Determine operating frequency from current CEOI	___	___	___	___	___
g. Align receiver-transmitter	___	___	___	___	___
h. Establish communication and open net	___	___	___	___	___
i. Prepare msg	___	___	___	___	___
j. Send/Receive msg	___	___	___	___	___
k. Maintain station log	___	___	___	___	___
l. Perform stopping procedures	___	___	___	___	___

INSTRUCTIONS

1. This questionnaire has two parts: an answer sheet and a question booklet. The section that you are now reading is the question booklet. Check to see that you have an answer sheet.

2. Read each statement carefully.

3. As soon as you understand a statement, decide how much you agree with it. Your first impressions are more valuable than your second thoughts.

4. After you have decided on your answer, it will be recorded on the separate Answer Sheet that indicates the amount of your agreement.

5. If no answer category exactly expresses your thoughts, use the best answer available. Be sure to mark only one answer for each statement and to respond to all statements.

6. Be sure to follow the answer sheet carefully. Match the numbers on the answer sheet with the number of each statement.

7. Please use a pencil in completing this form.

8. Please do not make any marks on the Question Booklet.

9. Now that you have completed the instructions, please go to Section A and begin responding to the statements.

SECTION A

In this section each question has the scale printed under it. Put your answer to these questions (numbers 1 to 24) on the answer sheet.

1. Sex

   A. Male
   B. Female

2. Marital Status

   A. Single
   B. Married, living with family
   C. Married, separated from family due to lack of affordable housing
   D. Married, separated from family due to other reasons
   E. Divorced

3. Housing

A. On post - barracks
B. On post - family housing
C. On post - other
D. Off post - government furnished housing
E. Off post - civilian housing

4. Race

A. Black
B. White
C. Other

5. Ethnic Background

A. Hispanic
B. Asian American or Oriental
C. Native American
D. Other

6. Is your present salary sufficient to provide you with a decent standard of living?

A. I can live quite comfortably within my salary.
B. My salary is adequate to meet my needs.
C. It is difficult to live decently with my salary.
D. Trying to live within my salary imposes a great hardship on me and my family (if any).
E. I can get by on my salary only by going heavily in debt.

7. Are you on your first term of enlistment?

A. Yes
B. No

8. Is your current duty MOS the same as your primary or your alternative MOS?

A. Yes
B. No

9. What is your level of education?

A. Less than high school
B. High school or G.E.D. diploma
C. Some college
D. College degree
D. Advanced degree

10. What type of unit are you in?

A. Combat
B. Combat Support
C. Combat Service Support

11. Were you trained in the specialty you asked for when you enlisted?

A. Yes
B. No

12. At the time you decided to enlist in the Army, were you working at a job for which you were being paid?

A. Yes
B. Yes and I supervised others
C. No

13. Prior to your entering the Army, did anyone tell you or suggest to you that you could be honorably discharged prior to completing your term of enlistment simply because you did not choose to stay in the Army?

A. Yes, my recruiter told me
B. Yes, someone else told me
C. Don't remember
D. No

14. Which of the following best describes your career intentions at the present time?

A. I will stay in the Army until retirement
B. I will reenlist upon completion of my present obligation but am undecided about staying until retirement
C. I am undecided whether I will reenlist
D. I will probably leave the Army upon completion of my present obligation
E. I will definitely leave the Army upon completion of my present obligation.

15. Have you ever tried to see your company/troop/battery commander?

A. I never tried to get to see him
B. I was able to get to see him without any trouble at all
C. I was able to get to see him, but it was a lot of trouble
D. I could not get to see him at all

16. To what extent does your job require you to work closely with other people (either civilians or soldiers in related jobs in your own organization)?

A----------B----------C----------D----------E

Very little; dealing with other people is not at all necessary in doing the job.	Moderately; some dealing with others is necessary.	Very much; dealing with other people is an absolutely essential and crucial part of doing the job.

17. To what extent do your supervisors or fellow soldiers let you know how well you are doing on your job?

A----------B----------C----------D----------E

Very little; people almost never let me know how well I am doing.	Moderately; sometimes people may give me "feedback;" other times not.	Very much; managers or co-workers provide me with almost constant "feedback" doing.

18. To what extent does doing the job itself provide you with information about your work performance? That is, does the actual work itself provide clues about how well you are doing--aside from any "feedback" co-workers or supervisors may provide?

A----------B----------C----------D----------E

Very little; the job itself is set so I could work forever without finding out how I am doing.	Moderately; sometimes doing the job provides "feedback" to me; sometimes it does not.	Very much; the job is set up so that I get almost constant "feedback" as I work about how well I am doing.

19. To what extent does your job permit you to decide on your own how to go about doing the work?

A----------B----------C----------D----------E

Very little; the job gives me almost no personal "say" about how and when the work is done.	Moderate amount; many things are standardized and not under my control but I can make some decisions about the work.	Very much; the job gives me almost complete responsibility for deciding how and when the work is done.

20. How much variety is there in your job? That is, to what extent does the job require you to do many different things at work, using a variety of your skills and talents?

A----------B----------C----------D----------E

Very little; the job requires me to do the same routine things over and over again.	Moderate variety	Very much; the job requires me to do many different things, using a number of different skills and talents.

21. In general, how significant or important is your job? That is, are the results of your work likely to significantly affect the lives or well-being of other people?

A----------B----------C----------D----------E

Very insignificant; outcomes of my work are not likely to have instant effects on other people.	Moderately significant.	Highly significant; the outcomes of my work can affect other people in very important ways.

22. What is your evaluation of the overall work effectiveness of your company/troop/battery?

A. Not effective
B. Slightly effective
C. Effective
D. Very effective
E. Extremely effective

23. Compared to all other units that you have ever served in how effective is your company/troop/battery?

A----------B----------C----------D----------E

Least effective Most effective

24. How many improvements would it take to make this unit the most effective company/troop/battery that you have ever served in?

A. Many improvements are needed
B. Quite a few improvements are needed
C. Few improvements are needed
D. Very few improvements are needed
E. No improvements are needed

SECTION B

The following questions (25-35) concern your current supervisor. Please use the response scale below.

A	B	C	D	E
To a very little extent	To a little extent	To some extent	To a great extent	To a very great extent

25. To what extent is your supervisor friendly and easy to approach?

26. When you talk with your supervisor, to what extent does he pay attention to what you're saying?

27. To what extent is your supervisor willing to listen to your problems?

28. To what extent does your supervisor maintain high standards of performance?

29. To what extent does your supervisor encourage people to give their best effort?

30. To what extent does your supervisor offer new ideas for solving job-related problems?

31. To what extent does your supervisor show you how to improve your performance?

32. To what extent does your supervisor provide the help you need so that you can schedule work ahead of time?

33. To what extent does your supervisor encourage the persons who work for him to work as a team?

34. To what extent does your supervisor encourage people who work for him to exchange opinions and ideas?

35. To what extent does your supervisor know what he is doing?

SECTION C

The following scale is used to indicate your agreement or disagreement with statements (36-104).

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

36. My job itself is not very significant or important in the broader scheme of things.

37. My job is one where a lot of other people can be affected by how well the work gets done.

38. My job is arranged so that a person does not have the chance to do an entire piece of work from beginning to end.

39. My job provides a person with the chance to finish completely any work he or she starts.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

40. My job denies a person any chance to use his or her personal initiative or discretion in carrying out the work.

41. My job gives a person considerable opportunity for independence and freedom in how he or she does the work.

42. I am working in the job areas for which I have been trained.

43. I get all the information I need about what is going on in other sections or departments in my unit.

44. The information I received down through formal channels is generally accurate.

45. All in all, I am satisfied with my job.

46. In general, I feel that I have gotten a fair deal from the Army.

47. Considering my skills and the effort I put into the work, I am satisfied with my pay.

48. All in all, I am satisfied with my supervisor.

49. All in all, I am satisfied with the persons in my work group.

50. All in all, I am satisfied with the Army compared to most other organizations.

51. My job requires a lot of cooperative work with other people.

52. My job can be done adequately by a person working alone--without talking or checking with other people.

53. The supervisors and co-workers on this job almost never give a person any "feedback" about how well he or she is doing the work.

54. Supervisors often let the person know how well they think he or she is performing the job.

55. Just doing the work required by my job provides many chances for a person to figure out how well he or she is doing.

56. My job is quite simple and repetitive.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

57. My job provides very few clues about whether or not the person is performing well.

58. My job requires a person to use a number of complex or sophisticated skills.

59. My unit is willing to try new or improved methods of doing work.

60. Work priorities are established in line with the unit's objectives.

61. Meetings in this unit generally accomplish meaningful objectives.

62. I am not afraid to make an occasional mistake.

63. Decisions are made in this unit at those levels where the most adequate information is available.

64. The job I have is a respected one on this post.

65. Decisions are made in this unit after getting information from those who actually do the job.

66. My unit is respected on this post.

67. People in my work group work hard.

68. I would like to stay in this unit as long as I can.

69. I get a sense of accomplishment from the work I do.

70. Workload and time factors are taken into consideration in planning our work group assignments.

71. I look forward to coming to work every day.

72. This unit places a high emphasis on accomplishing the mission.

73. I want to contribute my best efforts to the unit's mission and my assigned tasks.

74. My performance evaluations and efficiency reports have been helpful to me.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

75. This unit has a real interest in the welfare of assigned personnel

76. My job helps me to achieve my personal goals.

77. I have enough time off to take care of my personal and family needs.

78. The officer's and NCO's in this unit ignore race problems that exist here.

79. There is enough emphasis on competition in this unit.

80. There is reverse discrimination in this unit.

81. Rules in this unit are enforced.

82. There is racial discrimination against minorities in this unit.

83. There is little interference from outside units in doing our work.

84. My supervisor puts suggestions by the members of the company into operation.

85. There is a good working relationship among the personnel in this unit.

86. My supervisor acts without consulting the men in the unit.

87. My job is directly related to meeting the unit's goals.

88. My supervisor refuses to explain his actions.

89. This unit is able to respond to all the demands put on it to accomplish its mission.

90. My supervisor decides what shall be done and how it shall be done.

91. My supervisor makes sure his role in the company is understood by the men.

92. My supervisor insists that individuals follow standard operating procedures.

93. My supervisor lets individuals know what is expected of them.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

94. The senior NCOs in my unit look out for the welfare of the individual soldier in my unit.

95. My supervisor sees to it that the work of the company is coordinated.

96. The officers in my unit care about what happens to the individual soldier in my unit.

97. The soldiers in my unit expect everyone to do their best.

98. The soldiers in my unit try to think of better ways of getting the job done.

99. The soldiers in my unit get along with each other.

100. The soldiers in my unit criticize guys who are goofing off.

101. The soldiers in my unit stick together.

102. The soldiers in my unit let you know when they think you've done a good job.

103. The soldiers in my unit don't care how well the unit does its job.

104. The soldiers in my unit just look out for themselves.

105. My unit does not have a drug problem.

106. Excessive drinking is not a problem in my unit.

107. People of all races get along well with each other in this unit.

108. I enlisted in the Army to obtain a steady job.

109. I enlisted in the Army to find out what to do with my life.

110. I enlisted in the Army to get away from money or financial problems.

111. I enlisted in the Army to travel to new places.

112. I enlisted in the Army to become eligible for veterans' benefits.

113. I enlisted in the Army to receive special training or obtain a skill.

114. In enlisted in the Army to serve my country.

SECTION C

A	B	C	D	E
Strongly Disagree	Somewhat Disagree	Neutral	Somewhat Agree	Strongly Agree

115. My possessions are safe in my living quarters.

116. I feel safe on post.

117. My dependents are safe in their living quarters (if no dependents, skip).

118. I feel safe in my living quarters.

119. Do you have the opportunity to worship in the religion of your choice?

(A) Yes
(B) No

120. With regard to obtaining adequate health care for your dependents:

(A) I have no dependents.
(B) I have had no difficulty getting adequate health care for my dependents.
(C) I have had a little difficulty obtaining adequate health care for my dependents.
(D) I have had a lot of difficulty obtaining adequate health care for my dependents.
(E) I have been unable to obtain adequate health care for my dependents.

SECTION D

The following items deal with the activities that occur in your unit. Please use the response scale below.

A. Should be greatly decreased
B. Should be decreased
C. Should remain about the same
D. Should be increased
E. Should be greatly increased

121. The number of parades in my unit:
122. The number of military ceremonies in my unit:
123. The amount of group PT in my unit:
124. The number of inspections in ranks in my unit:
125. The number of off-duty unit activities in my unit:
126. The amount of individual PT programs and competitions (e.g., running, weight-lifting).
127. The amount of inter-unit sport activities (e.g., softball, basketball).

Thank you very much for your cooperation in completing this questionnaire. Your input is valuable in obtaining a good and fair picture of your unit.

78:5203a(R)

C-76

TAB H

Test #2 Data Analysis

ARTS Test Performance Index

Test Title	Mean	SD	Max Score
Written Test W1	15.6	3.9	24
Radio Telephone Procedures W2	5.7	1.8	7
Radio Teletypewriter Procedures W3	7.0	1.7	8
AN/VRC-46 Performance Test H1	1.9	1.8	6
AN/GRA-39 Performance Test H2	2.5	2.5	6
Generator Performance Test H3	7.3	4.5	22
GRA-50 Performance Test H4	2.1	1.6	5
AN/GRC-142 Performance Test H5	21.3	13.6	73

INITIAL ANALYSIS OF ANTS DATA
COMPARE TYPES OF TRAINING
FILE NONAME (CREATION DATE = 20 JUN 78)

20 JUN 78 PAGE 7

- O N E W A Y -

VARIABLE #1 WRITTEN TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	7.1110	3.5550	.222	.803
WITHIN GROUPS	101	1620.4270	16.0438		
TOTAL	103	1627.5380			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
SCHOOL	100	15.0000	4.0796	.4070	.0000	20.0000	14.0904 TO 15.8096
OJT	1	13.0000					
OJE	3	15.6667	5.1316	2.9627	10.0000	20.0000	2.9189 TO 28.4144
TOTAL	104	15.0538	3.9751	.3898	.0000	20.0000	14.0808 TO 15.8269
FIXED EFFECTS MODEL			4.0055	.3928			14.2767 TO 15.8310
RANDOM EFFECTS MODEL			1.0767	1.0035			10.9919 TO 20.1158

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .6245, P = .072 (APPROX.)
BARTLETT-BOX F = .277, P = .606
MAXIMUM VARIANCE / MINIMUM VARIANCE = 1.063

- O N E W A Y -

VARIABLE P1 WRITTEN TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE .050 LEVEL =

2.84 3.37

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET-OF THAT SIZE)

SUBSET 1

GROUP	OJT	OJE	SCHOOL
MEAN	13.0000	15.0667	15.0000

- -

INITIAL ANALYSIS OF ARTS DATA 28 JUN 78 PAGE 9
COMPARE TYPES OF TRAINING
FILE NUNAME (CREATION DATE = 28 JUN 78)

* U N E W A Y *

VARIABLE #2 RADIOTELEPHONE TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	7.2188	3.6094	1.078	.346
WITHIN GROUPS	101	339.3100	3.3595		
TOTAL	103	346.5289			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
SCHOOL	100	5.6300	1.8513	.1851	.0000	7.0000	5.2627 TO 5.9973
OJT	1	7.0000					
OJE	3	7.0000	.0000	.0000	7.0000	7.0000	7.0000 TO 7.0000
TOTAL	104	5.6827	1.8342	.1799	.0000	7.0000	5.3260 TO 6.0394
FIXED EFFECTS MODEL			1.8329	.1797			5.3282 TO 6.0392
RANDOM EFFECTS MODEL			1.3178	.7609			2.4890 TO 8.9564

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = 1.0000, P = .000 (APPROX.)
BARTLETT-BOX F = .409, P = .530
MAXIMUM VARIANCE / MINIMUM VARIANCE = 1.000

- O N E W A Y -

VARIABLE V2 ----- RADIOTELEPHONE TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE .050 LEVEL -

2.84 3.37

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	SCHOOL	OJT	OJE
MEAN	5.0300	7.0000	7.0000

- -

INITIAL ANALYSIS OF ANTS DATA 28 JUN 78 PAGE 11
COMPARE TYPES OF TRAINING
FILE NONAME (CREATION DATE = 28 JUN 78)

- O N E W A Y -

VARIABLE #3 RADIO TELETYPEWRITER TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	52.1600	26.0800	10.802	.000
WITHIN GROUPS	101	243.8400	2.4143		
TOTAL	103	296.0000			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
SCHOOL	100	7.0400	1.5694	.1569	1.0000	8.0000	6.7286 TO 7.3514
OJT	1	.0000					
OJE	3	8.0000	.0000	.0000	8.0000	8.0000	8.0000 TO 8.0000
TOTAL	104	7.0000	1.6952	.1662	.0000	8.0000	6.6703 TO 7.3297
FIXED EFFECTS MODEL			1.5538	.1524			6.6978 TO 7.3022
RANDOM EFFECTS MODEL			5.0001	2.0868			-5.4210 TO 19.4210

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = 1.0000, P = .000 (APPROX.)
BARTLETT-BOX F = .000, P = .951
MAXIMUM VARIANCE / MINIMUM VARIANCE = 1.000

- O N E W A Y -

VARIABLE #3 RADIO TELETYPEWRITER TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE .050 LEVEL -

2.84 3.37

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	OJT
MEAN	.0000

- - - - - - - - - - -

SUBSET 2

GROUP	SCHOOL	OJE
MEAN	7.0000	8.0000

- - - - - - - - - - - - - - - - - -

ONEWAY

VARIABLE H1 AN=URG=46 TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	11.3362	5.6681	1.701	.188
WITHIN GROUPS	74	246.6119	3.3326		
TOTAL	76	257.9481			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
SCHOOL	73	1.9726	1.8482	.2163	.0000	6.0000	1.5414 TO 2.4038
OJT	1	.0000					
OJE	3	.3333	.5774	.3333	.0000	1.0000	-1.1009 TO 1.7676
TOTAL	77	1.8831	1.8425	.2099	.0000	6.0000	1.4650 TO 2.3015
FIXED EFFECTS MODEL			1.8265	.2080			1.4806 TO 2.2976
RANDOM EFFECTS MODEL			1.7257	.9963			-2.4038 TO 6.1700

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .9111, P = .000 (APPROX.)
BARTLETT-BOX F = 2.620, P = .102
MAXIMUM VARIANCE / MINIMUM VARIANCE = 10.240

- O N E W A Y -

VARIABLE M1 AN-URC-66 TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE .050 LEVEL -

2.83 3.38

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	OJT	OJE	SCHOOL
MEAN	.0000	.5333	1.9726

- -

INITIAL ANALYSIS OF ANTS DATA 28 JUN 78 PAGE 15
COMPARE TYPES OF TRAINING
FILE NUMANE (CREATION DATE = 28 JUN 78)

- U N E W A Y -

VARIABLE M2 AN-GRA-39 TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	6.4157	3.2078	.517	.604
WITHIN GROUPS	74	458.8311	6.2004		
TOTAL	76	465.2468			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
SCHOOL	73	2.5342	2.4669	.2887	.0000	6.0000	1.9587 TO 3.1098
OJT	1	.0000					
OJE	3	2.3333	3.2146	1.8559	.0000	6.0000	-5.6521 TO 10.3188
TOTAL	77	2.4935	2.4742	.2820	.0000	6.0000	1.9319 TO 3.0551
FIXED EFFECTS MODEL			2.4901	.2838			1.9281 TO 3.0589
RANDOM EFFECTS MODEL			1.7670	1.0202			-1.8981 TO 6.8831

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .0294, P = .096 (APPROX.)
BARTLETT-BOX F = .299, P = .592
MAXIMUM VARIANCE / MINIMUM VARIANCE = 1.698

ONEWAY

VARIABLE H2 AN-GHA-39 TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE .050 LEVEL -

2.03 3.38

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE) -

SUBSET 1

GROUP	OJT	OJE	SCHOOL
MEAN	.0000	2.3333	2.5342

INITIAL ANALYSIS OF ARTS DATA 28 JUN 78 PAGE 17
COMPARE TYPES OF TRAINING
FILE NONAME (CREATION DATE = 28 JUN 78)

- O N E W A Y -

VARIABLE NS GENERATOR SET TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	81.1946	40.5973	2.066	.132
WITHIN GROUPS	74	1454.3380	19.6532		
TOTAL	76	1535.5325			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
SCHOOL	73	7.5890	4.4279	.5182	.0000	22.0000	6.5559 TO 8.6222
OJT	1	4.0000					
OJE	3	2.6667	4.6188	2.6667	.0000	8.0000	-8.8072 TO 14.1405
TOTAL	77	7.3506	4.4949	.5122	.0000	22.0000	6.3304 TO 8.3709
FIXED EFFECTS MODEL			4.4332	.5052			6.3440 TO 8.3573
RANDOM EFFECTS MODEL			4.0757	2.3531			-2.7742 TO 17.4755

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .5211, P = .417 (APPROX.)
BARTLETT-BOX F = .007, P = .993
MAXIMUM VARIANCE / MINIMUM VARIANCE = 1.088

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INITIAL ANALYSIS OF ARTS DATA                                    20 JUN 78      PAGE  10
COMPARE TYPES OF TRAINING
FILE   NONAME   (CREATION DATE = 20 JUN 78)

* * * * * * * * * * * * * * * * * * * * O N E W A Y * * * * * * * * * * * * * * * * * * * *

     VARIABLE  M3    --   GENERATOR SET TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE  .050 LEVEL -

         2.83  3.50

  HOMOGENEOUS SUBSETS   (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST
                          SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET  1

GROUP       OJE          OJT          SCHOOL
MEAN      2.6667       4.0000        7.5000
* * * * * * * * * * * * * * * * * * * * * * *
```

INITIAL ANALYSIS OF ARTS DATA
COMPARE TYPES OF TRAINING
FILE NONAME (CREATION DATE = 28 JUN 78)

28 JUN 78 PAGE 19

U N I V A R

VARIABLE M4 GRA-50 TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	9.0255	4.5127	1.893	.170
WITHIN GROUPS	74	197.5434	2.6695		
TOTAL	76	207.1688			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN
SCHOOL	73	2.0411	1.6197	.1896	.0000	5.0000	1.6632 TO 2.4190
OJT	1	5.0000					
OJL	3	4.0667	4.0817	1.4019	1.0000	5.0000	-4.3845 TO 7.5179
TOTAL	77	2.1039	1.6510	.1882	.0000	5.0000	1.7492 TO 2.4786
FIXED EFFECTS MODEL			1.6530	.1882			1.7460 TO 2.4740
RANDOM EFFECTS MODEL			2.0966	1.2047			-3.0796 TO 7.2870

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .0229, P = .100 (APPROX.)
BARTLETT-BOX F = .266, P = .615
MAXIMUM VARIANCE / MINIMUM VARIANCE = 1.052

INITIAL ANALYSIS OF ARTS DATA 28 JUN 78 PAGE 20
COMPARE TYPES OF TRAINING
FILE NONAME (CREATION DATE = 28 JUN 78)

- O N E W A Y -

VARIABLE HQ - GPA-SO TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE .050 LEVEL -

2.83 3.30

HOMOGENEOUS SUBSETS (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST
SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET 1

GROUP	SCHOOL	OJE	OJT
MEAN	2.0411	2.6667	5.0000

INITIAL ANALYSIS OF ARTS DATA 28 JUN 78 PAGE 21
COMPARE TYPES OF TRAINING
FILE NONAME (CREATION DATE = 28 JUN 78)

* O N E W A Y *

VARIABLE M5 AN-GRC-142 TEST

ANALYSIS OF VARIANCE

SOURCE	D.F.	SUM OF SQUARES	MEAN SQUARES	F RATIO	F PROB.
BETWEEN GROUPS	2	196.7090	98.3545	.525	.599
WITHIN GROUPS	74	13856.1743	187.2456		
TOTAL	76	14052.8833			

GROUP	COUNT	MEAN	STANDARD DEVIATION	STANDARD ERROR	MINIMUM	MAXIMUM	95 PCT CONF INT FOR MEAN		
SCHOOL	73	21.0822	13.8140	1.6168	5.0000	73.0000	17.8591	TO	24.3052
OJT	1	35.0000							
OJE	3	22.0667	7.6376	4.4096	16.0000	31.0000	3.0935	TO	41.0398
TOTAL	77	21.3247	13.5980	1.5496	5.0000	73.0000	18.2383	TO	24.4110
FIXED EFFECTS MODEL			13.6030	1.5590			18.2175	TO	24.4319
RANDOM EFFECTS MODEL			9.7179	5.6106			-2.8101	TO	45.4655

TESTS FOR HOMOGENEITY OF VARIANCES

COCHRANS C = MAX. VARIANCE/SUM(VARIANCES) = .7659, P = .002 (APPROX.)
BARTLETT-BOX F = .894, P = .347
MAXIMUM VARIANCE / MINIMUM VARIANCE = 3.271

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INITIAL ANALYSIS OF ARTS DATA                                    20 JUN 78        PAGE  22
COMPARE TYPES OF TRAINING
FILE   NONAPE   (CREATION DATE = 20 JUN 78)

* * * * * * * * * * * * * * * * * * * * * * * * O N E W A Y * * * * * * * * * * * * * * * * * * * * * * *

     VARIABLE  MS          AN-GRC-102 TEST

MULTIPLE RANGE TEST

STUDENT-NEWMAN-KEULS PROCEDURE
RANGES FOR THE  .050 LEVEL -

          2.83  3.30

  HOMOGENEOUS SUBSETS   (SUBSETS OF GROUPS, NO PAIR OF WHICH HAVE MEANS THAT DIFFER BY MORE THAN THE SHORTEST
                         SIGNIFICANT RANGE FOR A SUBSET OF THAT SIZE)

SUBSET  1

GROUP       SCHOOL       OJE        OJT
MEAN       21.0022     22.0667    35.0000
* * * * * * * * * * * * * * * * * * * * * * * * *
```

TAB I

Comparison of Group vs Self-Paced
Instructor Performance on Test #2

1.VARIABLE LIST

VARIABLES..	LABELS..
M1	WRITTEN TEST
M2	RADIOTELEPHONE TEST
M3	RADIO TELETYPEWRITER TEST
M4	AN-UHC-46 TEST
M5	AN-GRA-39 TEST
M6	GENERATOR SET TEST
M7	GRA-50 TEST
M8	AN-GRC-122 TEST
PTEST	PMOS TEST SCORE

COMPARISON OF GROUP VS SELF-PACED INSTR. AMONG SCHOOL TRAINED SUB

FILE SPSSDATA (CREATION DATE = 28 JUN 78)

T E S T

GROUP 1 = SELFGP FQ 1.

GROUP 2 = SELFGP FQ 2.

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	t VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE t-VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE t VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
M1 WRITING TEST												
GROUP 1	52	10.0577	3.250	.452	-1.92	.047	-1.87	92	.166	-1.82	72.90	.161
GROUP 2	42	14.0810	4.517	.697								
M2 RADIOTELEPHONE TEST												
GROUP 1	52	6.4038	1.159	.161	-3.46	.000	-5.15	92	.000	-4.84	59.84	.000
GROUP 2	42	4.6190	2.152	.332								
M3 RADIO TELETYPEWRITER TEST												
GROUP 1	52	7.5000	.754	.105	-7.74	.000	-3.19	92	.002	-2.94	49.57	.005
GROUP 2	42	6.5000	2.098	.324								
M1 ARITHMETIC TEST												
GROUP 1	45	2.0005	1.064	.288	-1.07	.020	.10	60	.050	.10	55.90	.050
GROUP 2	27	1.9030	1.931	.372								
M2 ARITHMETIC TEST												
GROUP 1	45	2.5349	2.472	.377	-1.02	.000	-.10	60	.920	-.10	55.70	.920
GROUP 2	27	2.5926	2.454	.472								
M3 OPERATION SET TEST												
GROUP 1	45	6.8037	5.587	.547	-2.39	.012	-1.64	60	.107	-1.49	39.75	.145
GROUP 2	27	8.6667	5.587	1.068								

SECOND ANALYSIS OF ARTS DATA 28 JUN 78 PAGE 3
COMPARISON OF GROUP VS SELF-PACED INSTR. AMONG SCHOOL TRAINED SUB
FILE SESSDATA (CREATION DATE = 28 JUN 78)

T - T E S T

GROUP 1 - SLFGP EO 1.
GROUP 2 - SLFGP FO 2.

VARIABLE	NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
M4 GRA-50 TEST												
GROUP 1	43	1.9302	1.055	.252	1.05	.904	-.54	68	.589	-.55	56.49	.584
GROUP 2	27	2.1481	1.010	.310								
M5 AN-GRC-142 TEST												
GROUP 1	43	19.9302	12.529	1.911	1.07	.828	-.72	68	.472	-.72	53.98	.476
GROUP 2	27	22.1852	12.956	2.495								
PTEST P-OS TEST SCORE												
GROUP 1	52	54.7308	174.815	24.242	2.65	.004	1.18	93	.239	1.24	86.35	.220
GROUP 2	43	10.5581	107.437	16.384								

TAB J

Battalion 05C Assignment Table

Battalion 05C Assignment Table

Unit	Range	Means	Standard Deviation
24th Sig Bn	7-38 months	14.8 months	7.667 months
HHB 5/52nd ADA	3-24 months	10.6 months	7.871 months
HHC 5/32nd Armor Bn	11-39 months	21.2 months	10.21 months
HHC 2nd Inf Bde	9-29 months	16.5 months	7.63 months
HHT 2/9 Armor SQD	6-28 months	14 months	7.62 months
HHB Divarty	3-24 months	17.3 months	7.51 months
HHC 2/7 Armor Bn	18 months		
HHB 1st Bn FA	29 months		
HHC 3rd Eng	5-21 months	15 months	7.014 months
HHB 1/13 FA Bn	3-14 months	8.2 months	4.31 months
HHC 1st Bde	3-24 months	9.25 months	8.58 months
609 TC Aircraft Maint	23-31 months	29.2 months	4.38 months
HHC 3/19 Inf Bn	13-21 months	16.6 months	3.3 months
HHC 2/19 Inf Bn	4-27 months	15.5 months	10.11 months
HHB 1/35 FA Bn	6-23 months	12.3 months	7.59 months
HHC 2/70 Armor	6-7 months	6.5 months	.5 months
2/21st Inf Bn	8-21 months	14.5 months	6.79 months
HHB 2/35 FA	17-24 months	19.3 months	3.3 months
HHC 145th Avn Bn	19-28 months	24 months	3.74 months
132 Avn Co	6 months		
HHC 2/34 Inf	2-35 months	18.3 months	13.47 months
w/o data thrown out 24 Inf Div	2-38 months	15.651 months	7.394 months
with data thrown out 24 Inf Div	2-38 months	15.614 months	7.574 months

PART III

The Computer Assisted Map Maneuver System in Support of Army Training Study Objectives Training Effectiveness Analysis 78

CAMMS/ARTS TEA 78

The Computer Assisted Map Maneuver System in Support of Army Training Study Objectives Training Effectiveness Analysis 78

Combined Arms Training Developments Activity
and Army Research Institute Field Unit
Fort Leavenworth, Kansas

July 1978

CAMMS/ARTS TEA 78

CONTENTS

	Page
EXECUTIVE SUMMARY	1
INTRODUCTION AND PURPOSE	1
METHOD	2
RESULTS	14
Training Effectiveness	14
Refinement of Measurement Procedures	19
CAMMS as a Training Research Vehicle	23
CONCLUSIONS	26
MAIN REPORT	
INTRODUCTION	28
OBJECTIVES	30
METHOD	32
Simulation System	32
Design	35
Battalion Command Group Performance Measures	37
Experimental Measures	43
Procedure	54
RESULTS	61
Training Effectiveness	61
Refinement of Measurement Procedures	74
CAMMS as a Training Research Vehicle	90
CONCLUSIONS	98

APPENDIXES

General Situation and Mission	A
Command Group ARTEP Tasks and Subtasks	B
ARTEP Analysis of Variance (ANOVA)	C
Organizational Processes ANOVA	D
Overall Performance ANOVA	E
Staff Element Objective Rating ANOVA's	F
Objective S2, S3, FSO Scores	G

EXECUTIVE SUMMARY

INTRODUCTION AND PURPOSE

Dwindling resources, competing demands for time, and greatly increased complexity of both extant and evolving weapon and supporting systems are creating an urgent need for the identification of the most efficient and effective methods of training possible. In response to these far reaching requirements, the Army Training Study (ARTS) was established. The ARTS' mission included the exploration of methods to develop an efficient, justifiable, and achievable training system for the Army of the 1980's. ARTS formulated both a short term and a long term effort to approach the problem. Training Effectiveness Analysis (TEA) 78, the short term effort, was designed to capitalize on ongoing training development efforts with a view towards economically gleaning as much early information as possible and deriving insights and direction for the longer term TEA 85 effort.

An ongoing program at the Combined Arms Center (CAC) having to do with the development of methods to more effectively and economically train command groups was one which could provide input to TEA 78 and possibly also to TEA 85. One battlefield simulation undergoing development testing and refinement at CAC, the Computer Assisted Map Maneuver System (CAMMS), was selected as the vehicle for conducting an exploratory effort which had the following purposes.

- Estimate the training effectiveness of CAMMS. This objective was aimed at the type and amount of training improvement that could be produced through the use of low cost battlefield simulation technology, i.e., CAMMS.

- Refine performance measurement procedures. At the time this effort was initiated, Army Research Institute (ARI) and CAC personnel had been jointly working on the development of valid and reliable measures of command group performance which were based, in large part, on the Battalion Command Group Module of ARTEP 71-2. Refinement of existing measures in terms of increasing their objectivity and quantifiability as well as exploring alternative measures, thus, constituted one of the objectives of the work reported here.

- Estimate the feasibility of continuing to utilize CAMMS as a vehicle for investigating command group training. This objective is highly related to the second one. That is, the question was whether or not the CAMMS, coupled with existing and developing measurement procedures, has the sensitivity and capability required of a research tool for providing sufficient data to shed light on as yet unanswered questions associated with command group training.

METHOD

PARTICIPANTS

Three mechanized infantry and two armor battalions drawn from four brigades of two CONUS divisions participated.

SIMULATION SYSTEM

The simulation system which was evaluated and served as the vehicle for generating the data collected was the CAMMS. This system consisted of three basic components. The first, the command group itself, was

constituted of its normal complement for combat conditions. Included was the commander, principal coordinating staff members, the Air Force liaison officer, the fire support officer, and supporting NCO's and RTO's.

The second major component of the system was the controllers, a group which included: (1) a chief controller who played the role of the brigade commander; (2) a brigade S1/S4 controller; (3) brigade S2 and S3 controllers; (4) three maneuver company commander controllers; (5) a fire support controller and two to three supporting forward observers; (6) a direct air support controller; and (7) an opposing force (OPFOR) controller. All controllers, except those playing the brigade commander and principal coordinating and special staff, maneuvered "troops" and items of simulated equipment on a game board which served as the terrain on which the battle was fought. Based upon calculations produced by supporting computer software and the events unfolding on the game board, both game board and brigade controllers provided realistic feedback and guidance to the command group players. A second major function of the brigade level controllers was to provide subjective ratings of how well the command groups performed on an overall basis as well as on selected ARTEP subtasks. An adjunct member of the controller staff was a Tactical Operations Center (TOC) monitor who observed the activities of the command group during planning and operational phases for the purposes of providing post exercise feedback and ratings of the command group's behavior for analysis.

A computer subsystem constituted the third major component of the CAMMS. This subsystem was designed to support military and logistics problems, greatly reduce map maneuver preparation time, and provide faster and more accurate computations. Artillery, air, mortars, helicopters, admin/log, and intelligence functions were processed for both the friendly force and the OPFOR. The system would accommodate task organizations ranging from specific teams up to the task force level.

DESIGN

A pre-test/post-test design was used to address explicitly the first and implicitly the second and third objectives of the effort. Thus, three separate exercises were conducted. The first and the last exercises constituted the pre- and post-tests respectively and a training exercise or treatment condition followed the diagnostic pre-test. A covering force mission executed in the Friedberg-Frankfurt area, was the one assigned during all exercises. The general scenario was always the same with the terrain being the only parameter which varied across the three exercises.

Time and the availability of command groups precluded including a control group to verify that performance gains, if any, which occurred were a function of the training received rather than extraneous or other potentially confounding variables. It was also necessary to use the CAMMS as both the testing and training vehicle. These shortcomings, along with the limited size of the sample, substantially reduce the confidence which otherwise could be placed in the results that were obtained.

BATTALION COMMAND GROUP PERFORMANCE MEASURES

Performance measures in this category were, in whole or for the most part, based upon the subtasks enumerated in the command group module of ARTEP 71-2. For purposes of presentation and discussion, they were broken down into subjective and objective categories. These are discussed, in turn, below.

Subjective Measures. Forty-seven of the 61 subtasks contained within the ARTEP, were subsumed in this category. The remaining 14 subtasks were not investigated either because they could not be readily observed or readily elicited. Appendix B to the main report identifies the subtasks that were examined. Within the subjective category were also included measures of organizational process variables which have previously been used in the investigation of unit effectiveness. These process variables included: acquiring information-sensing relevant aspects of the external and internal environment; communicating information-transmitting the sensed information; decision making-deciding what should be done in response to acquired information; communicating instructions and orders-communicating the decision and implementing orders; and monitoring-obtaining feedback concerning the results of the actions taken.

At least two controllers provided ratings of how well the command group performed each of the ARTEP subtasks with reference to the conditions and standards established therein. They also provided performance estimates for the overall command group, the commander, the S1, S2, S3, S4, FSO and ALO and four each of the organizational process variables. The

average or composite judgment of the raters was used as the measure for analysis.

Objective Measures. Objective performance measures were developed for a subset of 19 ARTEP subtasks whose standards were amenable to more rigorous quantification. These more objective performance measures were developed with the aid of military experts and through a process which involved decomposing a subtask into its more fundamental elements. For these measures, the appropriate controller would merely determine whether or not each of the elements of the subtask was present or absent, and the average number of elements present constituted the score which was analyzed.

EXPERIMENTAL MEASURES

These measures, as opposed to those described above, were not viewed as indices of command group performance. The variables addressed represented a set which prior research and deductive analyses have shown or suggested impact on unit effectiveness. Included here as well are speculative measures of battlefield outcomes which logically would be expected to relate to the proficiency of the command group as reflected in more conventional performance measures. Both subjective and objective measures were developed. These categories are discussed, in turn, below:

Subjective Measures. The chief controller and TOC monitor provided estimates of the extent to which the command groups were able to accomplish the major tasks of the covering force mission. Additionally,

they provided a global estimate of mission accomplishment. The measures falling within this subjective category are the following:

- Enemy Thrust. The accuracy with which the command group identified the enemy's major thrust.
- Decisive Engagement. The number of times the task force became decisively engaged.
- Task Force Losses. Estimate of the friendly losses during the execution phase.
- OPFOR Losses. Enemy force losses incurred during the execution phase.
- Mission Accomplishment. An overall estimate of the extent to which the command group accomplished its assigned mission.

Objective Measures. A wide range of variables of this type were investigated. The first, which forms a category of its own, has to do with the locus of control within the unit. Contained within the second and third categories of measures are ones which relate to the intelligence process and reaction to battlefield contingencies and battlefield outcomes respectively. The specific measures falling within each of these categories are the following:

- Locus of Control. Lessons learned from the 1967 and 1973 Mid-East Wars suggest that this variable can significantly affect the performance of fighting units. Decentralizing control of forces and other assets to the battalion level seemed to make it possible for the Israelies to more readily capitalize on fleeting moments of opportunity and created conditions conducive to innovation and improvisation. For these reasons, the locus of control variable was investigated in the present effort.

• Intelligence Operations and Reaction to Battlefield Contingencies. Previous work conducted by ARI with another simulation under development at CAC, the Combined Arms Tactical Training Simulator (CATTS), has shown that of the ARTEP subtask areas investigated, two general areas appear to be especially important. These areas are intelligence processing (conceived to consist of information acquisition/transmission and processing components) and the ability of the command group to perform that complex of activities involved in rapidly shifting forces in response to battlefield contingencies in order to mass the forces at the appropriate time and place. The measures included in the intelligence and concentrate/shift combat power areas are identified below.

• Intelligence Processing. Two quantitative measures were identified which might be reflective of the quality of performance of this process.

1. Communication between the Companies and Battalions. The transmissions examined included those from the company commanders requesting information, company commanders providing information, battalion commanders providing information, and battalion commanders requesting information. The transactions which took place in each of these categories were sampled for 15 minutes of every hour during the exercise.

2. Battlefield Visability. It was conjectured that the extent to which events on the battlefield could be "seen" by lower level task force units could affect the quality and quantity of information potentially available for input into the intelligence process. The distance between

each battle position and all natural or man-made obstacles and terrain features which interrupted line-of-sight was obtained and averaged across battle positions.

- Shift and Concentrate Forces. Five measures were identified which indirectly could reflect the ability of the command group to react approriately to battlefield exigencies. They are the following:

1. The distance between each of the assigned battle positions and main and alternate supply points. Anticipating contingencies should reflect itself in planning these critical battle and supply points. Additionally, it should also represent to a certain extent the fidelity of S3 and S1/S4 coordination.

2. The distance among battle positions. This measure could reflect in part the quality of judgment involved in making compromises between the knowns and unknowns of the situation in terms of positioning the task force's units.

3. Number of battle positions. This measure should be related to the one above and should reflect anticipated exigencies that may develop.

4. Distance of specified battle positions from each battle. The same rationale provided for the distance among battle positions measure described above applies here as well.

5. Engagement range of all battles fought. If one assumes that a task force mission carries with it the responsibility of engaging the enemy at the maximum possible range in order to inflict the greatest

number of casualties while at the same time minimizing friendly force losses, then the greater the range at which skirmishes occur within a given envelope should be indicative of relatively superior performance.

Battlefield Outcomes. Logically, the quality of the command and control component of the fighting force should be significantly related to the outcomes of battle. Obviously, there will be isolated exceptions to this, but on balance, some relationship should hold. To explore the extent to which command group performances were related to battlefield outcomes as determined via battle simulation, data on three crude battlefield outcome measures were obtained. These were: friendly unit equipment losses, friendly unit personnel losses, and ground lost or given up during the exercise.

PROCEDURE

Data Collection Team. A team, consisting of members provided by the (1) division from which the participating units came and (2) CAC and ARI collected data on all command group performance and experimental measures. The brigade level data collectors and game board players were controllers provided by the participating units' parent organization. The same individuals served in their respectively assigned roles, ones for which they had prior experience in all but a few isolated instances, for all exercises conducted within the division.

A TOC monitor as well as the chief controller were provided by CAC. The monitor's chief function was to observe ongoing activities of all command group members resident in the TOC and from these observations

provide subjective performance ratings. The chief controller, who monitored all game board activities and, thus, had nearly complete knowledge of the inputs received from the command group and the actions which resulted, provided ratings of those command group performances that he was in the best position to "observe."

Two ARI personnel constituted the third component of the data collection team. These individuals gathered the raw data associated with the objective experimental variables previously defined. They also monitored ongoing activities during the conduct of the exercise to insure that procedure was being followed vis-a-vis experimental design and control measures and assisted any of the data collectors/raters who had difficulty responding to or understanding the data collection instruments.

Test and Training Exercise

The procedure followed to gather data related to the subjective and objective command group performance measures and the more speculative experimental measures consisted of four basic components, all of which were completed over a four-day period. The schematic below depicts these four components.

The first component was an orientation/training session. During the initial portion of this session, both the controllers and players were briefed by ARI personnel and the chief controller concerning the overall objectives of the ARTS effort and what part the present investigation and they would play in accomplishing those objectives. They were familiarized with the experimental design and the general scenario to be used for all exercises, and were provided copies of the training objectives which were, in effect, the 47 ARTEP subtasks on which most of the data were collected. During the second half of the orientation session, only the controllers were present. They were (1) introduced to the data collection instruments and provided instructions on how to use them, (2) provided guidance concerning more specialized procedural requirements, and (3) given training concerning how to perform their assigned roles and functions as these related to the mechanics of the game.

Following the orientation session, the pre-test exercise was begun. The battalion received the brigade OPORD, developed plans, issued its OPORD to the companies, and then accomplished the execution phase of the play. Following the execution, a feedback session was held during which both general and highly specific feedback was given. The specific feedback was provided by the brigade level controller counterpart of the command group member in a one-on-one session. This same sequence of events was also followed for the training and post-test exercise. The training session differed from the pre- and post-test exercises

only in terms of the length of the execution phase, which was approximately twice as long. Also, only a general debriefing, rather than a complete feedback session was held after the execution phase of the post-test exercise.

RESULTS

Findings are described below in three sections corresponding with the three major objectives of the effort. Additional findings and indications may be forthcoming when time permits a more exhaustive analysis of the data. These will be separately documented.

TRAINING EFFECTIVENESS

The primary basis used for assessing training effectiveness was the nature and amount of performance change occurring subsequent to the diagnostic (pre-test) exercise. Also of interest was the ability of measures to differentiate or distinguish strengths and weaknesses among the components of performance. The data were tabulated, statistically analyzed and are discussed for each major type of performance measure. Because large numbers of statistically significant results were not likely with a sample size of five, trends and consistancies received greater attention than usual.

Subjective ARTEP Subtask and Task Ratings

There were statistically significant differences in rated performance attributable to the (1) exercise session, (2) subtask being judged, and (3) tasks comprised of those subtasks. Also the significant interaction obtained indicated that differences among exercise sessions were not uniform across all subtasks and tasks. The following table shows the change in mean performance across the three exercise sessions, i.e., pre-test, training, post-test, for the 12 ARTEP tasks. Differences

COMPARISON OF ARTEP TASKS FOR THE

PRE, TRAIN AND POST TESTS EXERCISES[a]

ARTEP Tasks	Difference Between Exercises[b] 2-1	3-1	3-2
Develop Plan Based on Mission	.26	.44	.18
Initiate Intel Prep on Battlefield	.56*	.51	-.05
Prepare and Organize Battlefield	.42	.51	.09
Troop Lead	-.74*	.30	1.04*
See the Battlefield During Battle	.40	.40	0.00
Control and Coordinate Combat Operations	.59*	.59*	0.00
Employ Fires and Other Combat Assets	.45	.43	-.02
Concentrate and Shift Combat Powers	.43	.34	-.09
Manage CSS Assets	.18	.62*	.44*
Secure and Protect TF	.43	.49	.06
Troop Lead During Battle	.20	.16	-.04
Situation Requiring Special Actions	2.10*	2.70*	.60*

[a] Data are extracts from Table 2

[b] 1 = Pre-test exercise, 2 = Training exercise, 3 = Post-test exercise
Maximum possible difference = 4.0

* Significant at $P < .05$ level

between post- and pre-test performance were statistically significant for four of the 12 tasks and a numerical improvement occured for 11 of the 12. Similarly the data analyzed at the subtask level produced 13 significant differences but 46 of the 47 subtasks showed a numerical improvement. Examination of differences between post-test and training exercises reveals an apparent leveling off of performance with generally smaller differences in most instances and no improvement shown for six of the tasks and 19 of the subtasks. The implications of this leveling off improvement are discussed in the subsequent section on CAMMS as a training research vehicle. Evidence of diagnostic capability among components

of performance was obtained from an inspection of the subtask means within exercise sessions. These ranged from a low of 1.30 for one subtask to a high of 4.20 for three subtasks in the pre-test. Thirty-five of the subtasks received mean ratings below 4.00 which, based on the rating scale anchors used, indicate failure to meet the standard of performance. On the other hand, post-test session results show all but four subtasks performed at or above the standard. The range in means for that session extended from 3.10 to a high of 4.60.

From the results presented above as well as the more detailed data provided in the main body of the report, it can be stated that there were three major areas of command group performance of ARTEP tasks and subtasks that had the most problems: intelligence, fire support, and admin/log. These findings closely parallel the informal observations of the CAMMS Research Team. They also correspond to earlier research on battalion command group ARTEP performance previously examined in CATTS exercises.

Organization Processes

Performance, on the organizational process dimensions, showed no statistically significant effects for exercise sessions, process dimensions or their interaction. Even on a non-statistical numerical basis alone, the change across sessions is very slight albeit in the direction of improvement from pre- to post-test and from pre-test to training.

In terms of differentiation for diagnostic purposes, these data suggest that on the average all five of these processes are performed a bit better than "somewhat effective" and that there is little basis for distinguishing among them.

Overall Performance

The analysis of overall performance ratings for each staff element, the battalion commander and the collective command group resulted in highly significant ($P < .001$) exercise and command staff effects. The significant differences among exercise sessions were attributable to the personnel, logistics and fire support functions. As seen in the table below the difference between post- and pre-test performance was significant for all three of these functions and like the ARTEP ratings,

DIFFERENCE BETWEEN THE MEANS OF THE

PRE, TRAIN AND POST TEST EXERCISES FOR OVERALL PERFORMANCE RATINGS[a]

In General, How Effectively Were the Following Activities Performed?	Difference Between the Means of Exercises[b]		
	2-1	3-1	3-2
Personnel (S1)	1.40*	1.60*	.20
Logistics (S4)	.60	1.10*	.50
Intelligence (S2)	.90	.80	-.10
Operations (S3)	.60	.80	.20
Fire Support (FSO)	.90	1.30*	.40
Close Air Support (ALO)	.60	.60	0.00
Overall, how effective was the BN CDR?	.20	.40	.20
Overall, how effective was the BN CMD GP?	.50	.70	.20

[a] These data are extracts from Table 4

[b] 1 = Pre-test exercise, 2 = Training exercise, 3 = Post-test exercise

* Signficant at $P < .05$ level

the differences in mean numerical values between pre-test and post-test for the six command staff functions, individually and collectively, and for the battalion commander reflected improved performance. Again, a slowing down in the rate of improvement in performance between the training and post-test exercises occured.

Evidence for differentiation of staff element performance within exercise exists in the form of the score range of 1.20 to 4.10 in the pre-test session. Though the average rating for all but three of the functions was above 4.00 for the post-test, there is still a range of 2.80 to 4.50.

ARTEP Related Objective Measures

Change in performance across exercises as measured by the ARTEP related objective scores was slight. Only one subtask of the 19 for which objective measures were devised produced a statistically significant change (improvement) in performance between pre-test and post-test exercises. That improvement was recorded for integrating combat services support into the scheme of maneuver. Because these objective measures were not designed to be representative or inclusive of any staff element function, no attempt was made to evaluate the capability for differential performance assessment.

REFINEMENT OF PERFORMANCE MEASUREMENT PROCEDURES

The measures used in this effort can be roughly dichotomized into those that reflect dimensions of performance that are generally accepted as being criteria for command group proficiency, e.g., ARTEP subtasks, and those which are much more speculative in nature. The speculative measures though having a rationale and ostensibly a more objective dimensionality, are very much in an exploratory stage. Whether and how these dimensions relate to more commonly accepted measures of command group performance and what difficulties there may be in application and interpretation received primary attention in this effort. The more conventional measures served as quasi criteria but both were examined in terms of relation to various measures of battlefield outcomes.

In the following paragraphs the interrelations among the various subjective and objective measures of battlefield outcomes are first discussed. Next the relationships of the battlefield outcome measures to both the ARTEP subjective and experimental objective measures of command group performance are presented. Finally, the relation of the experimental objective measures to the subjectively assessed ARTEP subtasks is discussed.

Battlefield Outcomes

Intercorrelational analysis of the eight battlefield outcome measures produced five statistically significant correlations out of a possible 28 with another three approximating significance. Virtually all of these involved personnel and/or equipment losses which themselves were highly

correlated for the blue forces. Another expected relation was that between mission accomplishment and red force losses. More perplexing but perhaps not implausible for a covering force operation, was the negative relation between the amount of error in identifying the locus of the enemy thrust and the blue losses sustained. Seemingly, the greater the error in estimating the thrust, the smaller the personnel, equipment and area lost. Perhaps in the short term such errors decrease exchanges of fire and the consequent losses.

Subjective Ratings and Battlefield Outcome Measures

The meaning of the various experimental battlefield outcome measures in regard to command group proficiency was explored by correlating them with the ARTEP subtask ratings. Of the 376 entries in the matrix of correlations, there were 47 which were statistically significant at the $P < .05$ level. Any coherency implicit in the matrix resides with the five outcome measures which accounted for 39 of the significant correlations. The first of these, error in locating the enemy thrust, relates negatively to the quality of performance of some of the fire support subtasks. In other words, the smaller the location error, the better the performance on the subtasks. All of the other significant correlations are positive. Mission accomplishment accounted for the greatest number of significant correlations, 13. A major cluster of subtasks significant for that outcome measure was also significant for the three others, OPFOR losses and task force personnel and equipment losses. Subtasks included were fire support,

analyzing the mission, organizing for combat and integrating combat support services into scheme of maneuver.

Summary ARTEP measures comprised by a simple averaging of subtasks subsumed by the planning tasks, by the execution tasks and by all tasks correlated significantly with only one outcome measure, mission accomplishment. Not surprisingly the relationship between battlefield outcomes and proficiency on ARTEP appears complex. It is doubtful that any outcome measures can fully account for ARTEP performance any more than equal weighting of the various ARTEP subtasks is likely to provide a summary measure of maximum predictive power.

There was a consistent and highly significant series of relationships between the organizational process ratings and three outcome measures, task force losses, OPFOR losses and mission accomplishment. The positive correlations indicate that the higher the rating on the various processes, the greater the losses suffered by the opposing forces, the better the rating on mission accomplishment, but also the higher the task force losses. Again, as with the summary ARTEP measures, the objective computer generated outcomes did not correlate significantly or in a logically consistent manner with the process measures.

Overall performance ratings for the various staff elements, the collective command group and the battalion commander when correlated with battlefield outcomes produced few (5) significant correlations and fewer surprises. That the battalion commander's performance would relate highly to mission accomplishment is almost dogma. That the greater

the number of decisive engagements the better the rated performance of the S2 is not surprising if the capability of the commander or S3 to become decisively engaged is dependent on the skill of the S2 in locating the enemy thrust.

Experimental Measures

Trends were difficult to perceive in the correlational data for the experimental objective measures with battlefield outcomes. Perhaps of most significance is the indication that the more centralized the level of control the greater the error in locating the enemy thrust with a concommitant (thought probably temporary) reduction in personnel and equipment losses as previously mentioned.

Additional insights sought through correlating the experimental measures with performance ratings on the 47 ARTEP subtasks were not very compelling though 58 of a possible 376 significant correlations were obtained. Perhaps of greatest importance is the finding that for eight ARTEP subtasks less centralized control results in better performance. It was also found that the smaller the average distance among battle positions the better the performance on ARTEP subtasks concerned with seeing the battlefield, control and coordination of combat operations, concentrating/shifting combat power, securing and protecting the task force, and reacting to special situations.

CAMMS AS A TRAINING RESEARCH VEHICLE

The observations and comments in this section are derived from planning and running these CAMMS training exercises and from insights derived in the process of analyzing the data. These findings are caveated by the ambiguity associated with the inability within time and resource constraints to determine the degree to which performance changes as measured in CAMMS are a function of learning how to better perform as a command group as opposed to learning how to play CAMMS to "beat the game." For convenience, the exposition is divided into system factors and application factors.

System Factors

Certain characteristics are requisite of a good training simulation. Among these are a realistic environment, representation of the functions and tasks skills being trained, exercising of the skills being trained, assessment of performance and feedback of results, and replicability of essential elements of the simulation without producing stagnation or boredom. CAMMS is remarkably well along on most of these dimensions given its stage of development.

Other more specific observations on CAMMS include: there is little basis for faulting realism. CAMMS was judged superior to a CPX in a recent survey even though greater fidelity is possible. The length of the execution phase of the CAMMS exercise is insufficient to provide more than

limited opportunity for admin/log play. A larger number of programmed or scripted set of probes is necessary to elicit or make explicit target behaviors, especially in the planning phase where steps leading to the OPORD are not easily observable. The variation in ratings which leads to difficulty in producing feedback and in interpreting results is increased by the lack of specificity of the ARTEP subtask criterion. The length of time needed to produce and analyze admin/log summary data restricts the amount of information available for feedback. A programmed text and reference manual would help insure consistency during repeated administrations and changing controller personnel.

Application Factors

Observations falling under the applications rubric in the current context are focused on those aspects of system use which either the trainer or trainee can capitalize upon, compensate for or at least be aware of in terms of possible impact on objectives.

Subsequent data analyses are planned to determine the effect of turbulence of the principle members of the battalion command group on overall performance and learning rate. The turbulence within the controller staff presents the problem of providing a common frame of reference for evaluating the training obtained. While controller turbulence may not jeopardize the training value to a unit, it can jeopardize the meaningfulness of the training research. While only one feedback format was used, the technique was much more acceptable than some previously used by

controllers. The one-on-one format is more comfortable for the controller and the player within the unit, especially when the need for negative feedback arises. The training value of CAMMS appeared to have peaked by the end of the second exercise. The performance had leveled off by the third exercise (post-test) to the point that the amount of measurable training was miniscule relative to the time and effort expended. This leveling off may represent a true learning effect or a lessening of motivation and relaxation of standards by the time of the post-test. In either case, two things are apparent: more than two consecutive days play, at least of the same type mission is not efficient, and further effort related to effective training strategies is needed.

CONCLUSIONS

The following conclusions are tempered to reflect the uncertainties resulting from constraints in the conduct of this effort, most notably, the small sample, and the potential confounding of measures of learning CAMMS with learning that which is trained by CAMMS:

- CAMMS shows evidence of being an effective training vehicle for improving battalion command group proficiency as subjectively judged in terms of differential performance on ARTEP Tasks and Subtasks and an overall assessment of the total command group and each of the major staff elements. The generally consistent and positive changes in performance across exercise sessions and differentiation among subtasks and elements within session attest to it utility.

- Development of a greater number of objective measures of command group performance in CAMMS is feasible to both supplement and ultimately supplant some of the existing subjective ratings. It is a difficult and slow process and should not be expected to obviate the need for some subjective ratings.

- The relationship of command group performance to battlefield outcomes is complex. The quality of performance on no single measure yet identified can be adequately interpreted in isolation of other measures, or the condition of performance.

- Performance on some ARTEP subtasks appears to influence battlefield outcomes. Additional effort will be required to obtain reliable estimates

of the degree to which performance on other ARTEP subtasks may also relate to outcome measures and what additional meaningful measures might be identified to more fully reflect the total dimensions of battlefield performance.

- Organizational process measures as used in this effort do not discriminate performance differences among the various measures themselves or change in performance as a function of the training exercise. However, their high relation to mission accomplishment and other outcome measures warrants further investigations.

- CAMMS has the potential for fulfilling the requirements of a training and training research vehicle envisaged for pursuit of TEA 85 objectives. While some modifications are indicated, these are relatively modest in nature and several concern improvements which would be made in the normal evolution of CAMMS as resources permitted. The intrinsic worth and flexibility of CAMMS together with the data obtained and learning experienced on the part of the CAMMS teams make it a leading contender for this role. For the near term CAMMS may be the only reasonable vehicle for examining the integration of troops on the ground with the play of a battalion level command group simulation in anticipation of National Training Center requirements determinations.

INTRODUCTION

The training of the individual soldier as well as collective training has, in recent years, become a more challenging and difficult task. The dwindling resources, the competing demands for time and the more complex tasks to be trained that are presently being experienced by Army personnel increases the need to develop the most efficient and effective methods of training possible. In response to these demands and requirements, the Army Training Study (ARTS) was initiated to explore means of developing an "efficient, justifiable, and achievable training system for the Army of the mid-1980's."* ARTS' approach to the problem was to formulate both a short term and long term effort. The short term effort, the Training Effectiveness Analysis (TEA) 78, was designed to capitalize on selected presently on-going training development and evaluation programs as a means to economically glean as much early information as possible and for deriving insights and direction for the longer term TEA 85 effort. TEA 85 is aimed at quantification of current training systems in order to support allocations of required training resources and as a basis for evolving training system improvements designed to provide the Army with the most efficient and effective training systems.

The Combined Arms Center (CAC) as proponent for all TRADOC battle simulations is presently involved in the development of several collective training programs for command groups at battalion and above levels.

*DA Msg, ATCG-ATS, DTG 221832Z Nov 77, Subj: Army Training Study (ARTS).

At the request of ARTS, these programs were examined to ascertain if any "piggy-backing" were possible to exploit this unique source of command group training data. There were two major areas of continuing concern in which an integration between the developmental effort for training command groups and the ARTS effort appeared feasible:

1. What is the relationship among command group performance as assessed in battle simulation, unit readiness, and combat effectiveness measures?

2. What are appropriate strategies to achieve optimum (cost and training effectiveness) command group proficiency levels through use of simulation technology?

Obviously definitive answers to these questions would not be possible for ARTS 78 within the time, resource and technology constraints prevailing. However, the need for and mutual interest in even tentative answers to portions of the above two questions prompted the initiation of an exploratory effort utilizing a current training system undergoing development by CAC: the Computer Assisted Map Maneuver System (CAMMS). It was determined that only five battalion command groups from two divisions were available for participation in this effort in time for input into the TEA 78 Report. It was recognized that the small sample size and limited representativeness would restrict generalizability and any analysis would therefore be of value mainly in terms of preliminary indications, trends and feasibility of approach.

However, it was felt that an initial look at command group training was necessary and should provide a source of useful planning information for ARTS as well as CAC.

OBJECTIVES

Specific objectives of this command group training effort derive from the broad questions identified above and the problem of measurement inherent in achieving answers to those questions. Only those objectives of direct relevance to the ARTS which could be addressed within the time constraints of TEA 78 are included below. Other objectives and analyses will be the subject of subsequent separate documentation.

Specifically, the present effort focused on three objectives:

1. To estimate the training effectiveness of CAMMS. This objective was aimed at the type and amount of performance improvement that can be produced with a battle simulation (i.e., CAMMS). Implicit in this objective is the development of command group performance assessment procedures and feedback mechanisms that would allow the command group to diagnose their training strengths and weaknesses and would enable meaningful feedback to the command group during and between training sessions so that their training effort could be concentrated in those areas where remedial training is most warranted.

2. To refine performance measurement procedures. This objective was designed to assist in the development of more valid and sensitive

means of measuring the proficiency level of battalion command groups. The command group/staff module of ARTEP 71-2 is a necessary though probably not sufficient component for such assessment. In addition, the degree to which measures for the performance of various of the tasks and subtasks could be made more objective and other measures of a more objective nature developed, the more uniform, equitable, and meaningful the assessment process and the greater the likelihood of achieving a basis for comparing performance across different battle simulations.

3. To estimate the feasibility of continuing to utilize CAMMS as a vehicle for investigating command group training. An important objective of this effort was to determine if CAMMS has the sensitivity and capability required of a research tool for providing sufficient data to answer some of the unanswered questions associated with command group training and to ascertain what might be necessary to enhance its utility for that purpose.

METHOD

PARTICIPANTS

Five battalion command groups, two mechanized infantry and three armor, participated in this effort. These groups were drawn from four brigades within two CONUS divisions.

SIMULATION SYSTEM

CAMMS,[1] as mentioned previously, is a training system undergoing development at the CAC. The system is being designed to overcome deficiencies of conventional methods, e.g., CPX, FTX, which have been used to provide command group training. It is a battle simulation designed to train commanders and staffs of armor, mechanized infantry, light infantry and cavalry units at both the brigade and battalion command levels. The command groups play within a non-nuclear environment and against a given enemy force.

CAMMS served as the instrument by which data on the performance of the above mentioned battalion command groups was obtained. A preliminary evaluation of the training effectiveness of the CAMMS was implicit in this process. For the purposes of this effort, the simulation was conceived to consist of three components. How each of these components was played or used in this effort, which parallels how the system is normally employed, is provided below:

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[1] A more detailed description of CAMMS can be found in Battle Simulations and the ARTEP, CATRADA, Fort Leavenworth, Kansas, November 1977.

The Command Group

The command groups were constituted of those persons which normally would have been present under combat conditions. In addition to the commander and principal coordinating staff members, the groups included the Air Force liaison officer, the fire support officer and supporting NCO's and RTO's. The exercise was played within a simulated Tactical Operations Center (TOC) equipped with the type of communications gear normally issued to the battalion. Thus, the command groups had the capability to communicate with both their superior and subordinate units as well as adjacent units if such adjacent units were played.

Controllers

A number of controllers, whose primary purpose was to manage the exercise in such a way as to maximize the command group training experience, were used to conduct the exercise. This group included: (1) a chief controller who played the role of the brigade commander; (2) a brigade S1/S4 controller; (3) brigade S2 and brigade S3 controllers; (4) three maneuver company commander controllers; (5) a fire support controller and two to three supporting forward observers; (6) a direct air support controller; and (7) an opposing force (OPFOR) controller. All controllers, except those playing the brigade commander and principal staff, maneuvered "troops" and items of simulated equipment appropriate to their role on a game board that served as the terrain on which the battle was fought. Based upon the results of calculations produced by supporting computer

software and the events which were unfolding on the game board as the battle progressed, both the game board and brigade controllers provided realistic feedback and guidance to the command group players. An adjunct member of the controller team was a TOC monitor who observed the activities of the command group during planning and operational phases for the purposes of providing post-exercise feedback and ratings of the groups' behavior for analysis in this investigation.

Computer Subsystem

The computer subsystem was designed to support military and logistics problems, greatly reduce map maneuver preparation time, provide faster and more accurate computations and, thereby, increase objectivity and provide a precise summary of the events which took place in the battle for analysis and critique purposes. The software available accommodated the employment of conventional forces with all their normal supporting weapons systems. Artillery, air, mortars, helicopters and admin/log functions were processed for the friendly force as well as the OPFOR. The system allowed for task organizations ranging from specific teams up to task force level. Interface with these programs was accomplished remotely through four computer terminals which were connected via commercial telephone lines to a centrally located computer. The terminal operators, normally radio-teletype operators, were provided by the participating units.

DESIGN

To explicitly address the first and implicitly address the second and third objectives of this effort, a pre-test/post-test design was used. Figure 1 depicts this design. The command groups participated in three separate exercises. However, the general scenario and type of mission were the same across the three exercises. The specific scenario[2] and mission used for each exercise was a variation of the more general one. Also, the three specific scenarios and missions were designed and assumed to be of equal difficulty. However, to correct for any differences in difficulty that may have existed, the missions for the pre- and post-test exercises were counterbalanced across units. A feedback session, the format and content of which were being pilot tested in this effort, followed each of the test and training exercises. Ideally, a control group which received only the pre- and post-tests would have been included to verify that those performance gains observed, if any, were due to the treatment or training rather than to other potential confounding variables. Additionally, it would have been desirable to have used CAMMS only for the treatment condition rather than across all conditions. This would have made it possible to avoid spurious relations that may be inherent in the results presented herein because the same measuring instrument was used both for testing and training purposes. Time and the availability of command groups precluded fulfilling either of these two conditions. These

[2]A brief description of the general and special situations for all exercises and the specific mission for each exercise is provided in Appendix A.

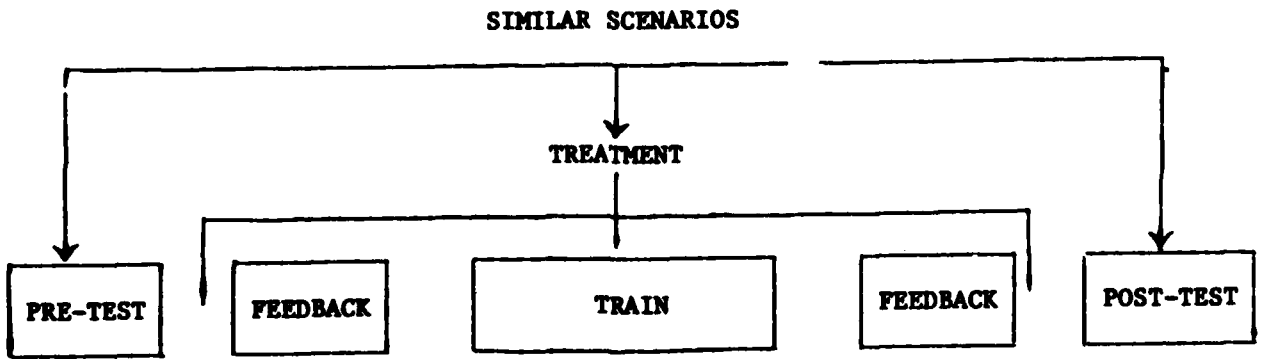

Figure 1. Experimental Design.

shortcomings as well as the size of the sample and instability within the controller group, a problem discussed more fully below, limit substantially the confidence which can be placed in the results presented in following sections.

BATTALION COMMAND GROUP PERFORMANCE MEASURES

A number of different types of performances were measured. These measures can be broken down into two broad categories; those which were obtained through a rating process and which, therefore, are subjective in nature and those which are objective in nature. Within both of these categories, performance measures related to a selected subset of the subtasks contained within the battalion/staff module of ARTEP 71-2[3] were gathered. Of the 61 subtasks included in the ARTEP, 47 were measured,[4] either subjectively, objectively or both. Appendix B identifies these 47 subtasks. Within the subjective category of measures were also included organizational process variables which have previously been used in the investigation of unit effectiveness. A more thorough discussion of the subjective and objective measures, in terms of the source from which they were obtained and the rationale for their investigation, is provided below.

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[3]Army Training and Evaluation Program (ARTEP) for Mechanized Infantry/Tank Task Force, No. 71-2, Headquarters, Department of the Army, Washington, D.C., 17 June 1977.

[4]Performance of the remaining 14 subtasks was not measured either because these performances could not be observed or because they could not readily or realistically be elicited.

Subjective Measures

ARTEP Related. Ratings on each of the 47 subtasks were obtained from one or more members of the control team. The subtasks rated by each of the controllers who provided such information is summarized below:

Controller	Subtask Rated
Brigade S1/S4	3J, 3K, 9A, 9B, 9C, 9D
Brigade S2	1B, 2A, 2B, 2C, 2D, 3F, 3I, 5A, 5B, 5C, 5D, 10A, 12A
Brigade S3	1A, 1C, 1D, 1E, 1H, 3A, 3B, 3C, 3D, 3G, 3H, 4B, 6A, 6B, 7C, 8A, 8C, 8D, 10F, 10G, 11A
FSO	1I, 1J, 1K, 1L, 3E, 7A, 7B
TOC Observer	All subtasks, except 9A to 9D.

The controllers were instructed to base their ratings upon the conditions and standards stated in the ARTEP for each of the subtasks. Their ratings were provided on five-point Likert type scales with "forgotten, overlooked or unit failed to address this subtask" and "exceeded standard" serving as anchors on the low (1) and high (5) ends of the scale respectively. Two complete sets of ratings were obtained. One nearly complete set was provided by the TOC monitor and the second set was provided by the various controllers who responded to those subtasks which were within their area of staff responsibility. These two sets of ratings were averaged for analysis purposes.

In addition to ratings for each subtask, controllers provided overall estimates of how well the command group performed across all subtasks. Specifically, overall ratings of the performance of the S1, S2, S3, S4, FSO and ALO, battalion commander and command group as a whole were obtained

from the chief controller and TOC monitor. Again, a five-point scale with low and high anchors respectively being "not effective at all" and "extremely effective" was used. The TOC observer and the chief controller were the only sources from which these overall estimates could be obtained. Averages of their ratings provided the raw data for analysis.

Organizational Processes. Olmstead, et al. (1973) has found within a military context that the ability of an organization to cope effectively with its environment is in large part a function of how well it manages to perform certain task clusters or processes which Schein (1972) had identified in earlier theoretical work. These processes and the definition of them used in this effort are presented below:

- Acquiring Information. The process by which the command group acquired information about its external and internal environment.
- Communicating Information. The process of transmitting information that was acquired to those parts of the unit that could act upon it.
- Decision Making. The process of making decisions concerning actions to be taken as a result of the acquired information.
- Communicating Instructions and Orders. The process of transmitting decisions and decision related orders and instructions to those parts of the unit that must implement them.
- Monitoring. The process of obtaining follow-up information about the results of the plans and orders.

The process variables provide a source of data concerning command group behavior which should be related to the performance of clusters of ARTEP

subtasks. However, it was not known to what extent, if any, they would be related to performance of the subtasks and, thus, they constituted another potentially independent or nearly independent source of information concerning the battalion's performance. Although data are reported in subsequent sections on the process measures, time constraints precluded examining the relationships among subtasks and process variables. Such analyses will be performed, however, and included in subsequent separate documentation.

Objective Measures

ARTEP Related. Objective performance measures were developed for a subset of ARTEP subtasks whose standards were amenable to more rigorous quantification. These more objective measures were developed with the aid of military experts and through a process which involved decomposing a subtask into its more fundamental elements. For example, the development of a plan for the resupply of units in contact, one of the S4 ARTEP subtasks, consists of a number of discrete as opposed to continuous components, e.g., planning the refueling operation, calculating time-distance factors between supporting and supported units and establishing priority for the prepositioning of antiarmor ammunition. Once the S4 had developed the plan, a cognizant member of the controller staff could merely determine whether or not each element was represented. Even though the example provided represents a dichotomous measure in the most fundamental sense, selected controllers actually responded in one of four ways to the presence

or absence of target behaviors. These four responses were: "Yes, the behavior occurred;" Yes, the behavior occurred but only with a specific probe(s) injected to elicit it;" "no, the behavior did not occur;" and "No, the behavior did not occur even with probing." The responses were assigned scores of 4, 3, 2, and 1 respectively, reflecting the assumed ordinal relation of the alternatives. Therefore, no assumptions were made as to the equality of intervals between the response alternatives on this set of discrete scales, and since probing was left at the discretion of the controllers, it was not possible to control the number of probes indected in an attempt to elicit the appropriate behavior. The scores for each sub-element or component of the vaious subtasks were averaged to produce a more objective measure of subtask performance.

Nineteen of the 47 ARTEP subtasks identified in Appendix B could be more objectively quantified. These subtasks and the controllers who were responsible for their evaluation are as follows:

Controller	Subtasks
Brigade S2	1B, 2B, 2D, 3F, 5A, and 5D
Brigade S3,	1A, 1C, 1D, 1E, 3D, 6A, 6B, and 8C
Brigade S1/S4	3J and 9D
Fire Support	1L, 7A, and 7B

As can be seen, each controller responded to a unique set of measures devised for the tasks shown above. In one instance, for subtask 1L, the subtask was broken down into three sub-subtasks, each of which was then decomposed into more fundamental elements. 1L sub-subtasks for which scores appear later in the report are: coordination with the FO;

informing the company commanders of the fire plan; and informing the supporting artillery of the fire plan. It was necessary to deviate from the four category discrete response format for three subtasks included in this category. These subtasks are 1E, 3A, and 3D.[5] The measures obtained for each of these subtasks are as follows:

1E. Select/control key terrain

- Number of key terrain features in the area of operation used by the battalion.
- The total number of key terrain features in the battalion's area of operation.
- The number of barriers, obstacles, and reinforced terrain used by the battalion.

3A. Determine critical place

- The grid coordinates of the location the command group identified as being the enemy's main thrust area.
- The grid coordinates of enemy avenues of approach identified by the command group.

3D. *Select control measures*

- The number of control measures used at each of the following type boundaries: check points, coordinating points, contact points, link-up points.

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[5]These measures could have easily been included in the experimental category because they are more speculative than the other measures discussed here. However, since they were developed with specific subtasks in mind, they were included here.

Single measures were derived from the raw numerical data provided for each of three subtasks.

EXPERIMENTAL MEASURES

The measures subsumed under this rubric represent an attempt to quantify variables which prior research and deductive analyses have shown or suggested impact significantly on the effectiveness of the unit. Included in this category as well are speculative measures of battlefield outcomes, measures that should logically be related to the proficiency of the command group as reflected in those conventional parameters of their performance discussed above. These measures, as opposed to the command group performances investigated, do not command a concensus of opinion within the Army community vis-a-vis whether or not they are important or are critical. Therefore, one can only conjecture as to their suitability for performance assessment. Some of the measures, e.g., locus of control, are speculative enough in the context of the scenario used so as to make it impossible to state on an a priori basis whether more or less of the variable's presence is "good" or appropriate. Whether it is good or not is probably greatly dependent upon the particular scenario being played and the type of terrain on which the battle is fought. However, for other measures, e.g., the number of times the task force units become decisively engaged during the covering force operation, it was possible to deduce what should represent more superior performance, i.e., according to published doctrine, the less frequently the units become decisively engaged, the better one could judge their performance to be.

Because of the nature of the measures falling within this category, they were not included in analyses reported dealing with the training effectiveness of CAMMS. For the training effectiveness analyses, only the command group performance measures described in the previous section were examined. The experimental measures were only entered into correlational analysis to determine if performance of them was in some way related to the more conventional measures of command group proficiency.

As was the case for command group performance measures, the experimental measures can be more or less clearly divided into objective and subjective categories. The measures falling within these two broad categories and the method used to derive them are briefly discussed below.

Subjective Measures

Mission Accomplishment and Components Thereof. The chief controller and TOC monitor provided estimates as to the extent to which the command group was able to accomplish major tasks of the covering force mission,[6] the mission which was played for pre- and post-test and training phases for each battalion. Additionally, a global measure of mission accomplishment was obtained. A description of the type of performance measured is the following:

- Enemy Thrust. This is a measure of the degree to which the battalion command group was able to identify the major enemy thrust.

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[6]Department of the Army FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, 30 June 1977.

The controllers indicated whether the major thrust had been identified within 1, 1-3, 3-5 and 5 or more kilometers. For purposes of data analysis, these categories were scored 1, 2, 3, and 4 respectively and, thus, a lower score should indicate more superior performance.

- Decisive Engagement. This is simply the number of times the task force became decisively engaged. The ratings provided were divided into four categories; never, once, twice, and three or more times, which were assigned scores ranging from 1 through 4 respectively for analysis purposes.

- Task Force Losses. This is an estimate of the friendly losses which were incurred during the operation. One of five categories of loss was selected by the raters. These categories ranged from 0% to 50% in 10% increments through the fourth category and more than 50% losses constituted the fifth response category. This scale was assigned numbers 1 through 5, with five representing the greatest loss of forces.

- OPFOR Losses. This variable is the counterpart of the friendly force loss estimate. Therefore, the same rating scale was used by the two controller raters who provided this estimate.

- Mission Accomplishment. This constituted an overall estimate of the extent to which the battalion accomplished its assigned mission. The components of the task force mission described above should represent components of this overall estimate. A five-point rating scale was used with "not at all effective" and "extremely effective" constituting the anchors at the low and high ends respectively.

These measures constituted the only type of subjective measures examined within this more speculative category of variables. They logically should be related to more conventional staff and command performance parameters when examined across all groups.

Objective Measures

Locus of Control. Lessons learned from the 1967 and 1973 Mid-East Wars suggest that the extent to which control is centralized can significantly affect the performance of fighting units. The Israelis, as opposed to their enemies, greatly decentralized control of forces and other assets to their battalion commanders, which made it possible for them to capitalize on fleeting moments of opportunity on the battlefield. It created conditions which were conducive to improvisation and innovation that would have otherwise been impossible. Although the contribution of this variable to Israeli successes could have been purely a function of the nature of the requirements being faced and the terrain on which the battle was fought, it seemed reasonable to investigate its influence within the context of the present investigation.

To measure this variable, a matrix was developed with organizational level (echelon within the battalion to which control could be vested) and category of asset (that which could be controlled) forming the major axes. This matrix is shown below.

Matrix Used to Develop the Locus of Control Measures

	Squad	Platoon	Company	Staff	Battalion Commander
Squad					
Platoon					
Company					
Other Units (e.g., Engineer)					
Tanks					
Mortars					
TOWs					
Air Support					
Artillery					
Redeye					
Other Weapons (e.g., Attack Helicopter)					

The OPORD was examined by one member of the research team in order to fill in the matrix. In almost all instances, the organizational unit having control of given assets was identified in the Order. In those instances where it was not, control was assumed to reside at the organizational level to which it normally would have been assigned. The number of assets controlled by each organizational level was multiplied by an arbitrary weight (1 through 5 for squad through battalion commander respectively) and these products were averaged across all command levels

to produce a final score. Thus, the higher the final score, the more centralized was the control of assets within the battalion. Although this is a crude approximation of reality, it should be somewhat indicative of the locus of control within the unit.

Intelligence Operations and Reaction to Battlefield Contingencies. Barber and Kaplan (in press) in previous and ongoing work with another battlefield simulation undergoing development at CAC, the Combined Arms Tactical Training Simulator (CATTS), have found that of the conventional ARTEP command group performances examined, two general areas appear to be of especially great importance. These areas are intelligence processing[7] and the ability of the command group to perform all these activities implicit in rapidly shifting forces in response to battlefield contingencies in order to mass the forces at the appropriate time and place. These general areas have been found to be important for two reasons. Relative to the performance of other ARTEP related measures, these areas are the ones on which the command groups perform poorly and, yet, they are ones that, on a tentative basis, appear to capture the largest amount of variance in overall command group performance measures. Given these findings, it appeared that these two areas should be the foci of attempts to develop more quantitative measures of performance. Such measures might not be practical to gather for feedback purposes

[7]It was assumed that this process consists of two components: information acquisition and transmission, and the processing of raw information into intelligence. The measures discussed here address primarily the information acquisition and transmission component.

during a unit's normal play of the simulation, but they could prove to be useful for future research purposes in pursuit of the overall objectives of TEA 85. Accordingly, an attempt was made to identify quantitative measures which (1) judgmental analysis suggested should relate to command group performance and, (2) could be readily obtained during the play of the simulation. A number of such measures were identified, the preponderance of which were associated with the shift and concentrate forces performance area. Since the intelligence area and operations, of which concentration and shifting of combat forces is a large part, are so closely related, it was not always possible to clearly distinguish between the two in terms of the measures developed. Keeping this fact in mind, a description of the measures grouped into the intelligence and concentration of forces areas is presented below.

- Intelligence Processing. Two measures conjectured to be related to this general performance area were identified. The first had to do with communications within the battalion. Communications transmissions examined were those from (1) the company commanders requesting information from the battalion, (2) the company commanders providing information to the battalion, (3) the battalion to the company commanders providing information and, (4) the battalion to the company commanders requesting information. The command net was monitored for a fifteen minute period during each hour of the exercise. Messages transmitted and received were categorized into those predetermined categories identified above.

The number of transmissions of each type which occurred during the 15-minute interval sampled each hour of the pre- and post-test and training exercises were summed and averaged. Thus, the average number of transmissions of each type per hour by exercise was available for analysis.

The second measure conjectured to be related to the intelligence process was the ability of lower level task force units to "see" the battlefield. "Seeing" the battlefield is obviously in part dependent upon the extent to which that battlefield can be observed from assigned battle positions. Accordingly, the distance between each task force unit's battlefield position and man-made or natural obstacle or terrain feature which obscured line of sight was obtained. Connecting the points (grid quadrants) of the obstacles and terrain features formed a polygon whose area could be readily calculated. These calculations were made for each of the battle positions and the areas were summed and averaged. Thus, the score produced reflects how much clear viewing area was available to any given task force unit.

- Shift and Concentrate Forces. Five measures were developed which indirectly could reflect the ability of the command group to effectively perform this complex set of activities. These measures and the procedure used to derive them are briefly described below.

  - Distance between battle positions and supply points. The distance between each of the battle positions and the main and alternate

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[8]Several other types of information were gathered, e.g., length of transmission and type of information provided or requested, but time precluded their analysis for input into this report.

supply points specified in the OPORD were obtained and averaged across all battle positions. The resultant mean distance perhaps should reflect how well the units could react to contingencies on the battlefield since anticipation of such conditions should have been explicit in planning the battle and supply positions established. Thus, to a certain extent, intelligence preparation before the battle and fidelity of logistical (S1/S4) and operations (S3) coordination could be reflected in this measure as well.

- Distance among battle positions. The distance among all battle positions as specified in the OPORD and established on the game board was obtained and averaged across battle positions. The mean obtained reflects the average distance between any given battle position and all other battle positions. Identification of the correct location of the enemy's main thrust should determine in large part how the friendly forces are initially positioned, whether in tighter mass or spread more loosely across the anticipated battle area(s). It should be reflective as well of a scheme of maneuver which anticipates that rapid shifts of combat power may be required as the battle progresses.

- Number of battle positions. This measure should be highly related to the one above and could reflect anticipated exigencies that may develop. The measure was straightforwardly obtained by counting the number of battle positions specified in the OPORD.

- Distance of specified battle positions from each battle. Again, this measure was conjectured to reflect the ability to anticipate contingencies and develop compromises in terms of positioning of forces that takes into account the knowns and unknowns of the situation. To

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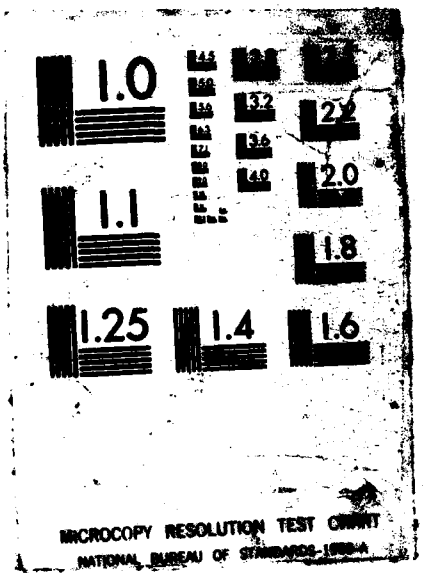
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calculate this measure, the distance between assigned battle positions for the various task force elements and the point at which the battle actually took place was obtained. These distances were then averaged for all task force elements.

- Engagement range of all battles fought. This measure is probably a more indirect than a direct measure of command group performance. It should reflect the ability of the task force units to successfully implement the covering force mission as the parameters of it have been specified in the OPORD. If one assumes that such a mission carries with it the task of engaging the enemy at the maximum range possible, to attrit their forces to the greatest extent possible, while at the same time to minimize losses and expenditures of resources of the friendly forces, then the greater the range at which skirmishes occur within a given envelope should be indicative of relatively superior performance. A number of parameters are therefore likely to contribute to how this particular measure might behave and, in that sense, it is even more speculative than the others included in the general experimental variable category. This measure was obtained at that point in time when the friendly and OPFOR controllers mutually agreed that an engagement should take place. The distance between the opposing forces was obtained for each engagement of each task force unit and averaged across all engagements. Thus, the score produced represents the average distance between opposing forces for any given engagement.

Battlefield outcomes. Measures of this variety, if they can be produced with any degree of fidelity via simulation, may be misleading for any given unit but should across a number of units bear some relationship to the performance capabilities of the command and control process. To explore this relationship, data were gathered on three crude battlefield outcome measures. These were number of friendly forces lost, number of friendly force weapons lost, and amount of ground lost[9] during the operation. The first two measures were derived from summaries of friendly unit weapons and personnel status summaries that were provided on an hourly basis by the computer. The losses calculated during each hour were summed over hours and averaged to produce the mean number of losses that occurred during any given hour. No differentiation as to type of weapons system or category of personnel was made in the calculations. Further, although the exercise SOP specified maximum limits for resupply action for given time periods, it was not possible to ascertain how rigidly the units adhered to these specifications. The amount of ground lost was obtained by merely measuring the distance between the front line traces at the beginning and end of each exercise.

All the various measures within this experimental category were gathered during each of the three training exercises. However, for

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[9]In a covering force mission, it is recognized that losing a specified or implied amount of ground within a specified amount of time is expected. However, given that the amount of ground to be lost was a constant, losing more or less than one could be indicative of how well the unit performed.

purposes of the correlational analyses presented in the next section, only the training exercise data were used because a more representative sample of the behaviors being measured could be obtained during this extended session.

PROCEDURE

Data Collection Team

A team, consisting of members provided by the (1) division of the participating units and (2) CAC and ARI, collected data on all command group performance and experimental measures. The brigade level controllers and game board players were provided by the participating unit's parent organization. The same individuals served in their respectively assigned roles, ones for which they had prior experience in all but a few isolated instances, for all exercises conducted within a particular division.

The TOC monitor was a lieutenant colonel provided from an element of CAC under whose auspices and direction the battalion command group ARTEP was developed. Thus, he was very familiar with staff procedures and operations at the battalion level. Although it was initially planned for the same individual to accompany the collection team to both participating divisions, for varying reasons this was not possible. The alternate TOC monitor, who served as a data collector during those exercises conducted at the second division, however, was assigned to the same element of CAC from which the first monitor came. Even though

these two individuals spent some time together in an attempt to form a unified frame of reference from which their ratings would be made, it is not possible to state definitively that this objective was achieved. This condition then obviated the possibility of examining the extent of agreement between the TOC monitor and the chief controller (who was the same individual across all exercises) for those instances where they provided comparable measures. Furthermore, initial plans called for a second observer who would have performed the TOC monitor functions in the combat trains area; a condition, which if fulfilled, would have provided a consistent frame of reference for the S1/S4 functional areas. Again, this requirement could not be fulfilled and, thus, it was impossible to collect data totally consistent across all units in the S1/S4 performance area.

The chief controller, one of the primary subjective data providers, also came from CAC and was assigned to the element responsible for developing CAMMS. Thus, he was very familiar with the simulation and had served as chief controller for at least 10 battalion level CAMMS exercises before participating in this effort. The data which he was responsible for providing and the data collection requirements of the TOC monitor and those brigade level controllers provided by the unit were specified in the previous section.

Two ARI personnel formed the final component of the data collection team. These individuals gathered the raw data from which the objective experimental measures were derived. They also monitored ongoing activities during the conduct of the exercise to insure that procedure was

being followed vis-a-vis experimental design and control measures and assisted any of the data collectors/raters who had difficulty responding to or understanding the data collection instruments.

Test and Training Exercises

The procedure followed to gather data related to the subjective and objective command group performance measures and the more speculative experimental measures is shown in Figure 2. The entire sequence of events, from orientation session through the post-test debriefing session, took place over a four-day period with no more than ten hours of game play occurring on any given day for the three exercises. Prior to initiating the first exercise, an orientation session was conducted for the players and controllers. During the first part of this session, both the controllers and players were present. They were briefed by ARI personnel and the chief controller concerning the overall objectives of the ARTS effort and what part the present investigation and they would play in accomplishing those objectives. Further, they were familiarized with the experimental design and the schedule of events which that design would entail as well as the general scenario that would be utilized in each of the exercises. Special requirements and constraints that would be required were discussed and the participants were told that a report summarizing the outcome of the exercises, but which would not identify the battalions in terms of their respective performances, would be provided to the division commander. The command group was provided copies of the training objectives for the exercises which were, in effect,

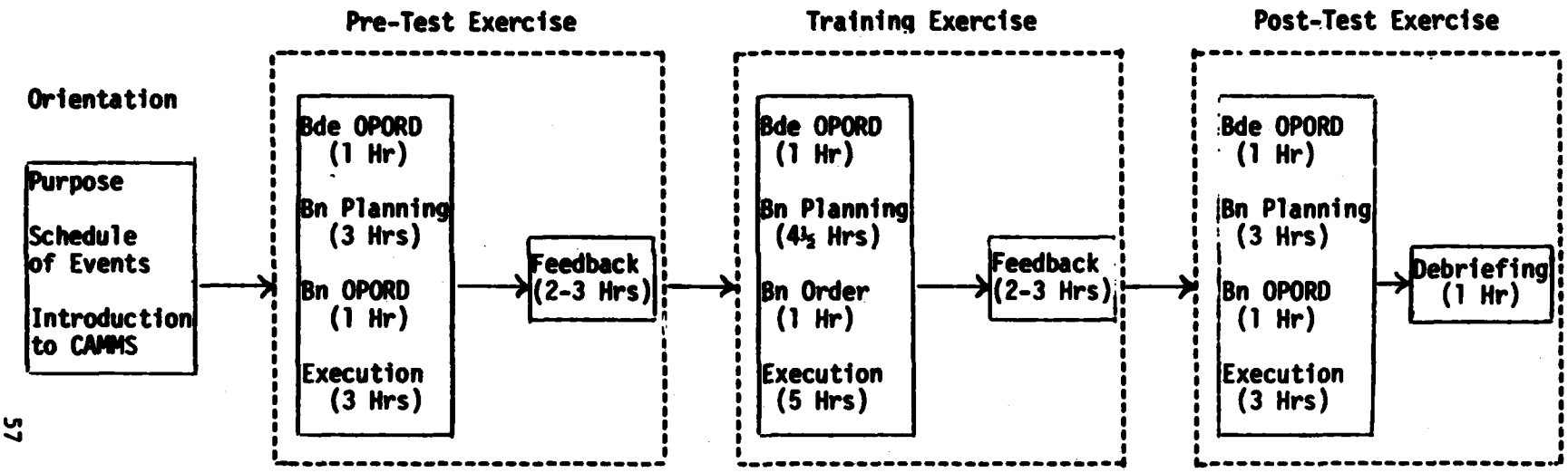

Figure 2. Experimental Procedure.

the 47 ARTEP subtasks on which most of the data were to be collected. During the second part of the session, only the controllers were present. They were (1) introduced to the data collection forms and provided instruction on how to use them, (2) provided guidance concerning more specialized procedural requirements than those which were covered in the general session, and (3) given training concerning how to perform the various roles and functions associated with the mechanics of the game as these factors related to the controllers' respective positions. A question and answer period was held at the end of the controller training session in order to verify that they fully understood the data collection requirements which they had been requested to fulfill and the requirements of the game which their assigned roles would entail.

Following the orientation session, the pre-test exercise was begun. During this time the chief and supporting controllers playing the role of the brigade, issued the brigade OPORD to the battalion. The battalion command group spent three hours analyzing the order and developing their plans, a process which culminated in issuing their OPORD to the companies. The execution phase of the exercise began with the issuance of the battalion OPORD.

Following the execution, the data which had been collected throughout the planning and execution phases were consolidated and a feedback session was held. The general format of this session and the activities which immediately prefaced it are shown in Figure 3. A general observations briefing was held first with all members of the command group present. The chief and OPFOR controllers conducted this session during

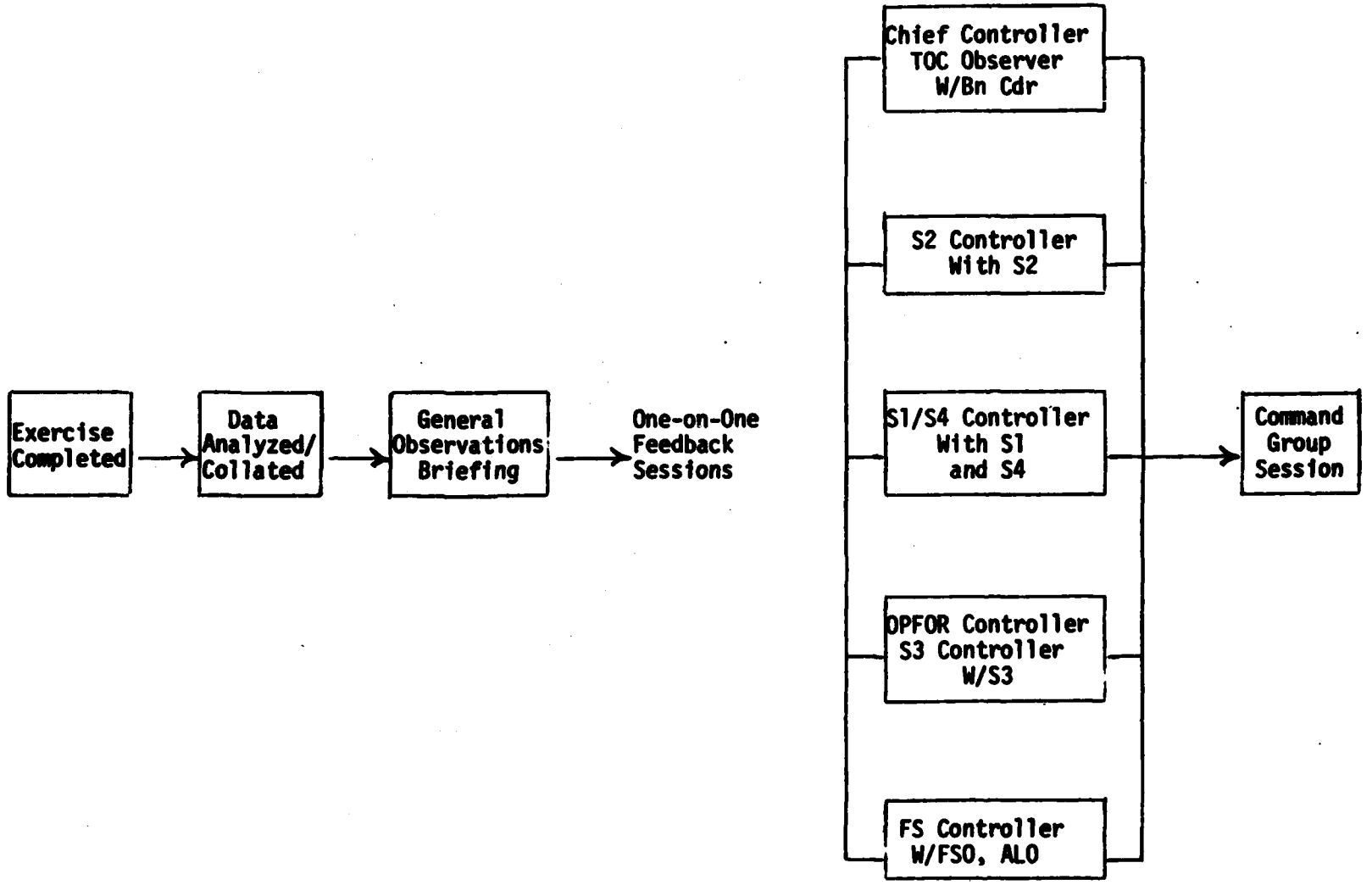

Figure 3. Feedback Session Format.

which they provided feedback based upon their observations and observations of others, as well as some of the quantitative data which had been collected. Following this briefing, each member of the command group and their counterparts on the controller staff met in separate closed sessions. During these sessions, detailed feedback was provided as to how well the staff member had performed those ARTEP subtasks which fell within his area of responsibility. The feedback was limited to the subjectively derived ARTEP subtask measures, the training objectives for the exercise. Specific examples of incorrect or inappropriate performance were provided for each subtask area to the extent this was possible. Following the one-on-one feedback sessions, the command group members met collectively in closed session during which each staff member had an opportunity to discuss the outcomes of the one-on-one session and propose to the battalion commander ways of overcoming deficiencies that had been identified. Remedial courses of action were developed and approved for implementation during the next exercise.

The sequence of events, from the issuance of the brigade OPORD through the feedback session, was followed for the training and post-test exercises with one exception. For the latter exercise, only a final general debriefing, rather than a full-blown feedback session, was conducted. In terms of duration, the execution phase was considerably lengthier in the training as opposed to the pre- and post-test exercises for obvious reasons. The exact duration of these phases is shown in Figure 2.

RESULTS

TRAINING EFFECTIVENESS

The primary basis used for assessing training effectiveness was the nature and amount of performance change occurring subsequent to the diagnostic (pre-test) exercise. Performance data for each of the three exercises were tabulated for each appropriate dependent measure,and separate repeated measures analysis of variance (ANOVAs) were performed to determine for each performance measure whether any of the differences between exercises achieved statistical significance. For those performance dimensions that achieved statistical significance, a posteriori least significant difference tests were performed to identify which of the differences among means were significant, i.e., pre-test vs. post-test, pre-test vs. training and training vs. post-test. Results are presented and discussed for each major type of performance measure. Change in performances over time is not the only ingredient of training effectiveness of interest. Ability of measures to differentiate or distinguish strengths and weaknesses among the components of performance is important. Accordingly, the data were also interpreted from this perspective for each major type of performance measure. Because of time constraints and the large volume of pairwise comparisons which would be required to determine and present the statistical significance of the differences among the ARTEP tasks and subtasks, the degree to which these measures discriminated performance, as reported subsequently, is based on only visual inspection of the data.

Subjective ARTEP Subtask and Task Ratings

All main effects and interactions from both the exercise by subtask and exercise by task ANOVAs were statistically significant at the $P < .001$ level except for subtask effects which were significant at only the $P < .05$ level. Summary ANOVA tables are shown in Appendix C. Thus, there were differences in rated performance attributable to the exercise session, attributable to the subtask being judged and to the tasks comprised of those subtasks; and of course, the interaction indicates that differences among exercise sessions were not uniform across all subtasks and tasks. The data showing the change in mean performance across the three exercise sessions for each subtask are shown in Table 1. A numerical improvement in mean performance between the first exercise session (pre-test) and the third (post-test) was obtained for 46 of the 47 subtasks. Though only 13 of these differences achieved statistical significance at $P < .05$ level, the consistency in the direction of the differences strongly suggests that the failure to achieve a far greater number of significant differences is more likely a function of the small number of units than it is the absence of real differences. These same data when aggregated by task produce findings which are consistent with those for subtasks as seen in Table 2 where differences between pre-test and post-test sessions are significant for only 3 of the 12 tasks but a numerical improvement in mean performance was obtained for all 12 tasks.

Examination of the differences in performance between the first (pre-test) and the second (training) session reveal patterns and magnitudes

TABLE 1

COMPARISON OF ARTEP SUBTASK RATING

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

ARTEP Subtasks	Mean and Standard Deviation (S.D.) Values*						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
	Mean	S.D.	Mean	S.D.	Mean	S.D.	2-1	3-1	3-2
1A	4.20	.32	4.70	.27	4.50	.46	.50	.30	-.20
1B	3.40	.42	4.00	.29	4.10	.42	.60	.70*	.10
1C	4.00	.61	4.30	.27	4.50	.35	.30	.50	.20
1D	3.80	.27	4.00	.50	4.20	.27	.20	.40	.20
1E	3.80	.20	4.20	.45	4.60	.38	.40	.80*	.40
1H	4.20	.57	4.50	.35	4.60	.38	.30	.40	.10
1I	3.70	.23	3.80	.27	4.10	.13	.10	.40	.30
1J	3.70	.45	3.90	.22	4.20	.27	.20	.50	.30
1K	3.80	.41	3.80	.43	4.20	.27	0.00	.40	.40
1L	3.80	.27	3.90	.22	4.00	0.00	.10	.20	.10
2A	3.40	.42	4.00	.29	4.10	.42	.60	.70*	.10
2B	3.60	.42	4.20	.53	4.10	.26	.60	.50	-.10
2C	3.50	.61	4.20	.27	4.00	0.00	.70*	.50	-.20
2D	3.60	.42	3.20	1.81	4.00	0.00	-.40	.40	.80*
3A	4.10	.26	4.60	.42	4.40	.22	.50	.30	-.20
3B	3.90	.55	4.50	.50	4.40	.35	.60	.50	-.10
3C	4.20	.27	4.60	.42	4.50	.35	.40	.30	-.10
3D	3.70	.53	4.30	.45	4.50	.46	.60	.80*	.20
3E	3.80	.25	3.80	.27	4.10	.13	0.00	.30	.30
3F	1.40	1.34	3.70	.67	3.80	.54	2.30*	2.40*	.10
3G	3.60	.74	3.50	2.00	4.50	.35	-.10	.90*	1.00*
3H	4.00	.36	4.50	.36	4.50	.35	.50	.50	0.00
3I	2.10	1.34	3.30	.84	2.20	2.06	1.20*	.10	-1.10*
3J	3.90	.22	4.00	.09	4.00	0.00	.10	.10	0.00
3K	4.00	0.00	3.90	.22	4.00	0.00	-.10	0.00	.10
4B	4.10	.22	3.40	1.94	4.40	.42	-.70*	.30	.10

TABLE 1 (continued)

COMPARISON OF ARTEP SUBTASK RATING

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

ARTEP Subtasks	Mean and Standard Deviation (S.D.) Values‡						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
	Mean	S.D.	Mean	S.D.	Mean	S.D	2-1	3-1	3-2
5A	3.80	.25	4.20	.27	4.00	0.00	.40	.20	-.20
5B	3.50	.46	4.00	.35	4.10	.26	.50	.60	.10
5C	3.60	.42	4.00	.35	4.10	.26	.40	.50	.10
5D	3.60	.42	3.90	.22	4.00	.43	.30	.40	.10
6A	3.90	.42	4.50	.35	4.00	.65	.60	.10	-.50
6B	3.10	1.72	4.30	.45	4.40	.42	1.20*	1.30*	.10
7A	3.90	.55	4.30	.27	4.30	.45	.40	.40	0.00
7B	3.70	.45	4.40	.42	4.50	.35	.70*	.80*	.10
7C	4.00	.35	4.30	.34	4.10	.55	.30	.10	-.20
8A	3.90	.22	4.30	.45	4.30	.57	.40	.40	0.00
8C	4.10	.26	4.50	.35	4.30	.56	.40	.20	-.20
8D	3.80	.27	4.20	.27	4.20	.23	.40	.40	0.00
9A	3.60	.52	3.90	.31	4.20	.45	.30	.60	.30
9B	2.40	1.52	3.50	.51	4.20	.45	1.10*	1.80*	.70*
9C	3.60	.89	3.00	1.73	4.00	0.00	-.60	.40	.10
9D	2.40	2.19	3.80	.43	4.20	.48	1.40*	1.80*	.40
10A	2.30	.84	3.20	.81	3.60	.50	.90*	1.30*	.40
10F	4.10	.56	4.30	.45	4.10	.55	.20	0.00	-.20
10G	2.40	2.19	4.10	.22	3.10	1.75	1.70*	.70*	-1.00*
11A	4.00	.35	4.20	.45	4.20	.23	.20	.20	0.00
12A	1.30	1.79	3.40	.47	4.00	.09	2.10*	2.70*	.60
Column Mean	3.54		4.02		4.14		.48	.60	.12

‡ N = 5

* Critical Mean Difference at the .05 Level = .67

TABLE 2

COMPARISON OF ARTEP TASKS FOR THE

PRE, TRAIN AND POST TESTS EXERCISES

ARTEP TASKS	Mean and Standard Deviation (S.D.) Values‡						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
	Mean	S.D.	Mean	S.D.	Mean	S.D.	2-1	3-1	3-2
1. Develop Plan Based on Mission	3.84	.21	4.10	.21	4.28	.16	.26	.44	.18
2. Initiate Intel Prep on Battlefield	3.53	.24	4.09	.27	4.04	.15	.56*	.51	-.05
3. Prepare and Organize Battlefield	3.70	.20	4.12	.32	4.21	.12	.42	.51	.09
4. Troop Lead	4.10	.22	3.36	1.94	4.40	.42	-.74*	.30	1.04*
5. See the Battlefield During Battle	3.62	.28	4.02	.24	4.02	.19	.40	.40	0.00
6. Control and Coordinate Combat Operations	3.81	.32	4.40	.38	4.40	.45	.59*	.59*	0.00
7. Employ Fires and Other Combat Assets	3.87	.27	4.32	.18	4.30	.41	.45	.43	-.02
8. Concentrate and Shift Combat Powers	3.91	.22	4.33	.33	4.24	.43	.43	.34	-.09
9. Manage CSS Assets	3.52	.49	3.70	.28	4.14	.15	.18	.62*	.44*
10. Secure and Protect TF	3.42	.38	3.85	.32	3.91	.36	.43	.49	.06
11. Troop Lead During Battle	4.00	.35	4.20	.45	4.16	.23	.20	.16	-.04
12. React to Situation Requiring Special Actions	1.26	1.79	3.36	.47	3.96	.09	2.10*	2.70*	.60*
Column Mean	3.55		3.99		4.17		.44	.62*	.18

‡ N = 5

* Significant at the .05 level or higher.

very much like those of the differences between the first and third session. Eleven of the 47 subtasks and 4 of the 12 tasks reached the $P < .05$ level of significance. A numerical improvement in mean performance occurred for 41 of the subtasks and 11 of the 12 tasks.

The parallelism of findings thus far noted do not extend to differences in performance between the second (training) and third (post-test) sessions. Again, from Tables 1 and 2 it can be seen that differences were significant for only five of the subtasks though three tasks still reached the $P < .05$ level. Perhaps more revealing is the generally much smaller differences obtained and the fact no numerical improvement was obtained for 19 of the subtasks and six of the tasks. This apparent slowdown in the learning rate is suggestive of the common learning curve asymptote. This will be discussed along with other plausible explanations in the subsequent section of the report dealing with CAMMS as a training research vehicle.

In terms of differentiating among ARTEP subtasks, inspection of the subtask means within exercise session as shown in Table 1 reveals scores ranging from a low of 1.30 for one subtask to a high of 4.20 for three subtasks in the pre-test. Thirty-five of the subtasks received mean ratings below 4.00 which, based on the rating scale anchors used, indicate failure to meet the standard of performance. On the other hand, post-test session results show all but four subtasks performed at or above the standard. The range in means for that session extend from 3.10 to a high of 4.60. For diagnostic purposes, the data can be viewed

in terms of planning functions (Tasks 1 through 4) and execution functions (Tasks 5 through 12). From that perspective, the subtasks of identify critical combat information and intelligence (1B, 2A), gather critical information and intelligence (2B), analyze opposing force (2C), and disseminate critical combat information and intelligence (2D), develop a communications plan (3F) and plan/employ active/passive security measures (3I) were all subtasks observed during the planning stages that were rated relatively low (i.e., mean less than 4.0). During the execution phase, a similar pattern developed, i.e., subtasks dealing with the same general behaviors were rated relatively low. These low rated subtasks included gather critical information and intelligence (5B), analyze opposing force (5C), disseminate critical combat information and intelligence (5D), defeat or suppress opposing force's electromagnetic intelligence effort (10A), and react to opposing force electronic warfare (12A).

During the planning stages, those subtasks associated with the fire support area were also generally rated relatively lower. However, the fire support related subtasks during the execution phase did not follow this pattern.

During the execution phase, subtasks related to the admin/log area such as arm and fuel the systems (9A), fix the system (9B), and support the troops (9C), were relatively low rated. However, admin/log related subtasks were not rated particularly low during the planning phase. These results for the admin/log area may be less reliable than most of the

others because of the limited opportunity of the admin/log controllers, who were the only raters, to observe the performance within this particular area.

At the task level, and using the same criterion as in the subtasks, the results of comparing the mean ratings are basically the same as obtained by looking at the specific subtasks, but at a grosser level.

The results of the analysis of the performance of the battalion command groups on ARTEP tasks and subtasks indicate that there were three major areas of command group performance that had the most problems: intelligence, fire support, and admin/log. These findings closely parallel the informal observations of the CAMMS Research Team. They also correspond to previous research on battalion command group ARTEP performance previously examined in CATTS exercises (Barber and Kaplan, in press).

Organizational Processes

Performance, as measured by ratings from 1 - not effective, to 5 - extremely effective, of the organizational process dimensions, was analyzed to determine whether there were changes occurring across sessions. The summary ANOVA table in Appendix D shows no statistically significant effects for exercise sessions, process dimensions or their interaction. Examination of the means and differences in Table 3 confirms that even on a nonstatistical numerical basis alone, the change across sessions is very slight albeit in the direction of improvement

TABLE 3

COMPARISON OF ORGANIZATIONAL PROCESSES

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

	Mean and Standard Deviation (S.D.) Values[‡]						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
Processes	Mean	S.D.	Mean	S.D.	Mean	S.D	2-1	3-1	3-2
Acquiring information	3.20	.65	3.42	.55	3.50	.35	.22	.30	.08
Decision making	3.70	.27	3.90	.42	3.75	.79	.20	.50	-.15
Communicating instructions and orders	3.45	.27	3.65	.60	3.70	.48	.20	.25	.05
Communicating information	3.40	.38	3.45	.72	3.50	.40	.05	.10	.05
Monitoring	3.25	.25	3.85	.42	3.80	.45	.60	.55	-.05
Column Mean	3.40		.365		3.65		.25	.25	0.00

‡N = 5

from pre- to post-test and from pre-test to training. In terms of differentiation for diagnostic purposes, these data suggest that on the average, all five of these processes are performed a bit better than "somewhat effective" and that there is little basis for distinguishing among them. Whether this is attributable to the small sample, the insensitivity of the measures as used in this effort or other factors cannot be determined from these data. Further implications of these data will be discussed in a subsequent section on measurement.

Overall Performance

The ANOVA for overall performance ratings obtained for each staff element, for the battalion commander and for the collective command group are contained in Appendix E. Exercise effects and overall command staff effects were statistically significant at the $P < .001$ level. When these data were analyzed in terms of simple effects, the only statistically significant differences among exercise sessions were for the personnel, logistics, and fire support functions. As shown in Table 4, all three differences were significant for personnel but only the difference between pre- and post-tests was significant for logistics and fire support. The personnel and logistics outcome should be viewed with caution because the reliability of these numbers is more dubious than for the numbers of the other functions since only the S1/S4 controller provided a rating whereas two separate ratings were obtained and averaged for the other functions. Nonetheless, like the ARTEP

TABLE 4

COMPARISON OF OVERALL PERFORMANCE RATING

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

In general, how effectively were the following activities performed?	Mean and Standard Deviation (S.D.) Values‡						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
	Mean	S.D.	Mean	S.D.	Mean	S.D.	2-1	3-1	3-2
Personnel (S1)	1.20	1.68	2.60	1.49	2.80	1.82	1.40*	1.60*	.20
Logistics (S4)	2.80	1.53	3.40	1.19	3.90	1.11	.60	1.10*	.50
Intelligence (S2)	3.10	.44	4.00	.60	3.90	.59	.90	.80	-.10
Operations (S3)	3.30	.32	3.90	.61	4.10	.81	.60	.80	.20
Fire Support (FSO)	3.00	0.00	3.90	.54	4.30	.46	.90	1.30	.40
Close Air Support (ALO)	3.70	.44	4.30	.31	4.30	.31	.60	.60	0.00
Overall, how effective was the BN CDR?	4.10	.52	4.30	.47	4.50	1.23	.20	.40	.20
Overall, how effective was the BN CMD GP?	3.40	.34	3.90	.49	4.10	.49	.50	.70	.20
Column Mean	3.13		3.79		3.99		.66	.86	.20

‡ N = 5

* Significant at the .05 level or higher.

ratings, the differences in mean numerical values between pre-test and post-test for the six command staff elements individually and collectively, and for the battalion commander reflected improved performance as did the differences between the pre-test and training exercise. Again, a tendency toward asymptote for the change in performance ratings between the training and post-test exercises seems indicated.

Examining means by exercise across staff functions give evidence of differentiation. Scores range from a low of 1.20 to a high of 4.10 in the pre-test session. While the average rating for all but three of the functions is above the "very effective" level for the post-test, there is still a range of 2.80 to 4.50. Again, the personnel and logistics areas were rated relatively lower than the others which either tend to confirm the weakness in performance or the biasing conditions which produced similar results previously.

ARTEP Related Objective Measures

The ANOVA tables for the five staff element/function categories for which objective measures for one or more subtasks were obtained are contained in Appendix F. In terms of training effectiveness as measured by differences among the three exercise sessions, only the exercise effects for the S1/S4 (admin/log) element achieved statistical significance at the $P < .05$ level. Table 5 shows that within this function, only one of the two subtasks produced significant differences. In this case, both the pre-test - post-test difference and the training - post-test difference achieved significance at the $P < .05$ level and both differences were in the direction of improved performance.

TABLE 5

COMPARISON OF OBJECTIVE S1/S4 RATING

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

	Mean and Standard Deviation (S.D.) Values‡						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
Related ARTEP Subtask	Mean	S.D.	Mean	S.D.	Mean	S.D.	2-1	3-1	3-2
3J	3.20	.62	3.40	.75	3.80	.49	.20	.60	.40
9D	1.90	.44	2.40	1.08	3.30	.58	.50	1.4*	.90*
Column Mean	2.55		2.90		3.55		.35	.10*	.65*

‡ N = 5
* Significant at the .05 level or higher.

The degree to which the objectively rated component tasks of the various staff element functions produced differential performance scores is not appropriately addressed for these measures because they were not designed to be either representative or inclusive in number or content of the respective staff element functions. However, for purposes of completeness, the tables of means, S.D.s, and differences for the S2, S3 and FSO elements are included in Appendix G. How they relate to the other ratings of the ARTEP subtasks from which they were derived are discussed below.

REFINEMENT OF PERFORMANCE MEASUREMENT PROCEDURES

The development of valid, reliable and sensitive measurement techniques to determine the proficiency level of battalion command groups was one of the objectives of this effort. As pointed out in the methods section, the measures used can be roughly dichotomized into those that reflect dimensions of performance that have been previously used and/or through concensus within the Army community are generally accepted as being criteria for command group proficiency, e.g., ARTEP subtasks, and into those which are much more speculative in nature. The latter, though having a rationale and ostensibly a more objective dimensionality, are just being explored in regard to their relationship to proficiency. For these more speculative measures the concern is whether and how these dimensions relate to more commonly accepted measures of command group performance and what difficulties there may be in their application and interpretation. Primary attention in this phase was on the more speculative

measures with the former serving as quasi criteria but both being examined in terms of relation to various measures of battlefield outcomes.

In the following paragraphs the interrelations among the various subjective and objective measures of battlefield outcomes are first discussed. Next the relationships of the battlefield outcome measures to both the subjective and experimental objective measures of command group performance are presented. Finally, the relation of the experimental objective measures to the subjectively assessed ARTEP subtasks is discussed.

Battlefield Outcomes

Table 6 shows the intercorrelations among the outcome measures. Five of the correlations are statistically significant and a few others are close to the significance level. The computer generated personnel and equipment losses correlate highly with each other suggesting that the attrition algorithms presume losses on these two dimensions are closely linked. These same two dimensions plus area lost correlate highly and in a negative direction with the factor enemy thrust, which is an estimate of the magnitude of the error in identifying the area where the major penetration will occur. This seems to say that the greater the error in estimating thrust, the smaller may be the losses of friendly personnel, equipment and area. This paradoxical result may not be unreasonable in a covering force operation. In essence, it could mean that sufficient error in locating the enemy thrust will reduce the frequency and intensity of fire exchanges and the resultant losses and relinquishing of area.

TABLE 6
Intercorrelations Matrix of the Relationships Among the Various Battlefield Outcome Measures[a]

	Battlefield Outcomes							
	Subjective					Objective		
	Enemy Thrust (1)	Decisive Engagements (2)	TF Losses (3)	OPFOR Losses (4)	Mission Accomplishment (5)	Area (6)	Personnel (7)	Equipment (8)
(1) Enemy Thrust	1.00	.68	-.30	-.54	.65	-.87	-.94*	-.91*
(2) Decisive Engagements		1.00	.04	-.20	.10	-.89*	-.71	-.78
(3) TF Losses			1.00	.85	.87	-.11	.51	.48
(4) OPFOR Losses				1.00	.92*	.25	.75	.73
(5) Mission Accomplishment					1.00	.25	.76	.70
(6) Area						1.00	.80	.81
(7) Personnel							1.00	.99**
(8) Equipment								1.00

[a]Correlation based on n = 5

*Significant at .05 level, 2 tailed test

**Significant at .01 level, 2 tailed test

The substantial negative correlation between area lost and number of decisive engagements also seems plausible in that more frequent decisive engagements might for the short term reduce the area given up but are not likely to result in better mission accomplishment. The absence of a correlation between number of decisive engagements and mission accomplishment tends to confirm this reasoning.

It is reassuring to note that increases in the rated OPFOR losses correlate with improved missions accomplishment scores. Also, success in attriting the enemy is positively correlated with friendly force losses, a finding which is reasonable and to be expected.

Subjective Ratings and Battlefield Outcome Measures

Because of the experimental nature of the battlefield outcome measures insights regarding their meaning for command group proficiency were sought by correlating these measures with the various ARTEP subtask ratings. The resulting correlation matrix with 376 entries contained 47 correlations statistically significant at $P < .05$. Five of the outcome measures accounted for 39 of these significant correlations with the remaining nine scattered across the other three outcome measures. Since any major import of the battlefield outcome measures in the present context resides in those 39 correlations, the tabled data and discussion are limited to those five outcome measures and the various ARTEP subtasks with which they correlate.

The first column in Table 7 contains the only negative correlations in the Table. For each of those four negative correlations the interpretation would be that the smaller the error in identifying the location

of the enemy thrust, the better the performance on the respective ARTEP subtasks. This seems to make sense given that three of the four ARTEP tasks concern the planning and coordination of fire support and the fourth concerns integrating CSS into the scheme of maneuver. Plausable explanations for the positive correlation of "communicate/coordinate plans and orders" with amount of error in locating the enemy thrust are elusive. In the absence of other information the correlation is as likely to be spurious as it is to be attributable to any of a number of remote explanations.

The relation of enemy losses to the seven ARTEP subtasks shown in the second column of Table 7 all seem reasonable. The better one analyzes the mission, determines critical place, organizes for combat, reinforces terrain, modifies scheme of maneuver, concentrates and shifts combat power, and fixes the systems, the greater the losses he is likely to inflict upon the enemy.

Mission accomplishment is the outcome measure having the greatest number of significantly related ARTEP subtasks. The three such subtasks relating to fire support planning again confirm the importance of this area. The fact that six subtasks concerned with preparing and organizing the battlefield are also highly related to mission accomplishment is not surprising. Similarly for the execution portion of the ARTEP, disseminating critical combat information and intelligence along with modifying scheme of maneuver, concentrating/shifting combat power and integrating CSS into scheme of maneuver were highly related to mission accomplishment as might be expected.

TABLE 7

Statistically Significant[a] Correlations with ARTEP Rating for the Five Battlefield Outcome Measures Having the Greatest Number of Significant Correlations

Subjective Outcome						Objective Outcome			
Enemy Thrust		Enemy Losses		Mission Accomplishment		Friendly Personnel Losses		Friendly Equipment Losses	
		1A	.88	1J	.87	1C	.85	1C	.85
1J	-.91	3A	.94	1K	.86	1J	.88	1J	.81
1K	-.85	3C	.94	1L	.87	1L	.88	1L	.81
1L	-.91	3H	.83	3A	.90	3A	.91	3A	.90
3G	.90	6A	.93	3B	.80	3C	.91	3C	.90
9D	-.85	8C	.93	3C	.90	5D	.81	9B	.81
		9B	.90	3G	.90	9D	.86	9D	.80
				3H	.90				
				3I	.80				
				5D	.93				
				6A	.97*				
				8C	.97*				
				9D	.92				

[a]All entries are significant at $P < .05$ level

*Significant at $P < .01$ level

Six of the seven ARTEP subtasks correlating significantly with computer generated friendly personnel losses also correlate significantly with computer generated friendly equipment losses. This is not surprising given the previously mentioned high correlation between personnel and equipment losses. However, the explanation of why better performance on those ARTEP subtasks were concomitants of greater personnel and equipment losses is still difficult unless, as proffered earlier, perhaps in a covering force mission the price typically paid for greater enemy attrition is increased friendly attrition.

Obviously the battlefield outcome measures may account for substantial variance in the performance of several other ARTEP subtasks which would not have achieved statistical significance with the present sample size. Correlations on the order of .50 to .70 between outcome measures and ARTEP subtask ratings would probably not achieve statistical significance with a sample size of less than 10. None the less, the data thus far are indicative of some underlying relationships which need to be further delineated in subsequent efforts and which suggest a need for further exploration of the relative importance or impact of the various subtasks overall performance. There is little reason to believe the various subtasks are equally crucial within any given mission. This notion was grossly examined with battlefield outcomes as the criteria by deriving three summary type ARTEP ratings and correlating them with the various outcome measures. These summary ratings were comprised by averaging those subtask ratings categorized under Tasks 1 through 4 for an overall planning phase score and those under Tasks 5 through 12 for an overall execution

phase score. The planning and execution scores were again averaged to get a total ARTEP score.

Implicit in such combining is that each subtask is of roughly the same importance, hence the unit weighting. Not surprisingly, the only correlations achieving statistical significance, as seen in Table 8, were between mission accomplishment and both the planning and total ARTEP ratings and even here only about 65% of the variance is accounted for. Harking back to the data relating the individual subtasks to the outcome measures, it is apparent that the summary data are reflecting primarily the influence of the 13 subtasks having a very high correlation with mission accomplishment. The relation of losses to the summary ARTEP ratings is negligible for the objective measures and though substantially higher numerically for the subjective estimates of loss parameters is still short of statistical significance. Thus it would seem that initial indications argue for differential weighting of the subtasks in any summary score.

Another indicator of overall command group performance was obtained with the organizational processes measure. Each separate process rating was included in this analysis as well as the average rating across all five processes. Referring again to Table 8, there was a consistent and highly significant series of relationships between the organization process ratings and the subjective assessment of task force losses, OPFOR losses and mission accomplishment. The positive correlations

indicate that the higher the rating on the various processes, the higher the losses suffered by the opposing forces, the better the rating on mission accomplishment, and (perhaps as a result of the underlying relationship between OPFOR losses and task force losses) the higher the task force losses. Acquiring information seems to be about the only process dimension which did not have a high positive relation to mission accomplishment and OPFOR losses. Whether this is a function of inability to adequately observe and rate those activities, a bonafide lack of correspondence, or a spurious result attributable to the sample size is not known. Again, as previously noted for the ARTEP tasks, the objective outcomes did not correlate significantly or in a logically consistent manner.

The correlations between battlefield outcomes and coordinating and special staff elements, the battalion commander and the command group as a whole are also shown in Table 8. Of the five significant correlations, two were for the S2 element - a positive correlation with number of decisive engagements and a negative correlation with area lost. Given the earlier mentioned high negative relationship between number of decisive engagements and area lost, this dual relationship is not surprising. It does not, however, make it any easier to understand how, in a covering force operation, the greater the number of decisive engagements, the better the rated performance of the S2 element. On the other hand, the high relationship of the close air support element rating to number of decisive

TABLE 8
Correlations Between Ratings of Command Group Performance and Battlefield Outcomes[a]

Ratings of Command Group Performance	Battlefield Outcomes: Subjective					Battlefield Outcomes: Objective		
	Enemy Thrust	Decisive Engagement	TF Losses	OPFOR Losses	Mission Accomplishment	Area	Personnel	Equipment
ARTEP Related								
Total	-.20	.43	.67	.75	.79*	-.18	.30	.22
Plan	-.28	.42	.69	.72	.83*	-.15	.33	.24
Execution	-.13	.42	.62	.75	.73	-.20	.20	.19
Organizational Processes								
Total	-.26	.26	.95**	.82*	.89*	-.21	.41	.35
Acquiring Information	.69	.35	.79*	.21	.47	-.72	-.32	-.27
Communicating Information	-.50	.04	.87**	.95**	.97**	.10	.65	.59
Decision Making	-.24	.13	.98***	.89*	.87*	-.16	-.47	.43
Communication Instructions	-.25	.44	.75	.71	.84*	-.21	.31	.22
Monitoring	-.12	.37	.91**	.81*	.83*	-.31	.30	.25

[a]Based on N = 5

*Significant at .05 level, 1 tailed test
**Significant at .01 level, 1 tailed test
***Significant at .001 level, 1 tailed test

TABLE 8 (Continued)
Correlations Between Ratings of Command Group Performance and Battlefield Outcomes[a]

Ratings of Command Group Performance	Battlefield Outcomes: Subjective					Battlefield Outcomes: Objective		
	Enemy Thrust	Decisive Engagement	TF Losses	OPFOR Losses	Mission Accomplishment	Area	Personnel	Equipment
Overall Performance								
Personnel (S1)	.19	-.20	.57	.31	.13	-.24	.09	.17
Logistics (S4)	.65	.40	.26	-.22	-.23	-.74	-.53	-.49
Intelligence (S2)	.52	.89*	.21	-.20	.01	-.84*	-.59	-.66
Operations (S3)	.08	.72	.63	.38	.58	-.56	-.07	-.17
Fire Support (FS)	.16	.51	-.51	-.61	-.32	-.21	-.47	-.55
Close Air Support (CAS)	.46	.88*	-.25	-.29	-.15	-.58	-.60	-.69
Bn Cdr	-.67	.00	.76	.72	.93**	.21	.66	.58
Cmd Group	.00	.61	.75	.48	.67	-.50	.05	-.04

[a]Based on N = 5

*Significant at .05 level, 1 tailed test
**Significant at .01 level, 1 tailed test
***Significant at .001 level, 1 tailed test

engagements seems to make more sense, at least if viewed as a function of increased opportunity for effective performance. The final significant correlation is that between rated overall performance of the battalion commander and mission accomplishment. While this is a desired and reassuring outcome, this is not surprising given that the battalion commander is normally held responsible for the degree to which the assigned mission is accomplished.

Experimental Measures

The experimental objective measures of command group performance including the four categorizations of communications frequency were correlated with battlefield outcome indices which themselves are experimental in nature. The results are shown in Table 9. Trends are difficult to perceive in these data except in regard to level of control and information provided to company commander variables. Significant and near significant correlations between these variables and enemy thrust location and personnel and equipment loss suggest the following picture. The higher (more centralized) the level of control, the greater the error in locating the enemy thrust with a consequent temporary reduction in loss of personnel and equipment for reasons discussed earlier. That reduction is concommitant with increasing amounts of information provided to the company by the battalion (perhaps as an attempt to compensate for perceived deficiencies in the performance of the company commander),

TABLE 9

Correlations Between Experimental Measures of Command Group Performance and Battlefield Outcomes[a]

Experimental Measures of Command Group Performance	Battlefield Outcomes: Subjective: Enemy Thrust	Decisive Engagement	TF Losses	OPFOR Losses	Mission Accomplishment	Objective: Area	Personnel	Equipment
Level of Control	.87	.60	-.60	-.59	-.73	-.62	-.88*	-.86
Engagement Range	-.27	-.73	.36	.37	.16	.39	.49	.59
BP from Battle	.38	.50	.70	.56	.41	-.63	-.10	-.11
BP from SP	-.35	-.02	-.41	-.46	-.11	.29	.01	-.06
Among BPs	.48	-.12	-.25	-.62	-.66	-.26	-.47	-.39
Clear Viewing	-.48	-.84	.23	.18	.13	.56	.56	.64
No of BPs	-.16	.15	-.63	-.35	-.20	.25	.11	-.18
No of SPs	-.19	.46	.14	-.34	.02	-.47	-.35	-.40
Info provided from Co Cdr	.70	.14	-.51	-.37	-.68	-.31	-.58	-.50
Info requested by Co Cdr	-.05	-.64	.19	.28	.03	.27	.31	-.42
Info provided to Co Cdr	.84	.67	-.67	-.73	-.76	-.63	-.93*	-.93*
Info Requested from Co Cdr	-.55	-.49	-.33	.21	.11	.75	.49	.50

[a]Based on N = 5

*Significant at .05 level, 2 tailed test

thus that information variable has a fairly high, though non-significant correlation with thrust location plus significantly high negative correlations with personnel and equipment loss.

Further insights regarding the experimental measures were sought through correlation with the subjective ratings of performance on the 47 ARTEP subtasks. Fifty-eight of these correlations achieved statistical significance. Forty-four correlations involved the same six experimental measures. Only these 44 will be presented here to facilitate understanding (Table 11).

For all eight significant level of control negative correlations, the implication would seem to be that less centralized control results in better performance. Five of the six significant negative correlations for "battalion to company information" communication involve ARTEP subtasks which were also significant for level of control. This can be interpreted to mean that less communication of information from battalion to company is associated with better performance, at least on those ARTEP subtasks where more autonomy is vested at lower levels. These subtasks concern priority of fires and fire support coordination, organizing for combat and reinforcing the terrain, disseminating critical combat information and intelligence, and integrating combat support services into the maneuver scheme.

All of the significant correlations between ARTEP subtasks and the "average distance between battle positions" measure were negative. This is an indication that at least for a covering force mission of the type,

in the location, with the force structure, etc., as played and evaluated in this effort, better performance on certain ARTEP subtasks is associated with smaller average distances between battle positions. Such a relationship seems quite rational when one considers that all but one of the ARTEP subtasks involved relate to the execution tasks of seeing the battlefield, control and coordination of combat operations, concentrating/shifting combat power, securing and protecting the task force, and the special action of reacting appropriately to enemy jamming.

One other experimental measure, "company to battalion information communication" produced all negative correlations with ARTEP subtasks. All but one of these related to planning activitites. Three of the seven concern identification and gathering critical combat information and intelligence, and one to developing a communication plan. Why less communication of information up to battalion should be associated with better performance on those ARTEP subtasks is hard to fathom unless one assumes that the ratio of "noise" to "signal" increases with the amount of information communication from company to battalion. Though seven out of eight correlations of "company to battalion requests" with ARTEP subtasks were also negative, none of these subtasks were the same as those significantly related to the "company to battalion information communication" measures. In fact, most of the ARTEP subtasks significantly related to this variable concern fire support functions which seems to indicate that the less the company has to request information, the better these functions are performed. Further evidence of what has been previously discussed in

TABLE 10

Statistically Significant[a] Correlations With ARTEP Ratings for the Six Experimental and Communications Measures Having the Greatest Number of Correlations

Levels of Control		Average Distance Between Battle Positions		Number of Battle Positions		Company to Battalion Requests		Company to Battalion Information		Battalion to Company Information	
1J	-.90	3H	-.87	1B	.90	1H	-.99*	1B	-.86	1J	-.83
1K	-.80	5A	-.96*	2A	.90	1J	-.87	1I	-.81	1L	-.83
1L	-.90	6A	-.81	2D	.99*	1K	-.87	2A	-.86	3C	-.91
3A	-.80	6B	-.93	3J	-.92	1L	-.87	2B	-.93	3H	-.91
3C	-.80	8A	-.93	3K	-.92	3I	-.88	3E	-.81	5D	-.89
3I	-.96*	8C	-.81	9A	-.92	5D	-.85	3F	-.85	9D	-.88
5D	-.91	8D	-.96			7B	.88	7C	-.89		
9D	-.92	10F	-.93			9D	-.87				
		12A	-.85								

[a]All entries are significant at $P < .05$ level

*Significant at $P < .01$ level

regard to dissemination of critical combat information and intelligence is reflected in the negative correlation of performance on that subtask with frequency of company requests for information from battalion, i.e., better performance on that subtask is associated with less frequent queries of the battalion by the companies.

The final experimental measure for which significant correlations were tabled was number of battle positions. Three of these correlations are positive and three are negative. The three positive ones relate to identification and dissemination of critical combat information and intelligence, not an unreasonable outcome if your communications are adequate. The negative correlations are also reasonable in that they concern providing supplies and arming, fueling and maintaining the equipment. The greater the number of battle positions, the more difficult such tasks might be.

CAMMS AS A TRAINING RESEARCH VEHICLE

There are a number of observations, impressions and uncertainties generated from the conduct of this effort. Most result from the actual process of planning and running the training exercises including discussions with cognizant players and controllers. Hard data of a form amenable to statistical analysis are rarely available to support these findings although some derive from inadequacies identified as part of data analysis. Most of the intrinsic value of these findings stems from the perceptions of the skilled CAMMS team and their intensive five-week exposure to and interaction with these exercises and the playing units.

For purposes of exposition, these findings are roughly grouped into system factors and application factors. As a general prelude, it should be stated that pervasive of both sets of factors is a well founded concern with the degree to which performance changes over time as assessed in CAMMS are a function of learning how to better perform as a command group as opposed to learning how to play CAMMS to get an improved score. This ambiguity could not be avoided within the constraints of the present effort nor would time and resources for TEA 78 permit a design from which these effects could be partially teased out. Essentially, the major need is for a yardstick or assessment tool external to CAMMS. It is intended that some preliminary data bearing on this question will be obtained if arrangements can be completed to have some of the units who play CAMMS, also play CATTS where any special skills unique to the CAMMS vehicle as opposed to content will be discounted.

Even with such additional data, the validity of the simulation and the measures of performance therein will require further confirmation. While considerable weapons, tactics and doctrinal experience, expertise and measurement sophistication have gone into developing CAMMS, a really sound assessment of the validity of CAMMS will be possible only after projects currently under development, e.g., Multiple Integrated Lasser Evaluation System and the National Training Center are completed, thus producing a highly realistic "live" battlefield from which definitive measures of command group and troop performance can be obtained.

System Factors

Certain characteristics are requisite of a good training simulation. These include creation of a realistic environment within which events unfold and actions transpire, reasonable representation of all functions and tasks which are deemed integral and important to the skills being trained, provisions to insure the performance of these tasks is precipitated, a means for credible assessment of the quality of performance and providing feedback regarding strengths and weaknesses of that performance, a capability to replicate on essential elements for equitable comparative assessments while maintaining sufficient flexibility to provide challenge and opportunity to make and correct mistakes. A training system possessing these characteristics has all the ingredients for supporting training effectiveness research. Obviously, these characteristics are not absolutes but other things being equal, the greater the success in these characteristics, the better the potential for effective training.

Looking at CAMMS from this perspective, there are several observations which can be made. The most general, yet perhaps the most important of which, is that CAMMS is remarkably well along on most of these dimensions given its stage of development. Other more specific observations include:

1. There is little basis for faulting realism. Though unquestionably greater fidelity could be achieved, for the intended uses of CAMMS there is no evidence of dissatisfaction on this dimension. In fact, CAMMS was judged

superior to a CPX in a recent survey (Kaplan and Barber - in-press). On what dimensions and in what increments greater fidelity in a battle simulation would beget better learning can only be conjectured at the present time.

2. To the extent that the command group ARTEP is currently the guiding light for this sort of training, it may be desirable to include more extensive admin/log play. The relatively short duration of the execution phases of the respective exercises does not afford much opportunity for play and evaluation of the gamut of these activities. Furture modification of existing or generation of new scenarios should provide explicit attention to insuring that sufficient opportunity for play of all the staff element functions is provided. At the same time, consideration should be given to whether or not the ARTEP is sufficiently exhaustive. It is suspected that command group performance may be somehow more than the sum of the performance on the ARTEP tasks and subtasks.

3. A programmed or scripted set of probes exceeding substantially in number those developed for this effort will be necessary if behaviors of interest not normally forthcoming or not observably explicit in the play of CAMMS are to be elicited in some systematic fashion. This is particularly relevant for the planning phase where specific probes and/or situations will need to be developed to elicit the planning sequences so that they may be observed by TOC observers and controllers. At the present time, most of the ratings derive from examining and analyzing the battalion OPORD rather than direct observations of the actual planning steps leading to the order.

4. Standards for the ARTEP subtasks are very generally worded and thus can apply to almost any command group situation. This generality leaves much room for interpretation by the rater and consequently can result in wide differences in ratings accorded the same group by different observers. Scoring or feedback based on scoring from such divergent judgments is of questionable meaning and is therefore, less credible. Some elaboration of the standards for specific CAMMS training/evaluation exercises could help. The same may be said of the personnel and equipment loss data calculated by the computer. The current summary output must be re-analyzed to get the appropriate information for training feedback. The re-analysis of the output to produce both friendly and enemy personnel/equipment losses interferes with the time needed by the S1/S4 controller to perform his controller functions. Resupply is usually done for the friendly forces but not the enemy forces because the time to enter the resupplied items into the computer would force the exercise out of real time. In addition, the summary output makes no provisions to account for resupply in figuring the loss status of personnel/equipment. Some provision should be made either to increase the number of controller personnel to enable a timely re-analysis of the summary data or to devise a software package to analyze the summary data into a form that can be used for training feedback and to account for resupply.

5. Standardized elements for reliability of repeated administrations is an elusive target if you wish at the same time to allow for player innovation and challenging controller reactions, and to avoid a rote

learning syndrome. For exportable training purposes as well as for training research/evaluation purposes where there must be dependence on ad hoc controllers for many of the positions, a programmed text and accompanying "time into exercise" reference manual could provide additional assurances of consistency in use.

Application Factors

It is no less true with training systems than with weapons or other complex battlefield systems, implementation by and for people create opportunities for divergent procedures of use. Observations falling under the applications rubric in the current context are focused on those aspects of system use which either the trainer or trainee can capitalize upon, compensate for or at least be aware of in terms of possible impact on objectives.

It is often difficult in a home station environment to have available on a continuous basis for at least four days all principal members of a battalion command group. Leave, emergencies and other priority demands take their toll. While a surrogate in an individual position usually is not all that debilitating, it can impact on the overall performance of the command group and their learning rate. One the other hand, it can be argued that such turbulence is typical and therefore training and evaluation might be more realistic if this is allowed to occur. Subsequent analyses of the present data are planned in an effort to get a partial handle on the broader question of the effects of command group turbulence on performance insofar as it appeared as a variable across

participating battalions. Hence, the concern is with length of tours with a unit etc., rather than presence or absence for a training exercise.

The concern with player substitution is paralleled by a concern by controller/evaluator substitutions occasionally within but more frequently between battalions making comparability tenuous because controller play cannot be totally proceduralized nor evaluation sufficiently objectified to insure that different controllers or evaluators reacting to the same events will behave the same. Consistency is largely dependent on having the same people from exercise to exercise within a battalion and from battalion to battalion across player units. While failure to do so may not jeopardize the training value obtained, it can jeopardize the training research benefits.

Providing the opportunity and data to support feedback to the playing unit is at least half the battle toward effective use. The remaining hurdle is the "how" or format for delivering that feedback. While only one feedback format was utilized, it appears that the technique was much more acceptable than some previously used. The command groups seemed receptive to the feedback and found it informative. The one-on-one feedback session appears to be in a format that is more comfortable than group feedback sessions for both the controller and the player within the command group. The controllers indicated that they felt much more comfortable and were much more willing to present negative feedback to the participants in the one-on-one session than in group settings.

One other pertinent aspect of application concerns the learning curve an the appropriate duration of CAMMS play to maximize performance

improvement as a function of time. While there are many questions in this domain, the only evidence generated in the present study suggests that performance has essentially asymptoted by the third exercise session (post-test). If that leveling off is attributable to a learning curve function, then more than two consecutive days play (at least of the same type mission) is not efficient. The prognosis might still be the same even if the result in attributable to an adaptation process where interest and motivation have decreased and standards have relaxed. Remedies for the latter condition might more easily be found. Actually the duration of a CAMMS exercise or successive exercises, the amount of time intervening between exercises, how these should be interspersed with use of other kinds of individual and collective training systems and exercises and many related questions are part of the overall training strategy the formulation of which will be dependent on achievement of various milestones in TEA 85.

CONCLUSIONS

The following conclusions are tempered to reflect the uncertainties resulting from constraints in the conduct of this effort, most notably, the small sample, and the potential confounding of measures of learning CAMMS with learning that which is trained by CAMMS:

- CAMMS shows evidence of being an effective training vehicle for improving battalion command group proficiency as subjectively judged in terms of differential performance on ARTEP Tasks and Subtasks and an overall assessment of the total command group and each of the major staff elements. The generally consistent and positive changes in performance across exercise sessions and differentiation among subtasks and elements within session attest to it utility.

- Development of a greater number of objective measures of command group performance in CAMMS is feasible to both supplement and ultimately supplant some of the existing subjective ratings. It is a difficult and slow process and should not be expected to obviate the need for some subjective ratings.

- The relationship of command group performance to battlefield outcomes is complex. The quality of performance on no single measure yet identified can be adequately interpreted in isolation of other measures, or the condition of performance.

- Performance on some ARTEP subtasks appears to influence battlefield outcomes. Additional effort will be required to obtain reliable estimates

of the degree to which performance on other ARTEP subtasks may also relate to outcome measures and what additional meaningful measures might be identified to more fully reflect the total dimensions of battlefield performance.

- Organizational process measures as used in this effort do not discriminate performance differences among the various measures themselves or change in performance as a function of the training exercise. However, their high relation to mission accomplishement and other outcome measures warrants further investigation.

- CAMMS has the potential for fulfilling the requirements of a training and training research vehicle envisaged for pursuit of TEA 85 objectives. While some modifications are indicated, these are relatively modest in nature and several concern improvements which would be made in the normal evolution of CAMMS as resources permitted. The intrinsic worth and flexibility of CAMMS together with the data obtained and learning experienced on the part of the CAMMS team make it a leading contender for this role. For the near term, CAMMS may be the only reasonable vehicle for examining the integration of troops on the ground with the play of a battalion level command group simulation in anticipation of National Training Center requirements determinations.

REFERENCES

1. Barber, H. F. and Kaplan, I. T. Battalion Command Group Performance in Simulated Combat. ARI Technical Paper, in press.

2. Kaplan, I. T. and Barber, H. F. Evaluation of a Computer-Assisted Battle Simulation: CAMMS Versus a CPX. ARI Technical Paper, in press.

3. Olmstead, J. A., Christensen, H. E. and Lackey, L. L. Human Resources Organization Technical Report 73-19, August 1973.

4. Schein, E. H. Organizational Psychology (2nd Ed.), Prentice-Hall, Inc. Englewood Cliffs, New Jersy, 1972.

APPENDIX A

General Situation, Mission Assigned, and Assets Available to Participating Battalions

GENERAL SITUATION

Hostilities had broken out along the eastern German border approximately twenty-four hours before. The Park Land Forces had crossed the border and moved through the Fulda Gap area. Their movement had been progressively southwestward, with the intended objective conjectured to be Frankfurt. Since the enemy crossed the national border, their opposition had been a corps covering force.

The XX Armored Division had been ordered to establish a covering force forward of the FEBA and defend in sector in the main battle area. In turn, the division had given parallel missions to all three of its brigades. The brigade's specific mission was to establish a covering force along line Gold and delay in sector forward of the FEBA, defend in zone from the FEBA to the brigade rear boundary and retain city X. and be prepared to assist in the passage of lines of the corps covering force at line Delta.*

MISSION ASSIGNED AND ASSETS AVAILABLE

Each of the three brigade missions constituted the basis for establishing the mission for the pre- and post-test and training exercises.

*Note that line Gold, Delta, and the city to be retained were changed for the pre- and post-test and training exercises of the participating battalions.

Regardless of the specific brigade mission, the general mission given to the participating battalions was the same. The only difference was the terrain on which the operation was conducted. A description of the general mission of the battalion is the following: establish a covering force forward of the brigade main battle area, occupy and prepare various battle positions and battle areas, be prepared to delay from the various battle areas and battle positions, prepare bridges in sector for destruction, occupy given battle positions and areas in MBA upon completion of the covering force mission, and prepare to reinforce battle areas in MBA on order. To carry out this mission, each mechanized infantry battalion received an armor company in exchange for one of its companies and, similarly, armor battalions received a mechanized infantry company in exchange for one of their companies. Thus, the extent of task organization was controlled. In support of each battalion, regardless of type, was a platoon of combat engineers. Brigade assets accessible to the battalions included one battalion of 155mm SP howitzers, close air support, and attack and recon helicopters whose use was under the control of the brigade S3. Divisional GS artillery was also available through the brigade.

As pointed out above, the general mission of the participating battalions for all exercises was the same; only the terrain on which the mission was executed varied. However, the three battle areas or sectors were all in the Friedberg-Frankfurt general area and within 10 to 25 kilometers of one another. Within each area there were at least

two enemy avenues of approach, and fordable and non-fordable rivers to contend with. The terrain, in general, for all exercises was hilly woodland with flatter farmland interspersed throughout. For the training exercise, the terrain was less wooded and hilly and contained more farmland. There was also a greater number of avenues of approach available to the enemy.

BATTALION COMMAND GROUP ARTEP

1. Develop plan based on mission.
   - 1A. Analyze mission
   - 1B. Identify critical combat information and intelligence
   - 1C. Identify critical friendly information
   - 1D. Analyze friendly capabilities
   - 1E. Select/control key terrain
   - *1F. Select routes/zones to objective
   - *1G. Select battle positions
   - 1H. Select delay and covering force positions
   - 1I. Plan use of organic/attached and non-organic fires
   - 1J. Determine priority of fires
   - 1K. Determine fire support required
   - 1L. Conduct initial fire support coordination
2. Initiate intelligence preparation of the battlefield
   - 2A. Identify critical combat information and intelligence
   - 2B. Gather critical combat information and intelligence
   - 2C. Analyze opposing force
   - 2D. Disseminate critical combat information and intelligence
3. Prepare and organize the battlefield
   - 3A. Determine critical place
   - 3B. Select a course of action
   - 3C. Organize for combat
   - 3D. Select control measures
   - 3E. Plan organic, attached, and non-organic supporting fires and determine priority
   - 3F. Develop a communication plan
   - 3G. Communicate/coordinate plans and orders
   - 3H. Reinforce terrain
   - 3I. Plan/employ active/passive security
   - 3J. Provide supplies
   - 3K. Maintain equipment
4. Troop lead
   - *4A. Supervise preparations
   - 4B. Supervise compliance with TF order
   - *4C. Conduct rehearsals
5. See the battlefield during the battle
   - 5A. Identify critical combat information and intelligence
   - 5B. Gather critical combat information and intelligence
   - 5C. Analyze opposing force
   - 5D. Disseminate critical combat information and intelligence
6. Control and coordinate combat operations.
   - 6A. Modify scheme of maneuver
   - 6B. Coordinate/communicate changes
   - *6C. Supervise execution
   - *6D. Maintain the battlefield
7. Employ fires and other combat support assets
   - 7A. Modify fire support plan
   - 7B. Employ fires
   - 7C. Employ other combat support assets
8. Concentrate/shift combat power
   - 8A. Determine critical place and time
   - *8B. Concentrate/shift combat power in the attack
   - 8C. Concentrate/shift combat power in the defense or retrograde
   - 8D. Protect thinly held areas
9. Manage combat service support assets
   - 9A. Arm and fuel the systems
   - 9B. Fix the systems
   - 9C. Support the troops
   - 9D. Integrate CSS into scheme of maneuver
10. Secure and protect the TF
   - 10A. Defeat or suppress opposing force's electromagnetic intelligence effort
   - *10B. Defeat or suppress opposing force's imagery intelligence effort
   - *10C. Defeat or suppress opposing force's human intelligence effort
   - *10D. Deceive the opposing force
   - *10E. Reduce vulnerability to opposing force mass destruction weapons systems
   - 10F. Detect/impede threats to TF security
   - 10G. Detect/defeat opposing force air assets
11. Troop lead during battle
   - 11A. Supervise compliance with TF order
12. React to situations requiring special actions
   - 12A. React to opposing force electronic warfare
   - *12B. React to chemical or biological attack
   - *12C. React to nuclear attack
   - *12D. React to loss of key member of command group

*Not evaluated in CAMMS

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

ARTEP TASKS

Source	df	Mean Square	F
Exercise	2	6.17	20.20**
Error	8	.31	
ARTEP Tasks	11	1.97	6.83**
Error	44	.29	
E x ARTEP Tasks	22	.80	3.77**
Error	88	.21	

**Significant at the .001 level

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

ARTEP SUBTASK

Source	df	Mean Square	F
Exercise	2	24.00	32.56**
Error	8	.74	
Subtask	46	2.67	4.99*
Error	184	.54	
E x S	92	.69	1.93**
Error	368	.36	

* Significant at the .05 Level
** Significant at the .001 Level

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

ORGANIZATIONAL PROCESSES

Source	df	Mean Square	F
Exercise	2	.53	1.49
Error	8	.36	
Org Processes	4	.39	1.86
Error	16	.21	
E x OP	8	.07	.83
Error	32	.09	

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

OVERALL PERFORMANCE

Source	df	Mean Square	F
Exercise	2	7.91	8.87**
Error	8	.89	
Overall	7	6.08	4.53**
Error	28	1.34	
E x O	14	.22	.43
Error	56	.52	

**Significant at the .001 level

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

OBJECTIVE S1/S4 RATING

Source	df	Mean Square	F
Exercise	2	2.57	8.70**
Error	8	.29	
S1/S4	1	6.91	67.22**
Error	4	.10	
E x S1/S4	2	.41	1.40
Error	8	.29	

**Significant at the .001 level

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

S2 SCORES

Source	df	Mean Square	F
Exercise	2	.09	.16
Error	8	.58	
S2	5	.68	1.30
Error	20	.52	
E x S2	10	.40	1.08
Error	40	.37	

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

S3 SCORES

Source	df	Mean Square	F
Exercise	2	7.01	.40
Error	8	17.73	
S3	8	67.24	1.85
Error	32	36.25	
E x S3	16	2.66	.30
Error	64	8.81	

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

OBJECTIVE FSO SCORE (1La, 1Lb, 1Lc)

Source	df	Mean Square	F
Exercise	2	.14	.02
Error	8	5.78	
FSO	3	.50	.35
Error	12	1.42	
E x F	6	1.87	1.38
Error	24	1.36	

REPEATED MEASURES ANALYSIS OF VARIANCE FOR

OBJECTIVE FSO SCORE 7B

Source	df	Mean Square	F
7B Use of fires	7	13510.33	1.72
Error	6	7834.66	

COMPARISON OF THE OBJECTIVE S2 SCORES

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

Measurements	Mean and Standard Deviation (S.D.) Values*						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
	Mean	S.D.	Mean	S.D.	Mean	S.D.	2-1	3-1	3-2
1B	3.33	.38	2.74	.41	3.12	.28	-.59	-.21	.38
2B	3.11	.72	2.82	.92	2.90	.24	-.29	-.21	.12
2D	3.45	.32	3.48	.24	3.32	.20	.03	-.13	-.16
3F	2.85	.85	3.25	.82	2.62	.91	.40	-.23	-.63
5A	3.12	.55	3.46	.64	3.50	.39	.34	.38	.04
5D	3.22	.54	2.66	.53	3.42	.81	-.56	.20	.76
Column Mean	3.18		3.07		3.15		-.11	-.03	.08

* N = 5

COMPARISON OF S3 SCORES

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

Measurements	Mean and Standard Deviation (S.D.) Values*						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
	Mean	S.D.	Mean	S.D.	Mean	S.D.	2-1	3-1	3-2
1A	3.4	.89	3.0	1.73	3.0	1.79	-.4	-.4	0
1C	4.0	0	3.2	1.79	3.2	1.79	-.8	-.8	0
1D	3.7	.30	2.86	1.66	2.96	1.68	-.84	-.74	.1
1E	7.7	4.27	10.16	18.67	6.46	9.72	2.46	-1.24	-3.7
3D	2.06	1.13	2.36	1.97	2.3	1.79	.3	.24	-.06
6A, 8C	3.0	1.70	3.94	.40	1.68	2.12	.94	-1.32	-2.26
6B	1.88	1.99	2.10	1.64	1.84	1.82	.22	-.04	-.26
6B, 8C	.88	1.07	1.76	1.71	.88	1.97	.88	0	-.88
8D	1.14	2.28	.72	.96	.80	1.79	-.42	-.34	.08
Column Mean	3.08		3.34		2.57		.26	-.51	-.77

*N = 5

COMPARISON OF OBJECTIVE FSO SCORES

FOR THE PRE, TRAIN AND POST TESTS EXERCISES

Measurements	Mean and Standard Deviation (S.D.) Values‡						Difference Between Exercises		
	Pre (1)		Train (2)		Post (3)				
	Mean	S.D.	Mean	S.D.	Mean	S.D.	2-1	3-1	3-2
1La Coordination with FO	2.90	1.45	2.40	1.91	3.20	1.79	-.50	.30	.80
1Lb Inform C.Co of fire plan	3.3	1.61	2.80	1.79	3.20	1.79	-.50	-.10	.40
1Lc Inform Arty of fire plan	3.2	1.59	3.00	1.73	3.00	1.73	-.20	-.20	0.00
7A Modify fire support plan	1.90	1.34	3.80	.43	2.50	1.66	1.90	.60	-1.30
7B Use of indirect fires#	58.5	18.1	153.5	137.13	164.0	74.79	95.0	105.5	10.5

‡N = 5
#N = 4

D-82,800-AG-Ft Belvoir

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